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(54) MULTI-LEVEL CONTROLLER SYSTEM

(76) Inventors: **Harvey Kasdan**, Sherman Oaks, CA (US); **Kenneth S. Gold**, Bell Canyon, CA (US); **Jon Frank**

Tindel, Valencia, CA (US); Ken A. Atterholt, Thousand Oaks, CA (US); David Alan Fridge, Pasadena, CA (US)

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Related U.S. Application Data

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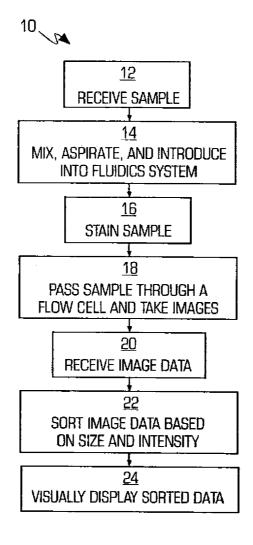
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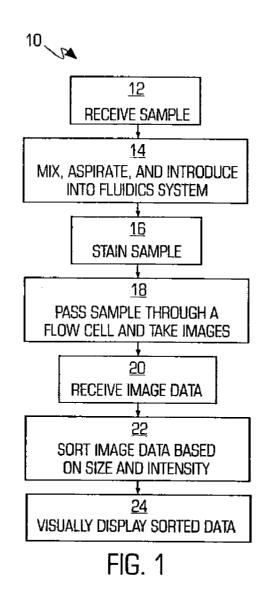
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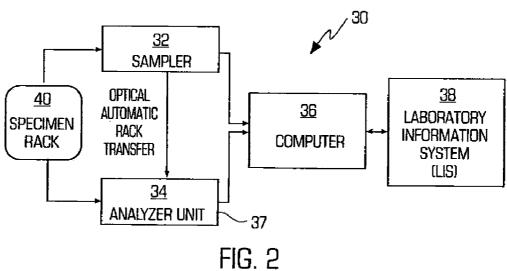
(52) **U.S. Cl.** 700/83; 700/86

(57) ABSTRACT

The invention is a state machine having a host controller that controls a level-1 controller, wherein the level-1 controller controls the level-2 controller. The level-2 controller controls system component controllers, which in turn control system components to execute a process segment. For example, the machine includes a host controller that selects a set of states to be executed, a level-1 controller that activates the set of states in a predetermined order, wherein each state includes commands, and a level-2 controller that controls system components according to the commands. A method of executing a process includes identifying a set of states to be executed, issuing state commands that need to be issued to execute the current state in the set of states, and activating a next state only after all expected status reports have been received for the current state.







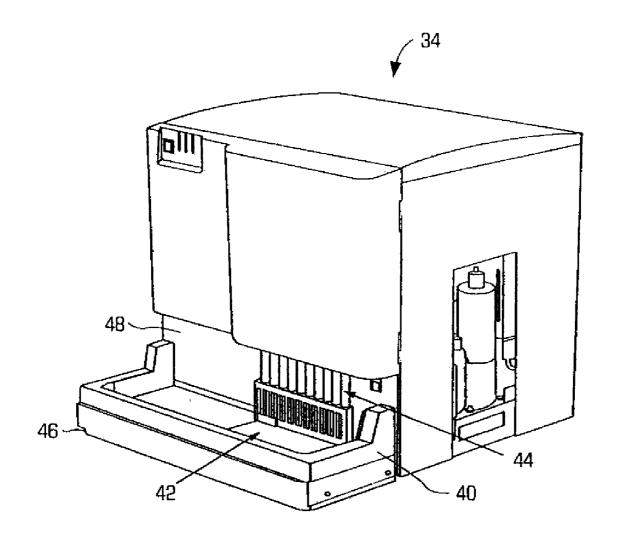
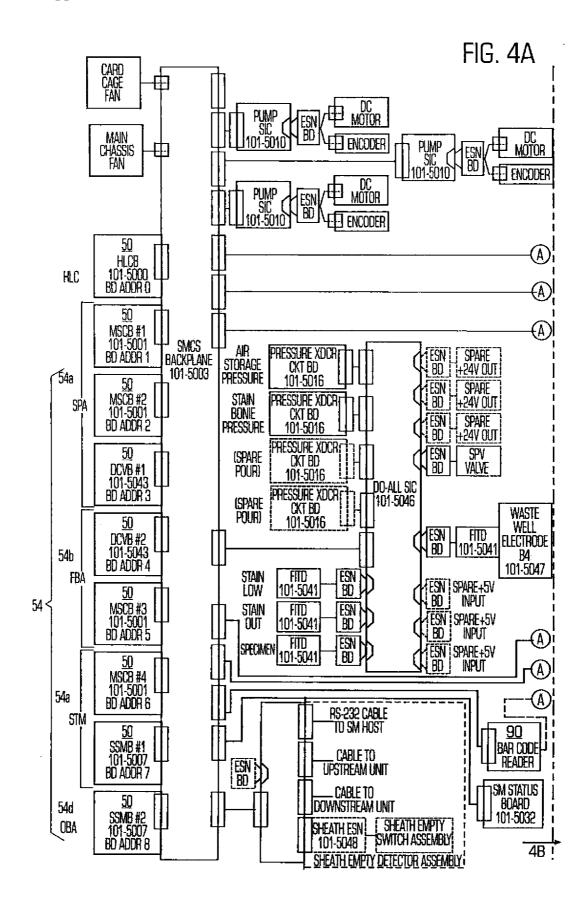
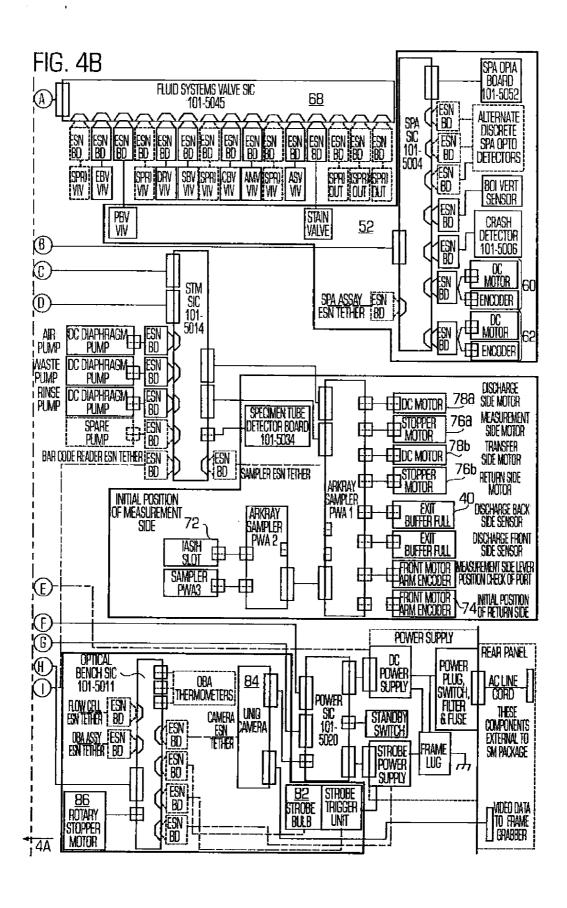
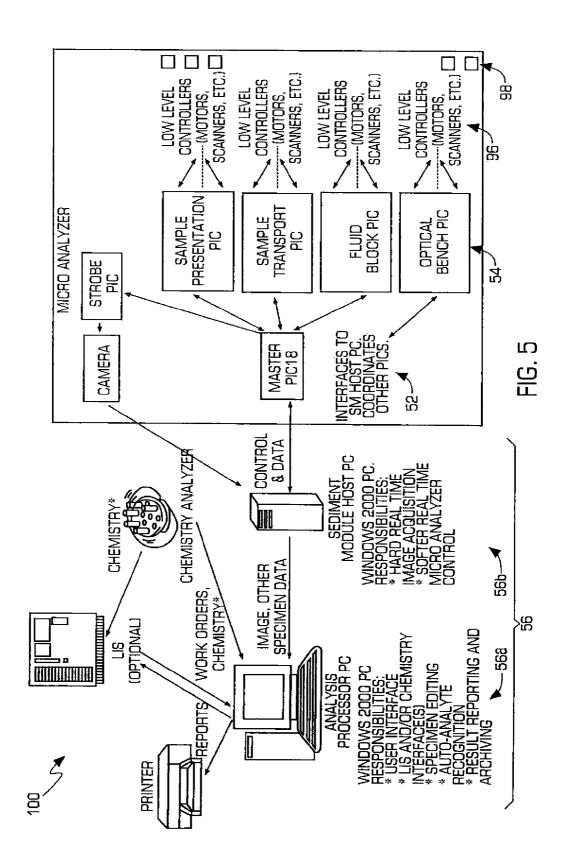


FIG. 3







eč	O	602	604 E	60,6
	,	<u>, </u>		
L1	L2	BEGIN	END	COMMENT
R	Н	1	14	RESET THIRD LEVEL CONTROLLERS
1	6	15	99	RESUME RUNNING RACKS
G	0	18	99	RUN RACKS UNDER HOST CONTROL
S	S	395	434	SERVICE SPECIMEN (RUN TUBES W/O HOST PC)
0	Ε	100	103	CLEAR RACK
R	Q	104	148	RUN GC CONTROL
1	7	149	336	RUN AUTOFOCUS CONTROL
W	8	335	349	WAIT FOR COMMAND, BUTTON, RACK OR TIMEOUT
l Z	Z	393	394	SLEEP
P	1	350	366	IRISOLVE CLEAN
W	S	435	439	SHORT WAKEUP
W	М	440	444	MEDIUM WAKEUP
W	L	445	449	Long Wakeup
S	D	450	453	SHUTDOWN
l W	Α	350	392	Wash with Bleach
D	L	454	481	RUN DILUENT
K	Ĺ	482	485	KILL (WAIT FOR POWER OFF)
В	Χ	486	487	BACKGROUND EXIT ERROR

FIG. 6

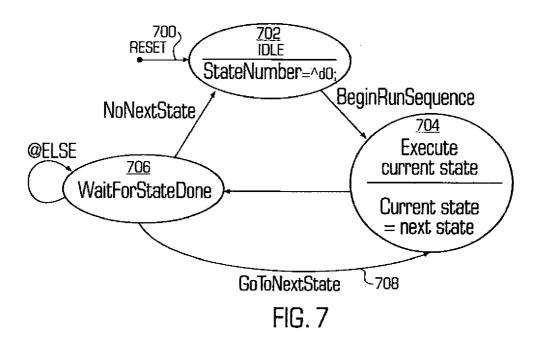


FIG.	8A1 300			30				30)B	
305	304 7	:	3069	306b ₂	30èc ;	306d	308 <u>3</u>	1 3 308b	080	308q
STATE	STATE DESCRIPTION		SPACIND	FBACIND	STNCND	OBACMD	SPASTAT	FBASTAI	STHSTAT	OBASTAT
0 1 RF	SET HIGH		0X0000 RE	OXOOOO RE	OXOOOO RE	OXOCOC Re	OXOO	OXOO	OXOO OXFF	OXOO OXFF
2 5	ART SHEATH BOTTLE EN L		I \$1	0X0000	0X0000	000000	OXFF 0X32	ŎXOO	0000	0000
3 WA 4 TU	NT FOR STEDLE AND SHEATH BOTTLE FULL DN DEC SUBATU DIEMP	, OR TIMEOUT	0X0000 S0	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	OXFF OX33		0X00 0X00	0000
5 WA	RN OFF SHEATH PUMP It for so Idle		00000	000000	0X0000	000000	OXFF	0000	0000	0X00 0X00
6 E	ST SHEATH LOW SENSE CONDITION		10X0000	0X0000	0X0000	000000	OXFF OXOO	0X00	0000	0X00
- / Sn 8 TE	EATH SENSE IS OK, SEND MESSAGE TOSM St sheath empty sense condition	 .	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X00 0X00	0000	0x00 0X00	0x00 0X00
<u> </u>	EATU CENCE IC LAW CENT MECCAPE TACK		000000	000000	0X0000	000000	0X00	OX(0	0x00	0x00
10 3	LATH JEHRE IS LOW, SEND MESSAGE TOSM, E Bath Sense is Empty, Send Message Tosm, E Art 3 Funcs: Ph, Cr.HS Alt For Spa Alt For Stm	BRANCH TO "CLEAR RACK"	0X00000 PH_	000000	0X0000		0000	0000		0x00
12 W	ANT FOR SPA		000000	HS 0X0000	CR 0X0000	0000X0 0000X0	OXXFF OXXFF	0X21 0X00	0X00	0x00 0X00
13 W	AT FOR STM		0X0000	L0X0000	OX0000	0X0000	0000	0X00	OXFF	OQXO I
14 E 15 BE	<u>id rh</u> Ginning of Go resume (16); set front	PANEL LIGHTS	0X0000 0X0000	0X0000	0X0000	0X0000 0X0000	0X00 0X00	0X00 0X00	0X00 0X00	0X00 0X00
l (B	LITTON GREEN, LED BLUEY			L					UNUU	
16 R 17 B	-READ THE BARCODE RANCH TO "RETRIEVE TUBE NUMBER"		000000	000000	BC GYODOO	0X0000	00,000	0X00	0x44	0X00
18 B	SININNG OF GO COMMAND: ASK SM IF WE (AN START	0X0000 0X0000	0X0000 0X0000	0X0000	0X0000	0X00 0X00	0X00 0X00	0X00 0X00	0X00 0X00
<u> 19 W</u>	<u>it for SM reply. Whose argument indicate</u>	S WHETHER TO PROCEED	0X0000	0X0000	000000	0X0000	0000	0X00	0000	0000
20 IF 21 R	SM REPLIES '00' BRANCH TO CANNOT_GO; SET HLCS	ELSE FALL THROUGH	0X0000 RE	OXOOOO RE	OXOOOO RE	OXOCOO RE	OXO OXF	OXO) OXFF	OXOO OXFF	OXIOO:
_221_M	AKE SURE OUTPUT IS CLEAR (STM:IC RETUR	INS 'J' OR 'F')	0X0000	000000) (000000	0000	OXOQ I	0x00	0X00
23 G		LIGHTS1	0X00000	0X00000	0X0000 0X0000	000000	OXXO	OXOO I	0x54	OXXX
24 G 25 U	OP BACK TO LOOKINGFORT)		0X0000 0X0000	0X0000 0X0000	000000	0X0000 0X0000	0X00 0X00	0X00 0X00	0x46 0X00	0X00 0X00
26 S	<u>t front panel lights (button green, </u>	LED BLUE)	0X0000	0X0000	000000	000000	0000	OXOO .	OXFF	0000
27 S 28 W	ART SHEATH BOTTLE FILL AT FOR S1 IDLE AND SHEATH BOTTLE FUL	OD TIMEOUT	S1 0X0000	0X0000 0X0000	000000		OX32 OXFF	0000	0X00 0X00	0X00 0X00
29 1	RN OFF SHEATH PUMP	, UA IIPIEVUI	SO	000000	000000	000000	0X33	0X00	0000	OXOO
30 W	AT FOR SO IDLE		0X0000	000000	000000	000000	OXFF	OX00	0000	0000
	ST SHEATH LOW SENSE CONDITION HEATH SENSE IS OK, SEND MESSAGE TOSM		0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X00 0XX0	9X9 9X9	0X00 0X00	0X00 0x00
33 T	ST SHEATH EMPTY SENSE CONDITION		0X0000	0X0000	000000	000000	OXOC	0X00	0X00	0X00
34 SI	<u>IEATH SENSE IS LOW, SEND MESSAGE TOSI</u> Tatu cense is enoty condinector took is	PRINCIPA TO PO END DICTO	000000	0X0000	0X0000		0000		0000	
36 T	ATH SENSE IS EMPTY, SEND MESSAGE TOSM, E LL STM TO FIND RACK, HC TO SET CP AND SP A	T STARTING POSITION	0X0000 PH	<u>0x0000</u> HC	MI	0X0000 0X0000	000	0X00 0X00	0000	0x00 0X00
37 F	31 FROM STM GOTO WAITUNTILSTMATIDLE	1	0X0000	0X0000	0X0000	0X0000	0000	0X00	0X31	OXOO
38 N 39 () <u>rack Endgobranch</u> Op Back	·	0X0000 0X0000	000000	0X0000 0X0000	000000	0000	0X00	0X39 0X00	0X00 0X00
401 W	NTUNTILSTMATIDLE1 (WAIT FOR SPA IDLE)	AS WELL)	000000	0X0000	000000	0000X0 0000X0		90 90 90 90	OXFF	0000
41 NC	<u>we to next tube position (first tube)</u>	ASPIRATE POSITION)	000000	0X0000	MN	000000	. OXOO	OX00	0X32	0000
421 RE	RIEVE TUBE NUMBER, TELL HOST WE'RE ALIVE 11 (OXOB),TERM OTHERWISE	; BRANCH IV END KACK	0X0000	0X0000	0X0708	000000	0000	OXOO	OxOB	0000
43 RE	RIEVE STORED TUBE DETECT VALUE: BRAY	ICH TO 'MOVE TO NEXT	0X0000	0X0000	0X070A	000000	0X00	0X00	0x00	OXOO
44 R	BE" IF O Trieve rack id: Branch to "RO" IF 29		0000000	0X0000	0X0709	000000	0X00	0000	0x1D 0X00	0X00 0X00
45 1	TRIEVE TUBE ID (BAR CODE)		000000	0X0000	0X0707	000000	_0X00	OX00		
46 GE	I SAMPLE INFO FROM HOST SM REPLIES '00', BRANCH TO 'MOVE TO NI	XI	OXOOOO	<u>000000</u>	000000	000000	_0.000	00000	UX00	0000
47 70	BE .		0X0000	000000	000000	000000	0000	0000	0000	0X00
1			L	ــــ	<u> </u>			$\lfloor \rfloor$		
				L 8B1						8A2
										⊸ , 1⊷

300	1									FIG. 8A2
310	312	314	316	318	350	322	324	326 〈	328	330
SMTST	TOSM	TVALUE		SENS	STST	SMSK	END	BRAN	DEST	TRANSLATED PARAMETERS
100000	0	0X0007	0X43	0X0032	0001	0003	000000	000101	0X5738	0X01, 0X03, 0X0000, 0X0101, 0X5738},
0 <u>00000</u> 1000000	0	8000X0 0x0000	0X44 0x00	0X0000 0x0000	0X00 0x00	0X00 0x00	0XCE4E 0x0002	00000X0 00000x0	0X0000 0X0000	0X00, 0X00, 0XCE4E, 0X0000, 0X0000 0x00, 0x00, 0x0002, 0x0000, 0X0000
OXOOOO	ő	0x0005	0x42	0x0033	0x01	0x01	0X8303	000000	000000	0x01, 0x01, 0X8303, 0X0000, 0X0000),
OX0000	0	0X0000	0x00	0X000X	0000	0000	0X0002	000000	0X0000	0X00, 0X00, 0X0002, 0X0000, 0X0000),
000000	Š	000000	0X00	000000	<u>0X00</u>	0000	<u>0x0002</u>	000000	0X0000	0X00, 0X00, 0x0002, 0X0000, 0X00000},
000000 1000000	Ox1F	0X0000 0x0000	0x00 0x00	0X0032 0X0000	0x00 0x00	0x80 0x00	0X8001 0x0000	0X0001 0x0101	8 11	0x00, 0x80, 0X8001, 0X0001, 8}, 0x00, 0x00, 0x0000, 0x0101, 11},
000000	0	0X0000	0X00	0X0032	0x00	0x40	0X8001	0X0001	10	0x00, 0x40, 0X8001, 0X0001, 10),
000000	0x20	0x0000	0x00	OXOOOO	0x00	0x00	0x0000	0x0101	11	0x00, 0x00, 0x0000, 0x0101, 111.
	0x21	0x0000	0x00	0X0000	0x00	0x00	0x0000	0x0101	0x3045	0x00, 0x00, 0x0000, 0x0101, 0x3045},
0 <u>00000</u>	Į Ņ	0x0009 0x0000	0x44 0x00	000000	0X00 0X00	0000	0X005F	0X0000 0X0000	000000	0X00, 0X00, 0X005F, 0X0000, 0X00000,
0 <u>X0000</u>	0	0X0000	0X00	0X0000 0X0000	0000	0X00 0X00	0X001F 0X001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X00 1F, 0X0000, 0X0000], 0X00, 0X00, 0X00 1F, 0X0000, 0X0000],
000000	Ŏ	0X0000	OXXX	000000	0000	0000	0X001F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X00000}.
0 <u>0000</u> 0	0	000000	ÖXÖÖ	0X6000	0)(09	0000	0x0101	CX0000	000000	OXOOXX, 0X00, 0x0101, 0X0000, 0X0000),
000000	0	0x000E	Dula	OX0000	0000	0000	OYONI	AVAAAA	NYMAAA	AVAA AVAA AVAATIF AVAAVAA AVAAVAA
100000		0X0000E	0x44 0X00	0X0000	0000	0000	0X001F 0X0000	0X0000 0x0101	0X0000 42	0X00, 0X00, 0X001F, 0X0000, 0X0000}, 0X00, 0X00, 0X0000, 0x0101, 42},
000000	0X82	OXOOOO	ŎΧÕÕ	0x6001	Ox11	0000	00000	000000	0X00000	0x11, 0X00, 0X0101, 0X0000, 0X0000),
0 <u>X3044</u>		0x000F	Cx44	0x6001	0x11	0000	0X001F	000000	OX0000	0x11, 0X00, 0X001F, 0X0000, 0X0000).
10 <u>X3030</u>	0	000000	OXOO	0X0000	0000	0000	0X0101	000020	98	OXOO, OXOO, OXO101, OXOO20, 98}.
10 <u>X0000</u>	Ŭ.	010000	0x44	0x6000	0x11	0000	OXCA4A	000000	000000	0x11, 0X00, 0XCA4A, 0X0000, 0X0000)
0 <u>X0000</u>	0	<u>000000</u> 000000	0X00 0X00	0X0000 0X0000	0X00 0X00	0X00 0X00	0x0101 0x0101	0X0000 0x0008	0X0000 26	0X00, 0X00, 0x0101, 0X0000, 0X00000}, 0X00, 0X00, 0x0101, 0x0008, 26}.
000000	Ö	000000	0000	00000	0000	0000	0x0101	0x0008	98	0X00, 0X00, 0x0101, 0x0008, 983
000000	0	0X0000	0000	0x0000	0x00	0X00	0x0000	0x0101 0x0000	23	0x00, 0X00, 0x0000, 0x0101, 231,
0 <u>00000</u>	0	000000	0000	0X6000	0X09	0000	0X005F	000000	000000	_ 0X09, 0X00, 0X005F, 0X0000, 0X00000},
0 <u>X0000</u> 0X0000	0	0x0000 0x0005	0x00 0x42	0x0000 0x0033	0x00 0x01	0x00 0x01	0x0002 0X8303	0x0000 0X0000	000000 000000	0x00, 0x00, 0x0002, 0x0000, 0X0000}, 0x01, 0x01, 0X8303, 0X0000, 0X0000},
0X0000	ŏ	000000	0x00	0X0000	0000	0000	0X0002	0X0000	000000	QXDQ, QXDQ, QXDQQQ, QXQQQQ, QXQQQQ
OX0000	Õ	OX0000	OXOO	0X0000	0000	0000	0x0002	000000	OX0000	0X00, 0X00, 0x0002, 0X0000, 0X00003,
000000	0.45	000000	OXXX	0X0032	0x00	0x80	000001	000001	33	0x00, 0x80, 0X8001, 0X0001, 33}.
0 <u>00000</u>	Ox1F O	0x0000 0x0000	0x00 0x00	0X0000 0X0032	0x00 0x00	0x00 0x40	0x0000 0x8001	0x0101 0x0001	36 35	0x00, 0x00, 0x0000, 0x0101, 361,
000000	0x20	0x0000	0x00	0X0000	0x00	0x00	0x0000	0x0101	36	0x00, 0x40, 0X8001, 0X0001, 35}, 0x00, 0x00, 0x0000, 0x0101, 36}.
	0x21	0x0000	0x00	0X0000	0x00	0x00	0x0000	0x0101	0x3045	0x00, 0x00, 0x0000, 0x0101, 0x3045}.
1000000		000000	0000	0X0000	0000	0000	0X0101	0X0000	000000	OXOO, OXOO, OXO 101, OXOOOO, OXOOOO),
000000	<u> </u>		0000	00000	0000	0000	0X0101	0X000X0	.40	0X00, 0X00, 0X0101, 0X0008, 40},
10 <u>X0000</u>		0X0000 0X0000	0X00	0X0000 0X0000	0X00 0X00	0X00 0X00	0X0101 0X001F	0X0008 0X0101	94	0X00, 0X00, 0X0101, 0X0008, 94}, 0X00, 0X00, 0X001F, 0X0101, 371,
10X0000		0x0011	0x44	000000	0000	0000	Ox8EOE	0X0000	OX0000	0X00, 0X00, 0x8F0F, 0X0000, 0X0000).
0 X0000	0x36	0x0012	0x44	000000	0X00	0000	0X001F	000000	OX0000	<u> </u>
0 <u>X0000</u>	Ox32	0x0013	()x44	000000	0000	.0X00	600101	000008	81	OXDO, DXDO, DXO101, DXDDO8, 81},
000000	0	0x0014	0x44	OXO0000	OX00	0000	0X0101	0X0008	41	OXOO, OXOO, OXO101, OXOOO8, 41}.
								,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-	
00000	Ŏ	00015	0x44 0x44	000000	0000	0000	000101	0x0008	0x5251	0X00, 0X00, 0X0101, 0x0008, 0x5251).
0 x3032	0X81	0x0016	0x44 0x44	0X0000 0X0000	0X00 0X00	0000	000101	000000	0X0000	0X00, 0X00, 0X0101, 0X0000, 0X00000},
	VACI	0x0017	UATT .	VAVAUU	VAVV	0000	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000);
0 <u>X3030</u>	0	0X000X0	0000	000000	0000	0000	0X0101	0X0020	41	0X00, 0X00, 0X0101, 0X0020, 41},
BA1					- \ 8E	<u>-</u>				'

FIG. 8B1

							10.	ו טט
STATE STATE DESCRIPTION	SPACMD	FBACMB	STAICMD	OBACMD	SPASTAT	FBASTAT	SIMSTAT	OBASTAT
481 IF SM REPLIES "2", BRANCH TO "CE" (CLEAR RACK)	00000	000000	000000	000000	OXXO	0000	0000	_ <u>0x00</u> i
49 TO TEST TUBE (INITIALIZE EP PUMP)	I	000000	000000	0000000	0x11	Dx00	0000	0000
501 WAIT FOR TT COMPLETE 511 WAIT FOR TIMAGE PROCESSINGIDLE*	000000	000000	000000	CX0000	0xFF	0x00		<u>0X00</u>
51) WAIT FOR "IMAGE PROCESSING IDLE"	<u> 000000</u>	000000	000000	000000	0x00	0,000	0X00	0X00 i
SZI DIANI DICATI ANA BALAGROUND CAFTURE	SB 0X0000	0X0000 0X0000	0X0000 0X0000	000000	0x31 0xFF		0000	0X00 0X00
541 TIMER DELAY REFORE CAPTURE	000000	000000	000000	0X0000 0X0000	0x00	0,00	00x00	0x00 !
52 START SHEATH FOR BACKGROUND CAPTURE 53 WAIT FOR SE COMPLETE 54 TIMER DELAY BEFORE CAPTURE CAPTURE BACKGROUND AND WAIT FOR FRAME PROCESSING COMPLETE (FUTURE WAIT FOR FRAME CAPTURE COMPLETE) OR 55 SHORT SAMPLE DETECTIOR SEND SHAFT SAMPLE SAMULAND WAIT FOR FRAME PROCESSING COMPLETE (FUTURE WAIT FOR FRAME CAPTURE COMPLETE) OR 55 SHORT SAMPLE DETECTIOR SEND SHAFT SOURCE SAMULAND WAIT FOR FRAME PROCESSING COMPLETE CHIEFTER WAS FOR FRAME SAMULAND WAIT FOR FRAME PROCESSING COMPLETE		9,,0000	0,,0000	0110000	0,00		UNIO	0,00
(FUTURE WART FOR FRAME CAPTURE COMPLETE) OR								
55 SHURI SAMPLE OF IECTOR.	0000000	0X0000	000000	0X00000	0x00	0x00	0x00	0x00
DENIA DANCE SAMELE DIANA, RAN ANNI MAN DENIA PRACE PRACEDIA DELL'ELE. POTTE MANTE CON CONTRA DELL'ANNI DELL'ENTE PARA DELL'ENTE PARA DELL'ENTE PARA DELL'ENTE PARA DELL'ENTE PARA DE				ŀ				i
(FUTURE WAIT FOR FRAME CAPTURE COMPLETE). # EXCEEDS 10 SECS	nVnnnn	nvocoo	000000	ayaaan	۸.۸۸	~~	امما	0.00
56 - GOTO BÅ. 57 Turn off ep pump on Spa	0X0000	0X0000 0X0000	000000	0X0000 0X0000	0x00 0x34	0x00 0x00	0x00 0X00	0x00
58 WAIT FOR EB COMPLETE 59 MOVE PIPETTE DOWN TO ASPIRATE POSITION IN TEST TUBE	0X0000	000000	000000	0X0000	OXF	0x00		0000
59 MOVE PIPETTE DOWN TO ASPIRATE POSITION IN TEST TUBE	ĪD	0X0000	000000	0X0000	0X13	0x00		0000
60 WAIT FOR TO COMPLETE AND "IMAGE PROCESSING IDLE"	0800000	000000	OX00000	axaaaa	OxFF	0x00	0X00	0000
60 WAIT FOR TD COMPLETE AND "IMAGE PROCESSING IDLE" 61 START ASPIRATION FOR SAMPLE TRANSFER 62 WAIT FOR AS AND RC COMPLETE	AS	RC.	0X0000	0X00000	0x17	0x00	0X00	0000
62 WAIT FOR AS AND RC COMPLETE 63 TIMER DELAY BEFORE CAPTURE	000000	000000	000000	000000	DAFE.	OXEE	00,000	OXOO ;
63 TIMER DELAY BEFORE CAPTURE CAPTURE SAMPLE FRAMES AND WAIT FOR SAMPLE	0X00000	000000	000000	0X0000	0x00	0x00	0x00	0x00
64 FRAME CAPTURE COMPLETE OR SHORT SAMPLE DETECTOR	0X0000	000000	0X00000	0X00000	0x00	OXCO	OXOO	0000
64 FRAME CAPTURE COMPLETE OR SHORT SAMPLE DETECTOR. SEND "SHORT SAMPLE" SIGNAL AND WAIT FOR		Unio oct.	Undedd	ONVOO	UNDO	unoc	0,00	1
65 I SAMPLE FRAME CAPTURE COMPLETE	0000000	0000000	0000000	0X00000	0x00	0000		0X00 ¦
66 TURN OFF EP PUMP ON SPA, SP PUMP ON FBA	EB_	EB	000000	0X0000	0x34	0x00		0000
67 WAIT FOR EB'S COMPLETE (SPA AND FBA)	OXO000	000000	000000	0X0000	OxFF	OxFF	0X00	0000
68 TO WASTE WELL 69	OXOOOO	DB 0X0000	0X0000 0X0000	0X0000 0X0000	0x15 0xFT	0,00	0000	0000
70	000000	0X0000	0X0000	0X0000	0x00	0x00 0xFF	0000	0000
71 TEST SHEATH FULL SENSOR 72 TURN ON RINSE PUMP AND RINSE PIPETTER	000000	0X0000	0X0000	0X0000	0000	0x00	0000	1 0000
71 TEST SHEATH FULL SENSOR 72 TURN ON RINSE PUMP AND RINSE PIPETTER	TR	RP	0X0000	OX0000	0000	0x25	ÖXÕÕ	ÖXÖÖ I
73 TURN ON RINSE PUMP AND RINSE PIPETTER	ŢQ_	RP	000000	000000	0000	0x25		0000
74 75	000000	0X0000	0X00000	0X0000	OXFF.	0x00		<u>0X00</u>
75 CLEAR PIPETTER/HOME CP AND SP/MOVE TO NEXT TUBE	0)(0000) (P	OXOOOO HC	OXODOD.	0X0000 0X0000	0,00	0xFF 0X00	0X00	0,000
77 CLEANTH ETTERMINITE ET AND SEPTIONE TO MEXT LOSE	000000	0X0000	0X0000	0X0000	OXFF	0x00		0000
78	0X0000	000000	000000	0X0000	0000	OxEF	.0000	<u> </u>
79	OX.0000	000000	0X0000	0X0000	0x00	0.00	OXFF	ÖXÖÖ I
80 SEND COMPLETION SIGNAL TO HOST, BRANCH TO "RETRIEVE TUBE NUMBER"	000000	0X0000	000000	0X0000	0000	0000		0000
81 END RACK BRANCH TARGET	000000	000000	0X0000	OX0000	0000	OXFF		0000
82	000000	0X0000	0X0000	0X0000	0000	0X00		0000
84 LOOP TO PH1	0X0000 0X0000	0X0000	ER.	0X0000	0000	0X00 0X00	0X33 0X00	0000
85 START SHEATH BOTTLE FILL	SI	000000	000000	000000	0X32	0000	0000	0000
RE WAIT FOR STUDIE AND SHEATH POITLE PILL OR TIMEOUT	000000	000000	000000	0X00000	OXFF	OXOO		0000
87 TURN OFF SHEATH PUMP 88 WAIT FOR SO IDLE	SO	000000	1 0X00000	0X0000	OX33	0000	0000	0000
88 WAIT FOR SO IDLE	000000	000000	000000	0X0000	OXFF	0000		0000
89 LTEST SHEATH LOW SENSE CONDITION 90 LSHEATH SENSE IS OK SEND MESSAGE TOSM	000000	000000	000000	000000	0000	0,00		0000
901 SHEATH SENSE IS UK, SEND MESSAGE TOSM 911 Test sheath empty sense condition	0X0000 0X0000	0X0000 0X0000	0X0000	0X0000	0000	0x00	0x00 0x00	0x00
92 SHFATH SPASE IS LOW, SEND MESSAGE TOSM	000000	000000	000000	0X0000	0000	0x00		0x00
92 SHEATH SENSE IS LOW, SEND MESSAGE TOSM SHEATH SENSE IS EMPTY, SEND MESSAGE TOSM,				WIND	7/100			2009
93 BRANCH TO "CLEAR RACK"	000000	OX0000	000000	OX0000	0000	0x00	0x00	0x00
SET SP AND CP AT PINCHED STANDBY POSITION,		l			1			
94 ENDGOBRANCHTARGET MAKE SURE SPA AND STM IDLE	0,0000	HS.	000000	000000	DXFE.	00021	OXFF	0X00
95 IBRANCH TO END OF 60 SEQUENCE 96 ISUBR: MOVE NEXT	0X0000 0X0000	0X0000	OXOOOO Man	000000 000000	0X00 0X00	0000	0X00 0X32	0000
L	UMAAAU .	LUNUAN		WWW.	LUNUV	WAUU	UAGE	000
↓8C1								8B2 ¹
								-

FIG 8R2

	1	1	1 1					-	$\overline{}$	FIG. 887
SMTST	TOSM	TVALUE	TFUNC	SENS	STST	SMSK	END	BRAN	DEST	TRANSLATED PARAMETERS
0X2D32	├ <i>─</i> (0X0000	0000	0000	0X0101	000020	0x3045	0X00, 0X00, 0X0101, 0X0020, 0x30451,
000000	(0X0000	0000	000000	0X00	0X00	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000)
000000	(10110000	OXO0_	0X0000	0X00	0000	0X001F	000000	0X0000	OXOO, OXOO, OXOO1F, OXOOOO, OXOOOO)
Ox3338	0x37	000000	0x00	000000	0000	0000	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000).
0X0000		000000 000000	0000	000000	0000	0000	0x001F	000000	0X00000	0X00, 0X00, 0x001F, 0X0000, 0X0000),
0X00X0 0X000X0	 }) 0X00018	0X00 0x42	00000X0	0X00 0x00	0X00 0x00	0X001F 0X0000	0X0000 0x0000	0X0000 0X0000	<u>0X00, 0X00, 0X001F, 0X0000, 0X0000},</u> 0x00, 0x00, 0X0000, 0x0000, 0X0000},
UNUUUU	 	/ JUANUTO	UNIC	0/0000	UXUU	UXUU .	UNUUUU	OAUGUU	ψίνουνο	ningo! ningo! ningono! ningono! ningono!!
					ļ					
0X3034	0X83	0x0000	0x00	0x0032	0x00	0x02	0x0001	0x0010	57	0x00, 0x02, 0x0001, 0x0010, 57),
								İ		
		0,700.40	ا م	0.0000			introduc		à 1250	0 00 0 00 0V0040 0 0000 0 4040)
OX3034	0x31	0X0019	0x43	0x0000	0x00	0x00	000010	0x0000	0x4258	0x00, 0x00, 0X0010, 0x0000, 0x4258),
000000) 0X0000	0X00	0X0000	OXDO	<u>0X00</u>	0x001F	000000	0X0000	0X00, 0X00, 0x00 IF, 0X0000, 0X0000).
000000		0X0000	0000	000000	0X00	0X00	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000),
0X0000	-	J 0X0000	_OXOO_	_0X0000_	OXOO	0000	_0X001F.	000000	TOXOOOO	0X00,0X00,0X60,1F,0X0000,0X0000),
Nx3338	0x37	000000	0000	000000	OXOO	OXOO	0x9212	000000	000000	0X00, 0X00, 0x9212, 0X0000, 0X0000),
00000		0.00000		000000	OXXX	0000	0X001F	000000	000000	OXOO OXOO DXOOTE OXOOOO OXOOOOY
000000		000000		000000	0000	0000	0x8606	000000	0X0000	0X00, 0X00, 0x8606, 0X0000, 0X0000)
000000		000067		000000	0x00	0x00	000000	0x0000	0X0000	0x00, 0x00, 0X0000, 0x0000, 0X0000)
									rc	
0X3036	0X85	0x00000	0x00	0x0032	0000	0x02	.0x0001	0x0010	66	0X00, 0x02, 0x0001, 0x0010, 66},
AVARAC	0x31	0X0063	0.42	000000	0X00	OYOO	0X0010	000000	0X4258	0X00, 0X00, 0X0010, 0X0000, 0X4258},
0X3036 0X0000		0 000000	0x43 0X00	000000	0X00	0X00 0X00	0X0010	0X0000 0X0000	0X000X0	0X00, 0X00, 0X001F, 0X0000, 0X0000},
000000	1	0 000000	0000	000000	OXOO	0000	000000	000000	000000	0X00, 0X00, 0X8606, 0X0000, 0X0000).
000000	 	Ŏ ŎXŎŎŎ Ŏ	- OXOO	0X0000	T 0X00	T 8888	† 0000 i F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000Y,
000000		0 (000000	0000	0X0000	0000	OX00	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000
000000		0 0X0000	0000	000000	0X00	0000	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000)
000000		0 0X000X		0x0033	0x01	10x0	0x0101	0x0001	/3	0x01, 0x01, 0x0101, 0x0001, 73},
0X0000		0 000000		0X0000	0X00	0000	0x0000	0x001F	74	
000000		<u> </u>	0000	000000	0000	0000	OXOO1E	000000	0X0000 0X0000	0X00, 0X00, 0X001F 0X0000, 0X0000),
0X0000		0 0X00X0 0 0X00X0 0		0X0000 0X0000	0000	0X00	0X001F 0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000}, 0X00, 0X00, 0X001F, 0X0000, 0X0000}.
0000X0 0000X0	0x36	0X000X		000000	10X00	0000	OXOO1F	0X0000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000}
000000		0 0X0000		000000	0X00	0000	0X001F	000000	0X0000	OXOO, OXOO, OXOO1F, OXOOOO, OXOOOO),
000000		0 000000		000000	OXOO	0000	0X001F	000000	000000	OXOO, OXOO, OXOO 1F, OXOOOO, OXOOOO).
000000		0 <u> 0</u> 00000	0000	0X0000	0000	0X00	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000\$,
0x0000	OX87	000000		0X0000	0X00	0X00	0X001F	0X0101	42	
000000	OX2F	00001	Cx44	OX0000	OXOO	OXOO	0X0004	0X0000	000000	0X00, 0X00, 0X0004, 0X0000, 0X0000),
0X00000	4	0 0X0010	0x44	0X0000	OXOO_	0X00	0X001E	0X0000	0X0000	OXOO, OXOO, OXOO1F, OXOOOQ, OXOOOO{,
000000		0 00001	0x44	0000000	0000	0000	0X001F	000000	0X0000 37	0X00, 0X00, 0X001E 0X0000, 0X0000).
000000		0 0X0000 0 0x0000	0000	0X0000 0x0000	0X00 0x00	0X00 0x00	0X0000 0x0002	0X0101 0x0000	0X0000	0X00, 0X00, 0X0000, 0X0101, 27}, 0x00, 0x00, 0x0002, 0x0000, 0X0000},
0X000X0		0 0x0005		0x0033	0x01	0x00	0X8303	000000	00000	0x01, 0x01, 0X8303, 0X0000, 0X0000),
0X0000		o loxooox		000000	0000	0000	000002	000000	000000	axaa axaa axaaaz axaaaa axaaaa
000000		Ó LÓXOGÓ		000000	0000	0000	0x0002	000000	0X0000	0X00' 0X00' 0x0002' 0X0000' 0X00001'
000000		n Toxooox		0X0032	0x00	0x80	0X8001	0X0001	91	0x00, 0x80, 0X8001, 0X0001, 911.
000000		0x0000		0X0000	0x00	0x00	0x0000	0x0101	94	0x00, 0x00, 0x0000, 0x0101, 94 ^x /.
000000		o loxooox		0X0032	0,000	0x40	000001	000001	93	
000000	_0x20_	0x0000	0,00	000000	0x00	0x00	0x0000	0x0101	94	0x00, 0x00, 0x0000, 0x0101, 94),
Nunnan	l near	0	nann	nynnnn	Δ.ΛΛ	D-000	0.0000	D-D101	Wavie	UNDER UNDER UNDER UNDER UNDER UNDER UND
OXOOOO	0x21	0x0000	0x00	000000	0x00	0x00	0x0000	0x0101	0x3045	0x00, 0x00, 0x0000, 0x0101, 0x3045),
000000	1	o loxoo11	0x44	000000	0000	oxoo	0x8E0E	000000	0X0000	0X00, 0X00, 0x8E0E, 0X0000, 0X0000).
000000		0 00000		000000	0000	0000	0X0000	0X0101	99	0X00, 0X00, 0X0000, 0X0101, 99},
000000		00001		000000	0000	0000	0X001F	000000	0X0000	OXOO, OXOO, OXOO1F, OXOOOO, OXOOOO).
8B1	, _	т —	1 = =	8C2			J	1 ===		·

FIG. 8C1

124 SEGNO FREP (INFOCROSTRO) REPRESENTATION REPRESENTATION REPRESENTE PRIMERE PRIMERE REPRESENTE PRIMERE PRIMERE REPRESENTE PRIMERE PRIMERE PRIMERE PRIMERE REPRESENTE PRIMERE PRIMERE REPRESENTE PRIMERE PRIMERE REPRESENTE PRIMERE PRIMERE PRIMERE PRIMERE PRIMERE PRIMERE								1 1	υ. ι	וטכ
97	STATE	STATE DESCRIPTION	SPACMD	FBACMD	STMCMB	OBACMD	SPASTAT	FBASTAT	STMSTAT	OBASTAT
99 FIND GO SCUENCE 101 SERIO CE OF CHEAR BATCH FRILL STOP 102 SERIO CE OF CHEAR BATCH FRILL STOP 103 SERIO CE OF CHEAR BATCH FRILL STOP 104 SERIO CE OF CHEAR BATCH FRILL STOP 105 SERIO CE OF CHEAR BATCH FRILL STOP 106 SERIO CE OF CHEAR BATCH FRILL STOP 107 SERIO CE OF CHEAR BATCH FRILL STOP 108 SERIO CE OF CHEAR BATCH FRILL STOP 109 SERIO CE OF CHEAR BATCH FRILL STOP 100 SERIO CE OF CHEAR BATCH FRILL STOP 100 SERIO CE OF CHEAR BATCH FRILL STOP 101 SERIO CE OF SERIO COMBELL 102 SERIO CE OF SERIO COMBELL 103 SERIO CE OF SERIO COMBELL 104 SERIO CE OF SERIO COMBELL 105 SERIO CE OF SERIO COMBELL 106 SERIO CE OF SERIO CE OF SERIO COMBELL 107 SERIO CE OF SERIO COMBELL 108 SERIO CE OF SERIO COMBELL 109 SERIO CE OF SERIO COMBELL 109 SERIO CE OF SERIO COMBELL 100 SERIO CE OF SERIO CE OF SERIO COMBELL 100 SERIO CE	97	END SUBR: BRANCH TO WAITUNG STMATIOLE	0X0000	000000	000000	0X0000	ŌXŌO	ōxoō i	0000	0000
99 HIND GO SEQUENT 000000 00000 00000 0000 0000 0000 0	98	CARLLOND FOR THACH OF A DUTTON FAR E CECONIC	000000	_ 000000_	000000	000000	0.00	0x00	0000	10x00
RETRIEVE TUES NUMBER BANKEN TO DILUENT ("DL") # 2 000000	-99	END OF GO SEQUENCE	<u> </u>		1 0X00000	000000	OXDO	OXOO	0X00	10000_i
RETRIEVE TUES NUMBER BANKEN TO DILUENT ("DL") # 2 000000	101	SEND OR TO STM- HOME PRETIED	NE PH			DYDDDD		UXUU TAATT		OXOO !
RETRIEVE TUES NUMBER BANKEN TO DILUENT ("DL") # 2 000000	167	HOME STM CARRIERS	000000		0x0000	0000X0	OXFF	OXOO	ÖXFF	0X00
RETRIEVE TUES NUMBER BANKEN TO DILUENT ("DL") # 2 000000	103	END OF "OF" (CLEAR RACKS)	000000	000000	000000	0X000X0	0X00	0X00	0000	00X00
RETRIEVE TUES NUMBER BANKEN TO DILUENT ("DL") # 2 000000	104	BEGIN OF "RQ" (RUM OC CONTROL)	RE	_RE	RE	0X00000	OXH	OXFF	OXH	10X00
10 10 10 10 10 10 10 10	105	RETRIEVE TUBE NUMBER; BRANCH TO WASH ("WA") IF T (UXUT), TERM OTHERWISE	000000	00000XO	0X0708	0X0000	ÓXOO	OXOO	0x01	0000
10 10 10 10 10 10 10 10	106	RETRIEVE TUBE NOWBER; BRANCH TO DIEDENT ("DE") IF Z (CXO2), TERM OTHERWISE	0X0000	000000	OX0708	000000	0000	0000	0x02	0000
10 10 10 10 10 10 10 10	107	RETRIEVE TUBE NUMBER; BRANCH TO DILUENT ("DL") IF 3 (OXO3), TERM OTHERWSE	0X0000	0X0000	0X0708	0X00000	0000	0000	.0x03	0000
F.S.NR PIES ** O. BRANCH TO **MOVE TO NEXT CONTROL TUBE	108	RETRIÉVE TUBE NUMBER; BRANCH TO AUTOFOCUS (*17") IF 5 (OXOS), TERM OTHERWISE	000000	000000	OX0708	000000	0X00	OXOO	0x05	0000
F.S.NR PIES ** O. BRANCH TO **MOVE TO NEXT CONTROL TUBE	109	RETRIEVE TUBE NUMBER: BRANCH TO DILUENT ("OL") IF 10	000000	000000	000708	DXOCOC	0000	OOXO	QxQA	0000
IF SM REPLIES '00', BRANCH TO 'MOVE TO NEXT CONTROL TUBE	110	RETRIEVE TUBE ID (BAR CODE)	000000	000000	000707	1 0X00000	0000		0XXX	
122 POSTION*	Щ	"		I WOOOD	0.00000	UAUGUG	UAUU	LVAUV	UAUU	I VAUV
133 TSM REPUES 2, BRANCH 10 'OE' (LEAR RACK)	112	POSITION"	000000	000000	000000	0X0000	0000	0X00	0X00	0X00 !
15	113	TF SM REPLIES '-2', BRANCH TO "OE" (CLEAR RACK)	0X00X0	OX0000	000000	0X0000		0X00		0X00
177 START SHEATH FOR REKKRONDO (APTURE S. 0,0000	1141	10 (EST 1088E	AYOOOO	000000	000000	000000	0x11	LVXVV	0000	10000
177 START SHEATH FOR REKKRONDO (APTURE S. 0,00000 0,00000 0,00000 0,00000 0,0000	1121	WAIT FOR "IMAGE PROXESSING IDLE"	00000	 XXXXXX 	 XXXXXX	 XXXXXX 	0x00	000	 XXXX	10000 1
CAPTURE BAUGADONN AND WAIT FOR FRAME CAPTURE COMPLETE) OR SHORT SAMPLE DETECTOR SHORT SAMPLE DETECTOR SHORT SAMPLE DETECTOR STOCKNOWN SAMPLE SIGNAL AND WAIT FOR FRAME CAPTURE COMPLETE). IF SAMPLE PUBLIC WAIT FOR FRAME CAPTURE COMPLETE, IF EXCEPTIS 10 SECS. GOTO BX. SAMPLE PUBLIC WAIT FOR FRAME CAPTURE COMPLETE). IF SAMPLE PUBLIC WAIT FOR FRAME CAPTURE COMPLETE. IF SAMPLE PUBLIC WAIT FOR FRAME CAPTURE COMPLETE. IF SAMPLE PUBLIC WAIT FOR SAMPLE PUBLIC WAIT FOR SAMPLE PUBLIC WAIT FOR SAMPLE PUBLIC WAIT FOR SAMPLE FRAME SAMPLE PUBLIC WAIT FOR SAMPLE FRAME SAMPLE FRAME SAMPLE FRAME SAMPLE FRAME CAPTURE SAMPLE FRAME	1171	START SHEATH FOR BACKGROUND CAPTURE	1 - CB:	0X0000	0X0000	1 0X0000	0x31	0X00	1 OXOO	TOXOO !
CAPTURE BAUGADONN AND WAIT FOR FRAME CAPTURE COMPLETE) OR SHORT SAMPLE DETECTOR SHORT SAMPLE DETECTOR SHORT SAMPLE DETECTOR STOCKNOWN SAMPLE SIGNAL AND WAIT FOR FRAME CAPTURE COMPLETE). IF SAMPLE PUBLIC WAIT FOR FRAME CAPTURE COMPLETE, IF EXCEPTIS 10 SECS. GOTO BX. SAMPLE PUBLIC WAIT FOR FRAME CAPTURE COMPLETE). IF SAMPLE PUBLIC WAIT FOR FRAME CAPTURE COMPLETE. IF SAMPLE PUBLIC WAIT FOR FRAME CAPTURE COMPLETE. IF SAMPLE PUBLIC WAIT FOR SAMPLE PUBLIC WAIT FOR SAMPLE PUBLIC WAIT FOR SAMPLE PUBLIC WAIT FOR SAMPLE FRAME SAMPLE PUBLIC WAIT FOR SAMPLE FRAME SAMPLE FRAME SAMPLE FRAME SAMPLE FRAME CAPTURE SAMPLE FRAME	1181	WAIT FOR SB COMPLETE	000000		000000	000000	1 OxFF	10000		
124 MOVE PIPETTE DOWN TO ASPIKATE PUSITION IN TEST TUBE D		COMPLETE (FUTURE WAT FOR FRAME CAPTURE COMPLETE) OR SUPERT CAMPLE FOR FRAME CAPTURE COMPLETE) OR	UKUUUU			0X0000		0x00	0x00	
124 MOVE PIPETTE DOWN TO ASPIRATE POSITION IN TEST TUBE D	121	EXCEEDS 10 SECS - GOTO BX.	000000	000000	000000	000000	0x00	0x00	0,000	0x00i
124 MOVE PIPETIE DOWN TO ASPIRALE PUSITION IN TEST TUBE TD	122	TURN OFF EP PUMP ON SPA	EB EB			000000	0x34			10000
126 START ASPIRATION FOR SAMPLE IRANSFER	1531	TANTO POPULO COPULCIO Mande pipe i de noma i di aspirade postitomena destitore			OXUUUU	DYNOVO		1000		OXOU-
126 START ASPIRATION FOR SAMPLE IRANSFER	訝	WAIT FOR TO COMPLETE AND "IMAGE PROCESSING TOLE"		T 000000	000000	0X0000	1 OxFF	0000	ÖXÖÖ	10000 !
128 TIMER DELAY BEFORE CAPTURE OXOOOO OXOOOO OXOOO OXOO OX	126	START ASPIRATION FOR SAMPLE TRANSFER	AS		000000	000000	(X17	0x00		10X00
CAPTURE SAMPLE FRAMES AND WAIT FOR SAMPLE FRAME CAPTURE OXODOD	12/	WALLFOR AS AND RECOMPLETE	DANOOO	000000						10,000
SEND "SHORT SAMPLE" SKINAL AND WAIT FOR SAMPLE FRAME	\neg	CAPTURE SAMPLE FRAMES AND WAIT FOR SAMPLE FRAME CAPTURE				1	1			1
WATEFOR FB'S COMPLETE (SPA AND FBA)		SEND "SHORT SAMPLE" SIGNAL AND WAIT FOR SAMPLE FRAME	UXUUQU						1	7 '
32 WATEOR EB'S COMPLETE (SPA AND FBA) 0X0000 0X0000 0X0000 0X0000 0X15 0X00	[3]	TURN OFF EP PUMP ON SPA. SP PUMP ON FBA	EB	I LB		0X0000	0,34	1 0x00	OXX0	ŎXŎŎ
136 TURN ON RINSE PUMP AND RINSE PIPETIFR 18 RP	[32]	WANT FOR EB'S COMPLETE (SPA AND FBA)		000000	000000	0X0000		OXFF		10X00 '
136 TURN ON RINSE PUMP AND RINSE PIPETIFR 18 RP	놣귀	IQ WASTE WELL	1100000	1 080000	1 UXUUUU	1 000000	UXI5		NAUU NYOO	<u> </u>
136 TURN ON RINSE PUMP AND RINSE PIPETIFR 18 RP	樧		000000	000000	T XXXXXX	T0X0000	0x00	Oxi I	0000	OXOO
137 0X0000	136 (TURN ON RINSE PUMP AND RINSE PIPETTER	T 18	T RP	1 OXOOOO	0X0000	0000	1 0x25		TOXOO i
139 CLEAR PRETTER/HOME CP AND SP CP HC 0x0000 0X0000 0X16 0X00 0X000 0X000 140	137		<u> </u>	1 000000	100000	000000	1 OXH	1 0x00	1 0100	- XXXX - 1
140	138	(TEAR PEPETTER/HOME (P AND SP	1 (b)	I WOUND	U-UVUV	- OXOGO	OXIO	DXOO	T XXXX	10000
141	鍋	CLEANING CERTIFICATION CERTIFICA	000000	000000	000000	OX0000	OXFF	0x00	0000	10000
142	<u>[4]</u>		0X0000	000000	OXOOOO	OX0000	0x00	OxH	0000	10000
144 WAIT FOR CONTROL RESULT FROM HOST; BRANCH TO "OE" OXOOOO OXOOOO OXOOOO OXOOO OXOO OX	142	CURITY PARKET E HARE CIVERAL TATURACT	<u> </u>	1 UX0000	0X000X0			UXUU		UXUU !
	145	WAIT FOR CONTROL RESULT FROM HOST; BRANCH TO "OE"								
10nl RPS		(CLEAN KALK JE FAILED (U)	L					_		8C2

FIG RCD

SMTST	TOSM	TVALUE	TFUNC	SENS	STST	SMSK	ÉND	BRAN	DEST	TRANSLATED PARAMETERS
000000		000000	ÖXOÐ	0X0000	OXOŌ		0000X0	<u>0X0101</u>	† — - ₄₀	0X00, 0X00, 0X0000, 0X0101, 40},
000000	<u>0</u>	0x0181	0x02	0x6001	0x12	0x00	0X0000	0x0000	0X0000	0x12, 0x00, 0X0000, 0x0000, 0X00003
0X0000	OrZF	0X0000 0X0020	0X00 0x44	0X0000 0X0000	0X00 0X00	00X0 0XX0	0X001F 0X8E0E	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X00 F 0X0000, 0X0000) 0X00, 0X00, 0X8E0E, 0X0000, 0X0000
0X0000	0	0X0021	0x44	0X0000	ŎXŎŎ	0000	0X001F	0X0000	0X0000	0X00, 0X000, 0X0001F, 0X00000, 0X000001
000000	0	000022	0x44	0X0000	0X00	OXXOO	OX8AOA	T0X0000	0X0000	<u> 0x00, 0x00, 0x8a0a, 0x0000, 0x0000</u>
0X0000 0X0000	0	0X0000 0X0023	0X00 0x44	0X0000 0X0000	0X00 0X00	0X00 0X00	OXOO1F OX8E0E	0X0000 0X0000	000000	0X00, 0X00, 0X00 IF, 0X0000, 0X00000
UNUUUU		UNOVES	UX44	VAVOUU	UAUU	VAUU	UNDEUE	UNUUUU	0X0000	OXXX, 0XXXX, 0X8E0E, 0XXXXX, 0XXXXXX
0X0000	0	0X0024	0x44	0X0000	_0X00	0000	0X0101	0X0008	0x5741	0X00, 0X00, 0X0101, 0X0008, 0x5741)
<u>0000000</u>	0	0X0025	0x44	0X0000	0X00	0X00	0X0101	0X0008	0x444C	0X00, 0X00, 0X0101, 0X0008, 0x444C}
000000	0	0X0026	0x44	0X0000	OXOO	0000	0XC101	0X0008	0x444C	0X00, 0X00, 0X0101, 0X0008, 0x444C)
000000	0	0 X 0027	0x44	0X00000	OX00	0000	OX0101	0X0008	6.2122	מינוב א מממעה העומים העומים
OXDCOO	0	0X0028	0x44 0x44	-0X0000	0000	0000	000101	0X0008	0x3137 0x444U	0X00, 0X00, 0X0101, 0X0008, 0x3137) 0X00, 0X00, 0X0101, 0X0008, 0x44445
0X0000		0X0029	Ox44	000000	0000	0X00	000101	OX0000	0X0000	**************************************
OX3032	1880	0X002A	0x44	0X000X0	0000	0X00	0X001F	0X0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000)
OX3030	0	000000	0X00	0X0000	0000	OX00_	0X0101 0X0101	0X0020	146	OXOO, OXOO, OXOTO1, OXOO2O, 146},
0X2D32	<u>Ö</u>	000000	0000	0X0000	0000	0X00	0X0101	0X0020	0x3045	0X00, 0X00, 0X0101, 0X0020, 0x3045)
000000 000000	0	0X0000 0X0000	0X00 0XX0	0X0000 0X0000	0X00 0X00	0000	0X001F 0X001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00001 0X00, 0X00, 0X001F, 0X0000, 0X00001
0x3338	0x37	000000	0x00 0x00	0X0000	0X00	0X00	0X001F	0X0000	0X0000	0X00, 0X00, 0X00 1F, 0X0000, 0X0000)
000000	0	000000	0000	000000	0000	0000	0x001F	0X0000	0X0000	0X00, 0X00, 0x001F, 0X0000, 0X00001
0X0000 0X0000	0	0X0000 0X0069	0X00 0x42	0X0000 0X0000	0X00 0x00	0X00 0x00	0X001F 0X0000	0X0000 0x0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00000
grovos		WW.00.5	VA15	VIVVV	VAUV	VAVO	VAVAVA	VAVA/AV	VVVVV	0x00, 0x00, 0X0000, 0x0000, 0X00000)
0X3034	OX83	0x000x0	0x00	0x0032	0x00	0x02	0x0001	0x0010	122	0x00, 0x02, 0x0001, 0x0010, 122},
0X3034	0x31	OXOO6A	Ox43	0x0000	0x00 i	0x00	OXO010-	0x0000	0x4258	0x00, 0x00, 0X0010, 0x00000, 0x4258},
0X3034 0X0000	0	00000X0	_00XO_	000000	0x00 0x00	_0X00	0x001F	ÖXÖÖÖÖÖ	000000	OXOO, OXOO, 0x001F, 0X0000, 0X0000).
0X0000 0X0000		0X0000 0X0000	0X00 0X00	000000	0000	0000	000011	0X0000	0X0000	0X00, 0X00, 0X00 1F, 0X0000, 0X000X1
0x3338	0x37	000000	OXOO	0X0000 0X0000	0000	0000	0X001F 0x9212	0X0000 0X0000	0X0000 0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000 0X00, 0X00, 0x9212, 0X0000, 0X00001
0X0000 T	0	000000	0X00	0X00000	0000	0X00 0X00	0X001F	OXO000	1 8888888 - 1	0X00, 0X00, 0X001F, 0X0000, 0X00005
0X0000 0X0000		0X006B	0X00 0x42	0X0X000 0X0000	0X00 0x00	0000	0x8606	0X0000	1 0X00000	0X00, 0X00, 0x8606, 0X0000, 0X00001
						0x00	0X0000	0x00000	0X0000	0x00, 0x00, 0x0000, 0x0000, 0x0000),
<u>0X3036</u>		0x0000	0x00	0x0032	0000	0x02	0x0001	0x0010	131	0X00, 0x02, 0x0001, 0x0010, 131},
0)(3036 0)(0000	0x31 0	0X0006C 0X00000	0x43 0x00	0X0000 0X0000	0X00 0X00	0X00 0X00	000010	000000	004258	0000 0000 000010 000000 0042583
0X00000	0	0X00000	0000	0X0000	0000		0X001F 0X8606	0X0000 0X0000	0X0000 0X0000	<u> </u>
0X0000 0X0000	0	0X0000 i	0000	000000	0X00	0000	0X001F	0X0000	1 00000X0	DX00, DX00, DX001F, DX0000, DX0000Y
0X0000		0X0000 0X0000	0000	00000X0	0000	0000	0X001F	000000	0X00000	0X00, 0X00, 0X001F 0X0000, 0X0000)
OXODOO L		ÓXCOCC	OXOO	0X0000	OXOO	0000	0X001E 0X001E	000000	0X0000 0X0000	0X00, 0X00, 0X00 1E 0X0000, 0X00001, 0X00, 0X00, 0X00 1E 0X0000, 0X00001,
0X0000	0	000000	OXXO	000000	0X00	OXO0	0X001F	0X0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000},
0X00000		10X00000 10X00000	0000	00000X0 00000X0	0000		OXOOTE	OXINO	(200000)	DADO CADO CADELE DADODO CADIDOS
<u>1 00000XO</u>		0000000	OXOO	0X0000	0000	0X00 0X00	0X001F 0X001F	0000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000), 0X00, 0X00, 0X001F, 0X0000, 0X00001
0X00000 L	0.1	0X0000 L	0000	000000	OXOO	OXOO	0X001F	000000	OXOOOO	OXOO: OXOO: OXOO1F. OXOOOO: OXOOOO5:
0X0000 0x0000		000000	0X00 0X00	000000	0X00		0X001F	000000	0X0000	OXOO, OXOO, OXOO1F, OXOOOO, OXOOOO).
0x3245	0	0X0000 0X002C	0x44	0X000X0 0X000X0	0X00 0X00	0X00 0X00	0x0101 0x001F	0x0000 0x0000	0x0000 0x0000	0X00, 0X00, 0x0101, 0x0000, 0x0000) 0X00, 0X00, 0x001F, 0X0000, 0X0000)
ı	!		1	T	1					

FIG. 8D1

STATI	STATE DESCRIPTION	SPACIND	FBACMD	STMCMD	DBACMO	SPASTAT	FRASTAT	STMSTAT	NRASTAT
	P	Or Nuiss		911910103	DEVOISE	Joi noini	L L	e me m	ر ا
145	IF SM REPLIES 'O', BRANCH TO "OE" (CLEAR RACK)	000000	OX0000	000000	0X0000	0X00	0000	0000	0000
146	MOVE TO NEXT CONTROL TUBE POSITION	000000	0X0000	MN	0X0000	0000	0X00	0X32	0X00
147	BRANCH TO "16" (GO RESUME)	0000000	0X0000	000000	0X0000	0000	0000	0000	0000
148	END OF RO SEQUENCE Begin 1:7" (Autofocus Control); reset hics	000000	0X0000	0X0000	0X0000	0000	0000	0000	0000
149	BEGIN " 17" (AUTOFOCUS CONTROL); RESET HLCS	RE	RE	RE	0X0000	OXFF	OXFF	OXFF	0000
1 <u>50</u>]	RETRIEVE CONTROL ID (BAR CODE)	0X0000	000000	0X0707	000000	0X00	0000	0X00	OXOO
1511	CET CAMPLE HAFO EROW HOST	0X0000	0X0000	0X0000	000000	0000	0000	0X00	OXO0_
152	IF SM REPLIES '00', BRANCH TO "MOVE TO NEXT	000000	000000	0X0000	0X0000	0X00	ÖXÖÖ	0000	0000
1 <u>53</u>	IF SM REPLIES '00', BRANCH TO 'MOVE TO NEXT IF SM REPLIES '2', BRANCH TO '00' (CLEAR RACK)	0X0000	0X0000	0X0000	000000	0000	0000	0X00	OXOO
154	KECOKO CORKENT AUTOFOCOS POSTIKOM (KEGOIKES	0X0000	0X0000	0X0000	HW	0000	0000	0000	0x31
155	WAIT FOR OBA COMPLETE.	CX0000	000000	000000	0x0000	0X00	0000	0000	0xFF
56	RETURN TO AUTOFOCUS POSITION	0X0000	000000	0X0000	MO	0X00	0000		0x32
157	WAIT FOR OBA COMPLETE.	000000	000000	0X0000	0x00000	0X00	0X00	<u>0000</u>	OxFF
1 <u>58</u>	TO TEST TUBE (INITIALIZE EP PUMP)	1 11	000000	0X0000	0X0000	0x11	0x00	0000	0X00
1 <u>59</u>	WAIT FOR IT COMPLETE	000000	0X0000	0X0000	000000	OxFF	0x00	0X00	0X00
160	DUMMY STATE FUTURE WAIT FOR HOST TO VERIFY READY	000000	0X0000	000000	0X0000	0x00	0x00	0X00_	0X00
161	MOVE PIPETTE DOWN TO ASPIRATE POSITION IN TEST	ID	0X0000	0X0000	000000	0X13	0x00	0000	0X00
162	WAIT FOR TO COMPLETE	000000	0X0000	0X0000	0X0000	OxFF	0x00	0000	0X00
63	AUTOFOCUSREADYFORCOMMAND: TELL HOST WE'RE	0X0000	0X0000	000000	0X0000	OX00	0X00	0000	0X00
64	WAIT FOR AN AUTO FOCUS COMMAND	0X0000	0X0000	000000	0X0000	OXOO	0000	0X00	OXOO
65	SM REPLY = '00' -> AUTOFOCUSCLEANUP	0X0000	000000	000000	0X0000	0000	0000	0X00	0X00
66	SM REPLY = "01">	000000	000000	0X0000	000000	0000	0000	0000	0X00
167	SM REPLY = "02"> AUTOFOCUSCOARSE	000000	000000	0X0000	0X0000	0000	0000	0000	0X00
168	SM REPLY = "03"> AUTOFOCUSPEAK SM REPLY = "04"> AUTOFOCUSCLINICAL	000000	000000	0X0000	000000	0000	0000	0X00	0X00
169	SM REPLY = '05' -> AUTOFOCUSCLINICAL	000000	000000	000000	0X0000	0000	0X00 0X00	0000	0000
1 <u>70</u> 171	SM REPLY = "10" ->	0X0000	0X0000	0X0000	000000	0000	0000	0000	0000
	SM REPLY = "11"> AUTOFOCUSPEAKFINALOFFSET	0X0000 0X0000	000000	0X0000 0X0000	0X0000 0X000X0	0X00 0X00	0000	0X00 0X00	0X00
172 173	SM REPLY = "12"> AUTOFOCUSCLINICALFINALOFFSET	000000	0X0000 0X0000	000000	0X0000	0000	0000	0000	0000
174	SM REPLY = "20" -> AUTOFOCUSFORWARD1	000000	000000	0X0000	000000	LOXOO	0000	0000	0000
/结	SM REPLY = "21" -> AUTOFOCUSFORWARD2	0X0000	0X0000	000000	0X0000	0000	0000	0000	0X00
1 <u>73</u> 176	SM REPLY = "22" -> AUTOFOCUSFORWARD4	0X0000	0X0000	000000	0X0000	0000	0000	0X00	0000
1 78	SM REPLY = "23"> AUTOFOCUSFORWARD8	0X0000	000000	0X0000	000000	0000	0000	0000	0000
178	SM REPLY = "24"> AUTOFOCUSFORWARD16	0X0000	000000	0X0000	000000	0000	0000	0000	0000
179 179	SM REPLY = "25"> AUTOFOCUSFORWAND32	000000	000000	0X0000	0X0000	0000	0X00	0000	0X00
80	SM REPLY = "26"> AUTOFOCUSFORWARD64	000000	000000	000000	0X0000	0000	0000	0000	0000
1 <u>81</u>	SM REPLY = '27' -> AUTOFOCUSFORWARD128	000000	000000	0X0000	000000	0000	0000	0000	0000
82	SM REPLY = "28" -> AUTOFOCUSFORWARD256	000000	000000	0X0000	0X0000	0000	0000	0000	0000
183	SM REPLY = '29' -> AUTOFOCUSFORWARD512	0X0000	0X0000	0X0000	0X0000	0000	0000	0000	OXOO 1
84	SM REPLY = "2A"> AUTOFOCUSFORWARD1024	000000	0X0000	000000	0X0000	0000	0X00	0X00	0X00
185	SM REPLY = "2B"> AUTOFOCUSFORWARD2048	0X0000	000000	0X0000	0X0000	0X00	0000		0X00
186	BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	000000	000000	0X0000	0000	0000	0X00	OXOO 1
87	AUTOFOCUSUGHTLEVELADJUSTMENT: SEND CURRENT	000000	000000	000000	0X0000	0000	0000	0X00	0X00
188	WAIT FOR STROBE SETTING	000000	0X0000	000000	0X0000	OXOO	0000	0X00	0X00
189	PAUSE FOR IT TO TAKE EFFECT	000000	000000	0X0000	0X0000	0000	0000	0000	OXOO
1 <u>1444</u>	1, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1	VANOVA	- WWW.	1 4/13/4/4	I	- VONY	1 *****	1 "	1
	 								. – i
	∱ oε ι							P	D2 1
								_	

FIG. 8D2

SMTST	TOSM	TVALUE	TFUNC	SENS	STST	SMSK	END	BRAN	DEST	TRANSLATED PARAMETERS
0x3030	— - ₀ -	 000000	OX00	000000	ÖXŐÖ	OXO0	0X0101	<u> 0X002</u> 0	0x3045	0X00, 0X00, 0X0101, 0X0020, 0x304
0X0000	0x36	OXOOZD	0x44	0X0000	0000	OXOO	OXOO1F	0X0000	000000	0X00, 0X00, 0X001F, 0X0000, 0X000
000000	0	000000	0X00	OX0000	0X00	0X00	0X0000	OX0101	Ox3136	0X00, 0X00, 0X0000, 0X0101, 0x313
000000	0	0X0000	0000	000000	0X00	0000	0X001F	0X0000	0X0000	0X00 , 0X00, 0X001F, 0X0000, 0X0000
0X0000	0	0X002E	0x44	0X0000	0000	0000	0X001F	000000	0X0000	0X00, 0X00, 0X00 if, 0X0000, 0X0000
0X0000	0	0X002F	0x44	0X0000	0000	0X00	OX0101	0000000	0X0000	OXOO, OXOO, OXO101, OXOOOO, OXOOO
OX3032	0x81	OX0030	0x44	0X0000	OX00	0X00	0X001F	0X0000	0X0000	OXOO, OXOO, OXOO 1F, OXOOOO, OXOOO
0X3030	0	0X0000	0000	0X0000	0X00	0000	0X0101	0X0020	326	0X00, 0X00, 0X0101, 0X0020, 326},
OX2D32		0X000X0	0X00	000000	0X00	0X00	0X0101	0X0020	0x3045	OXOO, OXOO, OXO 101, OXOO2O, Ox304
0X0000	0	0x2000	0x04	0X0000	OX00	0000	0x0040	0X0000	000000	OXDO, OXOO, OxOO40, OXOOOO, OXOOO
000000	0	0x2000	0x04	0X0000	0X00	0000	0x0040	0X0000	000000	0X00, 0X00, 0x0040, 0X0000, 0X000
0X0000	0	0x2000	0x04	0X0000	0000	0000	0x0040	0X0000	000000	0X00, 0X00, 0x0040, 0X0000, 0X000
0X0000	0	0x2000	0x04	0X0000	0000	0X00	0x0040	0X0000	000000	0X00, 0X00, 0x0040, 0X0000, 0X000
0X0000 0X0000	0	000000	0000	000000	0X00	0000	0X001F	000000	0X0000	0X00, 0X00, 0X00 1F, 0X0000, 0X0000
000000	0	0X0000 0X0061	0X00 0x42	00000X0 00000X0	0000	0X00 0X00	OXOO (F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000
0X0000	- 0	000000	0000	0X0000	0X00 0X00	0000	OXOO1F OXOO1F	0X0000 0X0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X000X
000000	0	000000	0000	0X000X0	0000	0000	0X001F	000000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000
0X0000	0x14	000000	0000	00000X0	0000	0000	0x0101	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000
0x3133	0	0x2000	0x04	0X0000	0X00	0000	0X001F	0x0000	0x0000	0X00, 0X00, 0x0101, 0X0000, 0X000 0X00, 0X00, 0X0011, 0x0000, 0x0000
0x3030	- - 0	0X0000	0000	0X0000	0X00	0000	000101	0x2020	313	0X90, 0X00, 0X0101, 0x2020, 313},
0x3031	ŏ	000000	0000	0X0000	0000	0000	000101	0x2020	187	0X00, 0X00, 0X0101, 0x2020, 3137, 0X00, 0X00, 0X0101, 0x2020, 187).
0x3032	ŏ	CX0000	OXÔO	0X0000	0000	0000	000101	0x2020	197	0X00, 0X00, 0X0101, 0x2020, 197},
0x3033	<u></u>	000000	0X00	0X0000	0X00	0000	000101	0x2020	224	0X00, 0X00, 0X0101, 0x2020, 224},
0x3034	Ō	0X0000	OXXO	0X0000	0000	OXOO	toxoloi	0x2020	252	0X00, 0X00, 0X0101, 0x2020, 252),
0x3035	0	000000	OX00	0X0000	0000	0000	0X0101	0x2020	328	0X00, 0X00, 0X0101, 0x2020, 328),
0x3130	0	OXOOOO	0X00	0X0000	OXOO	0000	0X0101	0x2020	283	0X00, 0X00, 0X0101, 0x2020, 283},
0x3131	0	000000	0000	000000	0000	0000	0X0101	0x2020	285	OXOO, OXOO, OXO101, Ox2020, 285),
0x3132	0	000000	0000	0X0000	OXOO	0000	0X0101	0x2020	287	0X00, 0X00, 0X0101, 0x2020, 287),
0x3230	0	OXOOOXO	0000	0X0000	0000	OXOO	0X0101	0x2020	289	0X00, 0X00, 0X0101, 0x2020, 289},
0x3231	0	0X0000	OXXX	000000	OXXX	OXOO	0X0101	0x2020	291	OXOO, OXOO, OXO101, Ox2020, 291),
0x3232	0	000000	UXOO	0X0000	OX00	0000	0X0101	0x2020	293	OXOO, OXOO, OXO101, Ox2020, 293},
0x3233	0	OX0000	OX00	0X0000	0000	0000	0X0101	0x2020	295	0X00, 0X00, 0X0101, 0x2020, 295},
0x3234	0	0X00X0	0000	000000	0000	OX00	0X0101	0x2020	297	OXIOO, OXIOO, OXIO 101, OXIO 2020, 297
0x3235	Ü	000000	0000	0X0000	0000	0000	0X0101	0x2020	299	OXOO, OXOO, OXO101, Ox2020, 299},
0x3236	0	000000	0000	0X0000	0000	0000	0X0101	0x2020	301	0X00, 0X00, 0X0101, 0x2020, 301},
0x3237 0x3238	0	0X0000	0X00 0X00	000000	0000	0000	000101	0x2020	303	0X00, 0X00, 0X0101, 0x2020, 303},
0x3239		0X0000 0X0000	0000	0X0000 0X0000	0X00 0X00	UXOU	000101	0x2020	305	0X00, 0X00, 0X0101, 0x2020, 305},
0x3241	0	000000		000000	0000	0X00 0X00	000101	0x2020	307	0X00, 0X00, 0X0101, 0x2020, 307,
0x3247	0	000000		000000	0000	0000	0X0101 0X0101	0x2020 0x2020	309 311	0X00, 0X00, 0X0101, 0x2020, 309}, 0X00, 0X00, 0X0101, 0x2020, 311},
000000		000000		000000	0000	0000	000000	000101	163	0X00, 0X00, 0X0000, 0X0101, 163},
000000		000000		000000	0000	0000	0x0101	000000	000000	0X00, 0X00, 0X0101, 0X0000, 0X000 0X00, 0X00, 0X0101, 0X0000, 0X000
0x3130	0.00			000000	0000	0000	0X001F	0x0000	0x0000	0X00, 0X00, 0X00 IF, 0x0000, 0x000
0x0000	ŏ	0X0032	0x42	0X0000	0000	0000	0X001F	0x0000	0x0000	0X00, 0X00, 0X0011; 0X0000, 0X0000
	<u> </u>					† 	1	3,0000		
BD1		· —	-		— – -	· -	<u> </u>			· —

FIG. 8E1

STATE STATE DESCRIPTION	SPACMD	FBACMD	STINCMO	OBACMD	SPASTAT	FBASTAT	STASTAT	OBASTAT]
190 SEND STROBE SETTING TO SM	6 00000	_0X0000	OXOŌOO	000000	- OXO	TOXOOT	0000	OXCO -
191 MAIT FOR JIMAGE PROCESSING IDLE"	0X0000	000000	0X0000	000000	0X00	OXOO	OXO0	0000
192 CAPTURE BACKGROUNDS FOR LIGHT LEVEL WAITFORSMTOBEDONENTHBACKGROUNDS: WAITFOR SM TO BE	0X0000	0X0000	0X00000	0X0000	0000	0X00	OX00	OXO0
1941 PONE WITH LIGHT LEVEL BACKGROUNDS	0000000	000000	000000	000000		OXO	oxoo	
IF SM REPLIES '00' BRANCH TO 'HANDLE STROBE'; ELSE FALL	1/ALAAA	UALRAN	CAUCIA	UALAAN	+ mm-	MALILY	UAUU	- 1/4/4/
£94. THROUGH	000000	0X00000	000000	000000	OXOO	0000	OXOO	0000
195 SEND COMPLETION SIGNAL TO HOST 196 Branch to Autofocusreadyforcommand	000000	000000	000000	000000	0000	ÖXÖÖ	0000	0000
196 BRANCH TO AUTOFOCUSREADYFORCOMMAND 197 AUTOFOCUSCOARSE: RETRIEVE CONTROL ID (BAR CODE)	0X0000 0X0000	0X0000	0X0000 0X0707	0X0000 0X0000	0X00	0X00 0X00	0X00 0X00	0X00 1
198 I GET SAMPLE INFO FROM HOST	0X0000	0X0000	T 000000	<u> </u>	ŎXŎŎ	ÖXÖÖ	T ÖXÖÖ	ÖXÖÖ !
IF SM REPLIES '00', BRANCH TO 'MOVE TO MEXT 199 Control Tubeposition (AF)' 200 If SM Replies '-2', Branch to '0e' (Clear Rack) 201 Walt for 'mage processing idle'	MANANA	avana	OVOCCO	AVADAA	avoa	OVOO	OVOO	0800
SUDT RE 2M BEDTIES 75, BESTRUM (ALL)	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X00 0X00	0X00 0X00	0X00 0X00	0X00 0X00
201 WAIT FOR IMAGE PROCESSING IDLE	0X0000	000000	OX0000	000000	0000	0X00	0000	0000
SOS I STAKT SHEATH FOR RACKPROUND CAPTORE	SB	000000	T 0X00000	0X0000	0031	0X00	0X00	0000
203 WAIT FOR SB COMPLETE 204 Timer Delay before capture	0X0000 0X0000	000000	000000	0X000X0 0X00X0	0XFF 0X00	0000	0000	0000
	CNOOOO	VACCOCO	UAUUUU	WILLOOD	0,000	VAUV	VAUV	UNDU
CAPTURE BACKGROUND AND WAIT FOR FRAME PROCESSING COMPLETE 205 PUTURE WAIT FOR FRAME CAPTURE COMPLETE) OR SHORT SAMPLE DETECTOR.	000000	0X0000	000000	000000	0700	oxoo	AYAA	ovoo i
SEND "SHORT SAMPLE" MESSAGE AND WAIT FOR FRAME	VAUAAA	VAUAAA	UNUUUU	UAUGOU	0000	VAW	0000	0000
SEND "SHORT SAMPLE" MESSAGE AND WAIT FOR FRAME PROCESSING COMPLETE (FUTURE WAIT FOR FRAME CAPTURE								
206 COMPLETE). IF EXCEEDS 10 SECS - GOTO BX.	000000	000000	000000	000000	OXO0	0X00	0X00	0X00
207 TURN OFF EP PUMP ON SPA 208 WALT FOR EB COMPLETE	EB 0X0000	0X0000 0X0000	0X0000 0X0000	0X000X0	OX34 OXFF	0X00 0X00	OXOO	0X00 0X00
ZUY LINITIAL OFFSET A (COARSE)	0X0000	000000	OX0000	1 A	0X00	0X00	OXO0	0033
210 WAIT FOR OBA BACK TO IDLE 211 WAIT FOR "IMAGE PROCESSING IDLE"	OXOXO0	000000	0X0000	0000000	0000	0000	0000	OXH I
211 WALL FUR TMAGE PROLESSING BULE" 2121 START ACRIPATION FOR CAMPIE TRANSFER	000000	0X0000	0X0000 0X0000	0X0000 0X0000	0X00 0X17	0000	0000	0000
212 START ASPIRATION FOR SAMPLE TRANSFER 213 WAIT FOR AS AND BC COMPLETE	AS 0X0000 0X0000 0X0000	000000	100000	0X0000	TOXIF -	OXF	0000	0000
214) TIMER DELAY BEFORE CAPTURE	0X0000	0X0000	ÖXÖÖÖÖ ÖXÖÖÖÖ	0X0000	T 0000	0X00	0000	0X00 0X33
215 COARSEFW1 AF 216 Walt for Ora Back to Idle	00000	0X0000 0X0000	0X0000 0X0000	NA OXOXXX	0X00 0X00	0X28 0X00	0000	0X33_I
CAPTURE SAMPLE FRAMES I SMISATNEXTALITO FOLLSPOSITION	VAUUUU	VAUGUU.	LAVVVV	UNIANA	UNU	VAVV	VAUV	OXFF I
CAPTURE SAMPLE FRAMES ("SMCSATNEXTAUTO FOCUSPOSITION") AND WAIT FOR SAMPLE FRAME CAPTURE COMPLETE OR SHORT								
217 SAMPLE DETECTOR	0X0000	0X0000	0X0000	000000	0X00	OXXO	0X00	0000
SEND 'SHORT SAMPLE' MESSAGE AND WAIT FOR SAMPLE FRAME		ŀ			1			ţ
218 CAPTURE COMPLETE	0X000X	000000	000000	0X0000	OXOO	0000	0000	0000
					1		-,,,	1
F SM ARGUMENT TO "DONEGATHERING MAGES" IS '00' BRANCH TO 219 FORWARD IONFOCUSMOTOR; ELSE FALL THROUGH	000000	000000	0X0000	0X0000	OXXO	0000	0000	oxoo i
2201 SEND COMPLETION SIGNAL TO HOST	0X0000	000000	000000	000000	OXOO	0000	OXXX	- 0000 i
221 I HOME PUMPS	HC	HC .	000000	0X0000	0)(27	0000	- 00X00	0X00 i
222 WAIT FOR AS AND RC COMPLETE	0X0000 0X0000	000000	0X0000	0X0000	OXFF	OXFF	0000	0000
223 BRAYCH YO ALI'OFOCUSKEADYFORCOMMAND 224 ALI'OFOCUSPEAK: RETRIEVE CONTROL ID (BAR CODE)	0X0000	0X0000 0X0000	T 0X0000 T 0X0707	0X0000 0X0000	0X00 0X00	0X00 0X00	0X00 0X00	0000
225 LGET SAMPTE INFO FROM HOST	ŎXŎŎŎŎ	ÖXÖÖÖÖ	0X0000	000000	0X00	ÖXÖÖ	OXOO	ÖXÖÖ_
F SM REPLIES '00', BRANCH TO 'MOVE TO NEXT CONTROL TUBE					-			
227 IF SM REPTIES '-2' RRANCH TO 'OF' /(1 FAR RACK)	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X00 0X00	0X00 0X00	0X00 0X00	0000
F SM REPUES 'CO', BRANCH TO 'MOVE TO NEXT CONTROL TUBE 226 POSITION (AF)' 227 I IF SM REPUES '-2', BRANCH TO "OF" (CLEAR RACK) 228 WALL FOR "IMAGE PROCESSING IDLE"	0X0000	0X0000	0X0000	OX00000	0X00	ÖXÖÖ.	ŎXOO -	ÖXÖÖ
229 STAKT SHEATH FOR BACKGROUND CAPTURE	28	000000	T0X0000	0X0000	0X31	OXOC	0X00	OXOO
230 WAIT FOR SB COMPLETE 231 TIMER DELAY BEFORE CAPTURE	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0XH 0X00	0X00 0X00	0X00 0X00	0000
	VALAÇÃO	VAUAVU	UNUALU	. NYMMM	VAUU	VAUJ	UAUU	0000
		+	+				· — — ·	3E2
▼							•	יייי ביייי

FIG. 8E2

SMTST	TOSM	TVALUE	TFUNC	SENS	STST	SMSK	END	BRAN	DEST	TRANSLATED PARAMETERS
000000	0x8B	000000	OXO0	OXC000	OXOG .	OXOO	0x0101	OXOOOO	0000X0	0X00, 0X00, 0x0101, 0X0000, 0X00000)
0x3338	0x37	000000	0x00	OX0X000	0000	0000	0X001F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X00001
0x0000	OX83	0x0000	0x00	0x0000	0x00	0x00	0x0101 .	0x0000	.0x000x0	0x000,0x000,0x0101,0x00000,0x00000),
QX3034	0	0x0000	0x00	0x0000	0x00	0x00	000010	0x0000	0x0000	0x00, 0x00, 0X0010, 0x0000, 0x0000),
กังวัดวัด	0	000000	OXOO	000000	OXOO	0000	0X0101	0X0020	279	OXOO, OXOO, OXO101, OXOO20, 279}.
0X3030 0x0000	0x87	00000	0000	0X0000	0000	0000	0X0101	0X0000	000000	OXOO, OXOO, OXO101, OXOOOO, OXOOOO).
0X0000	0	0X0000	0000	0X0000	0000	OX00	0X0000	000101	163	0X00, 0X00, 0X0000, 0X0101, 163}.
0X0000	0	0X002F	0x44	000000	OX00	QXQ0	000101	10X0000	000000	0X00; 0X00; 0X0101; 0X0000; 0X0000).
OX3032	0x81	DX0030	0x44	OX0000	0000	0000	CXO01F	0X0000	000000	0X00, 0X00, 0X00 1F, 0X0000, 0X0000;
0X3030	ĬQ.	000000	0000	000000	0000	0000	000101	000020	326	OXOO, OXOO, OXO101, OXOO20, 326).
ÓX2D32	0	000000	OXOO	000000	0000	0000	000101	000020	0x3045	0X00, 0X00, 0X0101, 0X0020, 0x3045),
0x33338	Ox37	000000	0000	000000	0X00	0000	0X001F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X00000, 0X00000
000000	0	0X0000 0X0000	0X00 0X00	0X000X0 0X0000	0000	0000	0x001F 0X001F	0X0000 0X000X0	0X000X0 0X000X0	0X00, 0X00, 0x001F, 0X0000, 0X00001 0X00, 0X00, 0X001F, 0X0000, 0X00001
000000 000000	Ŭ	000018	0x42	ŎXŎŎŎŎ	0X00 0x00	0X00 0x00	000000	000000	ÖXÖÖÖÖÖ	0x00, 0x00, 0x00000, 0x00000, 0x00000};
OX3034	0X83	0x00000	0x00	0x0032	0x00	0x02	0x0001	0x0010	207	0x00,0x02,0x0001,0x0010,207},
		ł								
OX3034_	0x31	0x0019	_0x43	_0x0000	0x00	0x00	0X0010	0x0000	0x4258	0x00, 0x00, 0X0010, 0x0000, 0x4258),
0X0000	Ď	000000	OXOO_	-0X0000	0000	_0X00	0x001F	OXO000	000000	0X00, 0X00, 0x001F, 0X0000, 0X00001,
000000 000000	0	0X0000 0X003R	0X00 0x44	_000000_ _000000_	0X0X0 0X0X0	0000	0X001F 0x0040	0X0000 0X0000	000000	0X00, 0X00, 0X001E 0X0000, 0X00000, 0X00, 0X00, 0x0040, 0X0000, 0X00000,
0X0000	i n		0x44	000000	0000	OX00	0x0040	0X0000	0X0000	0X00, 0X00, 0x0040, 0X0000, 0X00001,
0x3338	0x37	000000	0x00	ÖXÖÖÖÖ	ÖXÖÖ	ŎXÕÕ	CXO01F	000000	ÖXÖÖÖÖÖ	OXOO, OXOO, OXOO1F, OXOOOO, OXOOOOY.
OXOOOO	0	000000	0X00	0X0000	0000	0000	0X001F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000)
000000	Ď	000000	0X00	000000	0000	0000	0x8606	000000	000000	0X00' 0X00' 0x8606' 0X0000' 0X0000'
00000XO	Ô	0X0062 0X0041	0x42 0x44	0X0000 0X0000	0000	0x00 0X00	0X0000 0x0040	0x0000 0x0000	0X0000	0x00, 0x00, 0x0040, 0x0000, 0x0000), 0x00, 0x00, 0x0040, 0x0000, 0x0000),
00000		0,2000	0x04	000000	OXOO	0000	0x0040	0X00000	000000	0X00, 0X00, 0x0040, 0X0000, 0X00001
1			İ							,
OX3036	OX8D	0x0000	0x00	0x0032	0000	0x02	0x0001	0x0010	219	0X00, 0x02, 0x0001, 0x0010, 2193,
										, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
0X3036	0x31	0X0063	0x43	000000	OXOO	0000	000010	000000	0X4258	0X00, 0X00, 0X0010, 0X0000, 0X42583.
									1	,,,,,,,,,,,,,,,,,,,
0X3030	n	000000	OXÓO	000000	0000	0000	000101	000020	215	OXOO, OXOO, OXO101, OXOO20, 2153.
0x0000	Ox87	000000	OXOO	UXUUUU	0000	OXOO	000101	000000	000000	OXOO OXOO OXO101 OXOOOO OXOOOO
OXOOOO	Q	0X0000	OXOO	0X0000	0000	0000	0X001F	000000	000000	OXOO, OXOO, OXOO 1E, OXOOOO, OXOOOO?
0X0000	Ŏ	0X0000		0X0000	0000	0000	0x8606	0X0000	0X0000	0X00, 0X00, 0x8606, 0X00000, 0X000003,
0X0000 10X0000	0	0X0000 0X002F	0X00 0x44	0000000	0000	0X00 0X00	0X0000 0X0101	0X0101 0X0000	0X0000	0X00, 0X00, 0X0000, 0X0101, 163), 0X00, 0X00, 0X0101, 0X0000, 0X0000),
0X3032	0x81	00030	0x44	000000	0000	0000	0X001F	000000	000000	0X00, 0X00, 0X001F, 0X00000, 0X00000}
บรากราก เกรากราก	n	000000	nynn	000000	0000	OXOXO	ומומות	OX0020	326_	
0 X3030 0X2032		10X0000	0X00 0X00	000000	0000	0000	0X0101 0X0101	0X0020	0x3045	0X00, 0X00, 0X0101, 0X0020, 0x3045).
Ox3338	0x37	T0X0000	0x00	ÓXÓOCÓ	OXOO	ÖXÖÖ	0X001F	T0X0000	0X0000	F 0X00, 0X00, 0X001F, 0X0000, 0X0000T.
00000X0	0	0X0000	0X00	0X0000	0000	OX00	0x001F	OX0000	0X00X0	OXOO, OXOO, 0x001F, 0X00000, 0X000003.
000000	Ď	000000	0X00	000000	0000	0X00	0X001F	10X0000	000000	0X00, 0X00, 0X001F, 0X0000, 0X00003;
000000	0	0X0018	0x42	000000	_0x00_	0x00	OX0000	0x0000	0X0000	[0x00, 0x00, 0X0000, 0x0000, 0X0000\$.

18E1

8F2

FIG. 8F1

APERG INTER BEARINGS		T	t	 	Ť- :		.	
STATE STATE DESCRIPTION	SPACMO	FBACMD	STMCMD	OBACMO	SPASTAT	FBASTAT	STMSTAT	OBASTAT
CAPTURE BACKGROUND AND WAIT FOR FRAME				† -	1		 	}¦
PROCESSING COMPLETE (PUTURE WALT FOR FRAME			1		-			l i
232 CAPTURE COMPLETE) OR'SHORT SAMPLE DETECTOR	_000000	DX0000	10X0000	000000	0x00	_0000_	0x00	0x00
SEND 'SHORT SAMPLE' MESSAGE AND WAIT FOR FRAME PROCESSING								i
COMPLETE (FUTURE WAIT FOR FRAME CAPTURE COMPLETE). 233 IF EXCEPTS 10 SECS - GOTO BX.	execco	000000	000000	000000	0,00	0x00	0000	_{0x00} _
.2341 TURN OFF EP PUMP ON SPA	E8 0X0000	000000	nxnnnn	0X0000		0x00	OXXOO	OXOO !
Z3SEWALLFORER COMPLETE		000000	1 0X00000	000000	Ox34 OxFE	0x00	0000	OX00
236 F SM REPLIES '-1' BRANCH TO "FNO"; FLSE FALL THROUGH 237 Initial Offset B (PEAK)	0X0000 0X0000	000000	0X0000 0X0000	0X0000 118	0000	0X00 0X00	ÓXXX	0X00
238. WAIT FOR ORA BACK TO IDLE	000000	000000	000000	0x0000	0000	0000	0X00 0X00	Ox33 r
2391 WAIT FOR "IMAGE PROCESSING INLE"	000000	000000	000000	OXODOO	0x00	0x00	0000	0000
2401 START ASPIRATION FOR SAMPLE TRANSFER	AS	RC.	0X0000	000000	0x17	0x00	0000	OXOO .
241 WAIT FOR AS AND RC COMPLETE 242 TIMER DELAY BEFORE CAPTURE	0X0000 0X0000	0X0000 0X0000	0X0000	0X0000 0X0000	OxFF OxOO	0xFF 0x00	0000	0000
2431 PEAKFW1 AF	000000	000000	000000	NB	0000	0x28	0x00 0X00	0x00 0x33
244 WAIT FOR OBA BACK TO IDLE	OXOOOXO	000000	000000	0x0000	ĹŎXÕÕ	OXOO	0X00	OXFF '
CAPTURE SAMPLE FRAMES ("SMCSATNEXTALTIOFOGUSPOSITION") AND	AVAAAA	400000	avasas	alleane				
245 WAIT FOR SAMPLE FRAME CAPTURE COMPLETE OR SHORT SAMPLE	000000	0X000X0	0X0000	000000	0x0x0	0000	0000	0X00 ~
SEND "SHORT SAMPLE" MESSAGE AND WAIT FOR SAMPLE FRAME	000000	0X0000	OX0000	000000	0x00	OXCO	OX00	oxoo ¦
IF SM ARGUMENT TO "DONEGATHERINGIMAGES" IS '00' BRANCH TO		1]			i
247 FORWARDTONFOCUSMOTOR; ELSE FALL THROUGH 248 SEND COMPLETION SIGNAL TO HOST	000000	000000	000000	0X0000	0000	OXOO	OXOO	0X00
249 HOME PUMPS	OXOOOO HC	0X0000 HC	0X0000 0X0000	0X0000 0X0000	0X00 0x27	0X00 0x00	0X00 0X00	0X00 0X00
250) WAIT FOR AS AND RC COMPLETE	000000	000000	000000	000000	0xFF	OXFF	OXOO	OXOO I
251 BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	000000	000000	DX0000	0000	0000	0000	0000
ZSZ AUTOFOCUSCUNICAL RETRIEVE CONTROL ID (BAR CODE) ZSS GET SAMPLE INFO FROM HOST	000000	000000	00/0/	000000	0000	0000	OXOU	OX00 i
IF SMCREPTIES 'ON' BRANCH TO "MOVE TO NEXT	UNUUUU	UAUUUU	0X0000	000000	0000	0000	0000	0X00
IF SITELPTES TO TRANCH TO MOVE TO NEXT 254 CONTROL TUBE POSITION (AF) 255 IF SM REPLIES '-2', BRANCH TO "OF" (GEAR RACK) 256 WAIT FOR "IMAGE PROCESSING IDE"	0X0000	0X0000	0X0000	000000	0000	0000	0X00	OX00 :
2551 IF SM REPLIES '-2', BRANCH 10 'OF' (CLEAR RACK) 2561 WAIT FOR "IMAGE PRIXESSING IDLE"	000000	000000	000000	000000	0100	OXOO	0000	OXXO :
257 START SHEATH FOR BACKGROUND CAPTURE	0X0000 SB	0X000X0 0X000X0	0X0000 0X0000	0X0000 0X0000	0x00 0x31	0x00 0x00	0X00 0X00	0X00 0X00
2581 WAIT FUR SIS COMPLETE	OXOÑOO	000000	OXOCOO	000000	OWFF	0x00	0000	0000
2591 TIMER DELAY BEFORE CAPTURE	000000	0X0000	0X0000	0X0000	0000	0000	0000	0x00
CAPTURE BACKGROUND AND WAIT FOR FRAME PROCESSING								
COMPLETE (FUTURE WAIT FOR FRAME CAPTURE 260 (COMPLETE) OR SHORT SAMPLE DETECTOR.	0X0000	0X0000	000000	000000	0x00	0x00	0x00	0x00
I SENI) "SHITIRI SAMPLE" MESSAGE AND WAIT FOR FRAME	UNUVUU	VANOVA	UNUUU	0,000	UAUU	VAUV	UXUU	ULUU
PROCESSING COMPLETE (FUTURE WAIT FOR FRAME								f
2611 CAPTURE COMPLETE). IF EXCEEDS 10 SECS - GOTO BX.	000000	000000	000000	000000	0x00 0x34	0.00	0x00	0x00 0x00
2021 JUMP OFF EF FUNIF ON 3FX	OX0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0034 0xH	0x00		UXUU
263 WAIT FOR EB COMPLETE 264 IF SM REPLIES '-1' BRANCH TO "END"; ELSE FALL THROUGH	0X0000	0X0000	000000	000000	OXOO	000	OXO OXO	0X00 0X00
265) INITIAL OFFSET C (CLINICAL)	<u> </u>	0X00000	ÖXÖÖÖXÖ	1	0000	OXOO	ÖXÖÖ	0x33
2661 WALFOR OBA BACK TO IDLE	000000	000000	OX0000	0x0000 0x0000	1 OXO0	OXOO	OX00	(XFF
267 START ASPIRATION FOR SAMPLE TRANSFER	AS OXOOOO	I RC	OXOOOX	000000	0x17	0x00	OX00	OXOO .
268 WANT FOR AS AND RCCOMPLETE 2691 IMER DELAY BEFORE CAPTURE	<u> </u>	0X0000 0X0000	0X0000 0X0000	000000	OxFF.	OXF.	OXO0	0000
2701 (TINKA) FW1 AF	000000	00000	000000	0X0000	0000	0x00 0x28	0x00	0x00 0x33
2701 (TINKALEWI) AF 2711 NAVI FOR OBA BALKTO JOLE	000000	000000	OXOOOO	0x0000	1 8888 I	0000		0xH
-+								
BG1								8F2

FIG. 8F2

SMTST	TOSM	TVALUE	TFUNC	SENS 	STST	SMSK	END 	BRAN	DEST	TRANSLATED PARAMETERS
X3034	0X83	0x0000	0x00	0x0032	0x00	0x02	0x0001	0x0010	234	0x00, 0x02, 0x0001, 0x0010, 234},
		240040				4.00	080040	0.0000	0.4355	0.00 0.00 080010 0.0000 0.1000
X3034	0x31	0X0019 0X0000	0x43	0x0000 0X0000	0x00 0X00	0x00 0X00	000010	0x000x0 00000X0	0x4258	0x00, 0x00, 0X0010, 0x0000, 0x4258), 0X00, 0X00, 0x001F, 0X0000, 0X00001,
X0000 X0000	1 -	000000	0X00 0X00	0X0000	OXXX	1 0X00	0x001F 0X001F	T0X0000	0X0000 0X0000	-0X00, 0X00, 0X001F, 0X0000, 0X0000F,
x2D31		0X0000	0000	000000	0X00	0000	0X0101	OX0020	335	OXOO, OXOO, OXO101, OXOO20, 335},
X0000		0X003B	0x44	000000	0000	0000	0x0040	0X0000	0X0000	0X00, 0X00, 0x0040, 0X0000, 0X0000)
X0000 x3338	0x37	0X003B 0X0000	0x44 0x00	0X0000 0X0000	0000	0000	0x0040 0x001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0x0040, 0X0000, 0X0000\ 0X00, 0X00, 0X001F, 0X0000, 0X0000\
X0000	(TÖXÖÖÖÖ	OXXX	0X0000	T 0X00	0X00	i XXXXXIII	0000000	000000	OXOO, OXOO, OXOO 1F, OXOOOO, OXOOOO),
X0000	(000000	CXOO	1 0X000X0	0000	OXQQ	0x8606	000000	0X0000	0X00, 0X00, 0x8606, 0X0000, 0X00003
X0000 X0000		0X0062 0 0X0041	0x42 0x44	0X0000 0X0000	0x00 0X00	0x00 0X00	0X0000 0x0040	0x0000 0X0000	0X0000 0X0000	0x00, 0x00, 0X0000, 0x0000, 0X00001, 0X00, 0X00, 0x0040, 0X0000, 0X00001
X0000		0X003B	0x44 0x44	0X0000	0X00	0000	0x0040	0X0000	0X0000	OXOO, OXOO, OXOO40, OXOOOO, OXOOOO)
X303 6	0X8D	0x00000	0x00	0x0032	0000	Ox02	0x0001	0x0010	247	0X00, 0x02, 0x0001, 0x0010, 247},
X3036	0x31	0X0063	0x43	0X0000	0X00	0000	000010	0X0000	OX4258	OXOO, OXOO, OXOO10, OXOOOO, OX4258}
X3030	l (0000000	0000	000000	0000	0X00	000101	000020	243	OXOO, OXOO, OXO101, OXOO20, 243).
x0000	0x87	OX0000	OXXO	0X0000	0X00	0X00	0X0101	0X0000	0X0000	OXOO, OXOO, OXO101, OXOOOO, OXOOOO3
X0000	() 0X0000	0000	0X0000	0X00	0000	0X001F	0X0000	000000	0X00, 0X00, 0X001F, 0X0000, 0X00001
X0000 X0000) 10X0000) 10X0000	0X00 0X00	0X0000 0X0000	0000	0000	0x8606 0x0000	0X0000 0X0101	0X0000 163	0X00, 0X00, 0x8606, 0X0000, 0X0000 0X00, 0X00, 0X0000, 0X0101, 1631.
)X0000		00002F	0x44	ŎXŎŎŎŎ	T ÖXÖÖ	0X00 0X00	TOXOTOT	1000000	0X00000	OXOO, OXOO, OXO101, OXOOOO, OXOOOO
)X3032	0x81	0X0030	0x44	000000	0000	0X00	0X001F	0X0000	0X0000	OXOO, OXOO, OXOO 11, OXOOOO, OXOOOO
X3030	. (000000	0000	OXOXX	OXOO	OX00	OXO101	0X0020	326	OXOO, OXOO, OXOTOT, OXOO20, 326},
X2D32		000000	0000	0X0000	0000	0000	0X0101 0X001F	0X0020	0x3045	0X90, 0X00, 0X0101, 0X0020, 0x3045) 0X00, 0X00, 0X001F, 0X0000, 0X00005
)x3338)X0000	0x3/	000000	0x00 0x00	000000	0000	0000	0x001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000 0X00, 0X00, 0X001F, 0X0000, 0X0000
DXD000		ÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖÖ	0000	000000	OXOO	ÖXÖÖ	0X001F	0X0000	0X0000	0X00, 0X00, 0X00 1F, 0X0000, 0X0000
X0000		000018	0x42	000000	0x00	0x00	000000	0x00000	0X0000	0x00, 0x00, 0x0000, 0x0000, 0x0000}
X3034	0X83	0x0000	0x00	0x0032	0x00	0x02	0x0001	0x0010	262	0x00, 0x02, 0x0001, 0x0010, 262],
1100 T	01103	- CARCOUR	GAOO	UNUUL .	-	1		LADOTO	202	41441 41441 41441
X3034	0x31	0X0019	0x43	0x0000	0x00 0x00	0x00 0x00	000010	0x0000 0x0000	0x4258 0X0000	0x00, 0x00, 0X0010, 0x0000, 0x4258}.
XŬŬŬ) 0X0000	0000	000000			0x0011			0X00, 0X00, 0x00 1F, 0X0000, 0X0000
X0000 X2031) 10X0000) 10X0000	0000	0X0000 0X0000	0000	0X00	0X0101	0X0000 0X0020	335	0x00, 0x00, 0x0011; 0x0000, 0x0000} 0x00, 0x00, 0x0101, 0x0020, 3351.
X0000	T ()	0x44	0X0000	0X00	1 0X00	0x0040 0x0040	T0X0000	0X0000	OXOO, OXOO, 0x0040, 0X0000, 0X0000)
X0000 X0000 X0000	1 1)		T0X0000	T 0X00	OX00	0x0040	T0X0000	000000	I - 0X00, 0X00, 0x0040, 0X0000, 0X0000
XOOOX		00000X0 0 00000X0 0	0X00 0X00	0X0000 0X0000	0X00 0X00	0X00 0X00	0X001F 0x8606	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X901F, 0X0000, 0X0000 0X00, 0X00, 0x8606, 0X0000, 0X0000
00000) 0X0062	0x42	000000	000	0x00	000000	0x0000	000000	0x00, 0x00, 0x0000, 0x0000, 0x00001
X0000) (0X0041	0x44	0X0000	OX00	OX00	0x0040	T0X0000	000000	OXOO, OXOO, OxOO40, OXOOOO, OXOOOO
X0000		OXOO3B	Ox44	0X0000	0000	0X00	0x0040	0X0000	0X0000	0X00, 0X00, 0x0040, 0X0000, 0X0000
 3F1		· <u> </u>						- 		

FIG. 8G1

STAT	SPACMD	FBACMD	STMCMD	OBACMD	SPASTAT	FBASTAT	STMSTAT	OBASTAF
STAT]				,
	CAPTURE SAMPLE FRAMES		T	1			Γ	
	("SMCSATNEXTAUTOFOCUSPOSITION") AND WAIT FOR SAMPLE							l I
272	FRAME CAPTURE COMPLETE OR SHORT SAMPLE DETECTOR	OX0000	0X0000	OXOOOO	000000	0x00	0X00	0000
273	SEND "SHORT SAMPLE" MESSAGE AND WAIT FOR SAMPLE Frame Capture Complete	OX0000	0X00000	000000	000000	0x00	OXOO	oron I
7/3	IF SM ARGUMENT TO "DONEGATHERINGIMAGES" IS "OO"	UNUUUU	VAUAAA	DAODOU	UNIANU	LUXVV	LAWY.	TOXOOT !
274	BRANCH TO FORWARD TONFOCUSMOTOR: FLSE FALL THROUGH	000000	000000	000000	000000	Loxoo	0x00	0000
275 276	SEND COMPLETION SIGNAL TO HOST HOME PUMPS	000000	000000	000000	000000	0000	0000	0000
276	HOME PUMPS	1 HC	HC	0)(0000	0X0000	0x27	0x00	0000
277 278	WAIT FOR AS AND RECOMPLETE BRANCH TO AUTOFOCUSREADY FOR COMMAND	000000	000000	000000	000000	OXFF	OxFF	0000
279 279	HANDLESTROBE: WAIT FOR STROBE SETTING	0X0000 0X0000	0X0000 0X0000	000000 000000	0X0000 0X0000	0X00 0X00	0000	0000
280	PAUSE FOR IT TO TAKE EFFECT	000000	0X0000	DX0000	000000	0000	0X00 0X00	0000
280 281	SEND STROBE SETTING TO SM		1 0X000X0	0000X0	00000XO	1 0X00	ÖXÖÖ	<u> 1 0000 !</u>
282 283	BRANCH BALK TO WAITFORS MTCBEDONEWITHBACKGROUNDS	000000	1 0X0000	DX0000	1 OXOOOO	0X00	0X00	0000
	AUTOFOCUSCOARSEFINALOFFSET	000000	000000	000000	₿A	0X00	0000	0000
284 285	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	000000	0X0000	000000	0000	0000	OXOO!
285	AUTOFOCUSPEAKFINALOFFSET	000000	0X0000	000000	BB	0X00	OXO0	0X00
286	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	0X00000	0X0000_	000000	000000	OXO0	0X00	OXOO
287	AUTOFOCUSCUNICALFINALOFFSET	000000	0X0000	000000	BC	0X00	0X00	OX00
288 289	WAIT FOR ORA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	000000	0000000	DX0000	OXOO .	0X00	0X00
709	AUTOFOCUSFORWARD1 WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	0X0000	000000	000000	FO	0000	0X00	0000
290 291	AUTOFOCUSFORWARD2	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 F1	0X00 0X00	0X00 0X00	0000
292	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	000000	000000	000000	0X00	0000	0000
293	AUTOFOCUSFORWARD4	0X0000	0X0000	000000	FZ	0000	0000	0000
294	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	000000	000000	000000	oxoo	0000	0000
295	AUTOFOCUSFORWARD8	000000	0X0000	000000	F3	0X00	0000	OX00
296 297	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	0X0000	0X0000	0X0000	000000	OX00	0X00	0X00 i
	AUTOFOCUSFORWARD 16	0X0000	0X0000	000000	F4	0000	0X00	1 0000
298	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	0X0000	000000	00000X0	0X00	0X0X0	OX00_[
299	ALTOFOCUSFORWARD32	000000	0X0000	000000	F5	0000	0000	OX00_i
8	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND AUTOFOCUSFORWARDG4		000000	0X0000	DX0000	<u> </u>	0X00 0X00	0X00
	NAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	OX0000	0X0000		16	0X00		0000
302 303	AUTOFOCUSFORWARD 128	0X0000 0X0000	0X0000 0X0000	0X000X0	0X0000 F7	0X00 0X00	0000	OXOO ;
	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND			000000			0X00	0000
304 305	AUTOFOCUSFORWARD256	000000	00000X0 0000X0	0X0000	0X0000 F8	0X00 0X00	0X0X0 0X0X0	0X00 0X00
306	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	000000	000000	000000	0000	0000	OXOO ;
307	AUTOFOCUSFORWARD512	000000	0X0000	0X0000	F9	OXOO	0X00	0X00
	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	0X0000	0X00000	0X0000	000000	0000	0000	0X00
308 309	AUTOFOCUSFORWARD1024	000000	000000	ÖXÖÖÖÖ	TA	† <u>8x86</u>	0000	1 00000 :
310	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	000000	000000	000000	000000	OXOO	0000	0000
311	AUTOFOCUSFORWARD2048	0X0000	0X0000	0X0000	FB	OXOO	0000	OXOO !
312	WAIT FOR OBA AND BRANCH TO AUTOFOCUSREADYFORCOMMAND	CX0000	0X0000) OXOOOO	000000	0000	0000	0000
313	AUTOFOCUSCLEARUP: TO WASTE WELL	IW .	DB	000000	000000	0x15	0x00	<u> </u>
314 315		0X0000 0X0000	0X0000 0X0000	000000	000000	0xFF	0x00	0X00
316	TEST SHEATH FULL SENSOR	00000	000000	0X000X0	000000	0x00 0x00	0x0T 0x00	0000
#	TURN ON RINSE PUMP AND RINSE PIPETTER	I IR	IP I	000000	000000	1 8000	0x25	10000 i
					1	1-11-1	1	
	<u>-</u> <u></u>							OOD

18H1

FIG. 8G2

SMIST	TOSM_	TVALUE	TFUNC	SENS_	STST	SMSK	END	BRAN	DEST	TRANSLATED PARAMETERS
l I overes	AUAD	0.0000		4 4024	61/04					
OX3036	OX8D	0x00000	0x00	0x0032	0000	0x02	0x0001	0x0010	274	0X00, 0x02, 0x0001, 0x0010, 274},
OX3036	0x31	0X0063	0x43	0X0000	OXOO	0X00	000010	0X0000	0X4258	0X00, 0X00, 0X0010, 0X0000, 0X4258},
										
<u>0X3030</u>	0	0X0000	OX00	0X0000	0X00	0X00	0X0101	OX0020	270	0X00, 0X00, 0X0101, 0X0020, 270},
0x0000	0x87	000000	0X00	0X0000	0000	0X00	000101	000000	0X0000	CX00, 0X00, 6X0101, 0X0000, 0X0000},
AVOSOO		070000	03100	27222	41144					
0X0000 0X0000	0	0X0000 0X0000	0X00 0X00	0X0000 0X0X00	0X00 0X00	0X00 0X00	0X001F 0x8606	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000}, 0X00, 0X00, 0X8606, 0X0000, 0X0000),
0X0000	ŏ	0X0000	OXOO	0X0000	0X00	OXOO	0X0000	0X0101	163	0X00, 0X00, 0X0000, 0X0101, 1633.
0x3130	Ū	0X0044	0x44	000000	0X00	OXOO	0X001F	T0x0000	0x0000	0X00, 0X00, 0X00 11, 0x0000, 0x00001.
000000	0.00	0X0045	0x42	0X0000	0000	0000	0X001F	0x0000	0x0000	0X00, 0X00, 0X001F, 0x0000, 0x00001,
0X0000	0x8B	0X0000	0000	000000	0000	0X00	0x0101	0X0000	000000	0X00, 0X00, 0x0101, 0X0000, 0X0000),
0x0000 0x0000) D	0X0000 0x2000	0000	000000	0000	0000	0x0000 0x0040	0x0101 0x0000	0X0X00	0X00, 0X00, 0x0000, 0x0101, 193}, 0X00, 0X00, 0x0040, 0X0000, 0X0000),
XXXXXX	ľ	1000000	0x04 0x00	0X0000	0X00 0X00	0X00	0x0040	0x0040	163	0X00, 0X00, 0X004C, 0X0040, 1631,
OXOOOO	U	0x2000	0x04	000000	0000	0000	0x0040	000000	UX0000	0000, 0000, 00040, 000000, 000000),
0X0000	0	0X0000	0000	0X0000	0X00	0X00	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163},
000000	0	0x2000	0x04	0X0000	0X00	OX00	0x0040	000000	OXOCOO	0X00, 0X00, 0x0046, 0X0000, 0X0000},
0X000X0	0	000000	OXOO	0X0000	0X00	OX00	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163},
000000	0	0x2000	0x04	0X0000	0X00	OXOO	0x0040	0X00000	000000	0000, 0000, 000040, 000000, 000000),
0X0000	0	0X000X0	0X00	0X0000	OXOO	OX00.	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163},
0X000X0	0	0x2000	0x04	000000	0X00	OX00	0x0040	000000	OXO000	0X00, 0X00, 0x0040, 0X0000, 0X0000),
0X0000	0	0X000X	OXOO	0X0000	0X00	OX00	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163},
00000	, Q	0x2000	0x04	000000	0000	0000	0x0040	000000	000000	0X00, 0X00, 0X0040, 0X0000, 0X0000},
000000	0	000000	0000	000000	0000	0000	0x0040	0x0040	163	0X00, 0X00, 0X0040, 0X0040, 163},
0X0000	0	0x2000	0x04	0X0000	0X00	OX00	0x0040	0X0000	000000	0X00, 0X00, 0x0040, 0X0000, 0X0000),
0X0000 0X0000	0	0X0000 0x2000	0X00 0x04	0X0000	0000	0000	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163},
0X0000	0	0X0000		0X0000 0X0000	0000	0000	0x0040	000000	000000	0X00, 0X00, 0x0040, 0X0000, 0X0000),
0X0000	Ö	0x2000	0X00 0x04	0X0000	0X00 0X00	0X00 0X00	0x0040 0x0040	0x0040 0X0000	0X00000	0X00, 0X00, 0x0040, 0x0040, 163}.
0X0000	0	0X0000	0000	0X0000	0000	0X00	0x0040			0X00, 0X00, 0x0040, 0X0000, 0X0000), 0X00, 0X00, 0x0040, 0x0040, 1633
1 000000	 	10x20000	0x04	- XXXXXX	0000	- XXXX	0x0040	0x0040 0x0000	0X00000	0X00, 0X00, 0x0040, 0x0040, 163}, 0X00, 0X00, 0x0040, 0X0000, 0X0000),
OX0000	Ô	0X0000	0000	000000	0000	0000	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163},
0X0000	Ŏ	0x2000	0x04	OXCOCO	OXOO	ÖXÖÖ	0x0040	ÖXÖÖÖÖÖ	0X0000	0X00, 0X00, 0X0040, 0X0000, 0X0000,
000000	.0	000000	0X00	0X0000	0000	0X00	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163).
0X0000	0	0x2000	0x04	0X0000	0X00	OXXO	0x0040	OX0000	0X0000	0X00, 0X00, 0x0040, 0X0000, 0X0000),
0X0000	0	00000X0	0X00	0X0000	0000	0X00	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163),
0X0000	. 0	0x2000	0x04	0X0000	0000	OXOO	0x0040	0X0000	0X0000	0X00, 0X00, 0x0040, 0X0000, 0X0000},
0X0000	Q	000000	0000	000000	0000	0000	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163),
OX00000		0x2000		0X0000	0X00	OX00	0x0040	000000	0X0000	0X00, 0X00, 0x0040, 0X0000, 0X0000},
000000		0X0000		0X0000	0000	0X00	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163},
000000		0x2000		000000	0)(00	0000	0x0040	000000	000000	0X00, 0X00, 0X0040, 0X0000, 0X0000),
000000		0X0000		000000	0000	0000	0x0040	0x0040	163	0X00, 0X00, 0x0040, 0x0040, 163},
0X0000 0X0000		000000		000000	0000	0000	0X001F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000),
0X0000	. 0		0000	0X0000 0X0000	0000	0000	0X001F 0X001F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X00001,
00000		000000	0000	0x00033	0x01	0X00 0x01	0,0101	0X0000 0x0001	0X0000 318	0X00, 0X00, 0X001F, 0X0000, 0X0000}, 0x01, 0x01, 0x0101, 0x0001, 318},
OX0000		0X00000	0000	000000	000	0X00	0x0000	0x001F	319	0X00, 0X00, 0x0000, 0x001F, 319),
		TAKANATA T	VIIVV	VIVVVV	WWV	V/V	VAVVVV		- 213	VAVV, VAVV, VAVV, VAVV [], 313],
004				-				BHS		

8G1 18H2

FIG OUT

							FIC	3. B	H1
STA INDE	STATE DESCRIPTION	SPACMO	FBACMD	STMCMD	OBACMD	SPASTAT	FBASTAT	STMSTAT	OBASTA
317	TURN ON RINSE PLIMP AND RINSE PIPETTER	<u> </u>	RP -	ōxoōoō	000000	000	Ωx25	0000	OXOO
318_	TŮRN ÓN RÍNSE PŮMP ÁNĎ RÍNSE PIPETTER			0X0000	00000XD	10X00	0x25	0000	TOXOO
319 320		0X0000 0X0000	0X0000 0X0000	000000	0X0000 0X0000	LOXFF Toxoo	0x00 fxF	0000	0000
321	CLEAR PIPETTER/HOME CP AND SP/MOVE TO NEXT TUBE	Œ.	l HC	MN	Loxooo	0X16	0000	OXOO	0000
322 323		000000	0X0000 0X0000	000000	000000 000000	0XFE 0x00	Oxff Oxff	0000	OXXX
324		000000	000000	000000	000000	0x00	0000	OXOO OXFF	OXOO
325	BRANCH TO "16" (GORESUME)	1 000000	0X0000	000000	000000	0000	OXOO	0000	0000
326	MOVETONEXICONTROLTUBE_AF: MOVE TO NEXT CONTROL TUBE Position (AF)	000000	_0X0000	MN	000000	0000	0000	0X32	OXOO
327	BRANCH TO "16" (GO RESUME)	000000	000000	000000	000000	10X00	0000	0000	0000
328 329	VALIDATE CURPOSITION: WAT FOR OBAJDLE	000000	000000	000000	0x0000	0000	10 X 00	0000	LOXFF
330	VALIDATE CURRENT FOCILS POSITION (MUST BE "IN FIRST AF VALIDATEL: IE 31 ("GOOD") FROM OBA GOTO AF ISVALID	0X0000 0X0000	0X0000 0X0000	00000X0 0000X0	VP 0X0000	0X00 0X00	0X00	0X00 0x00	0x00 0x31
331 332	I IE 20 ("RAN") EROM ORA COTO AE ISMOTVALID	000000	0X0000	0X0000	OXO000	0000	OX00	0x00	0x30
132_	LOOP BACK TO AF VALIDATE 1 AF ISVALID: SEND EFOCUSPOSITIONISVALID (0X29) TO HOST AND GOTO AUTOFOCUSREADYFORCOMMAND AF ISNOTVALID: SEND EFOCUSPOSITIONISNOTVALID (0X28) TO HOST AND GOTO AUTOFOCUSREADYFORCOMMAND END 17 TAUTOFOCUS CONTROL)	000000	OX0000	0X00000	000000	0000	OXOO	OX00	0000
333	I AND GOTO AUTOFOCUSREADYFORCOMMAND	000000	000000	000000	000000	0000	000	0X00	OXCO
	AF_ISMOTVALID: SEND EFOCUSPOSITIONISMOTVALID (0X28) TO								``
334 335	HOST AND GOTO AUTOFOCUSREADYFORCOMMAND	000000	000000	0X0000	000000	0X00	OXOO	0000	0X00
333 336	I SINKI MENIULE	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X00 0X00	0X00 0X00	OXOO OXFF	0X00 0X00
₹₹7	SEND SYNCH COMMAND TO HOST	OX0000	000000	000000	000000	0000	0X00 0X00	0.00	0X00 0X00
338 339	WAIT FOR SM COMMAND TELL STM TO LOOK FOR RACKS	0X0000 0X0000	000000	OXOCOO Wr	00000X0 0000X0	0X00 10X00	0X00 0X00	0000	0000
340	WAIT FOR BUTTON OR RACK	1 0X0000	1 0X0000	0X0000	000000	0000	0000	0X00 0X52	0X00 0X00
341	SEND SYNCH COMMAND TO HOST	000000	000000	000000	000000	0000	0000	0x00	ioxoo
342 343	WAIT FOR SM COMMAND BRANCH TO SHUTDOWN IF STANDBY PERIOD EXCEEDED	000000	0X0000 0X0000	0X0000 0X0000	0X0000	0X00 0X00	0X00 0X00	2 88	0000
344	UNCONDITIONALLY BRANCH TO ENDIDE Branch to wakeup long if long standby pendu exceeded	0X6000	1 0X0000	1 0X0000	OXOOOO	10X00	OXO0	OXO0	0000
345 346	BRANCH TO WAKEUP CONG IF CONG STANDBY PERIOD EXCEEDED Branch to wakeup medicin if intermediate standby period	0X0000 0X0000	000000	0X0000	00000XO I	LOXOO .	0000	0000	0000
347	BRANCH UNCONDRONALLY TO WAKEUP SHORT	OXOGOG	0X0000 0X0000	0X0000 0X0000	0X000X0 0X000X0	0X00 0X00	0X00	000 000 000 000 000 000 000 000 000 00	0X00 0X00
348_		T-0X0000	0X0000 0X0000	1 000000	1.0X000X0	10X00	0000	0000	0000
349 350	TIMEOUT GO TO REALIDLE START PI; TO TEST TOBE:ALSO START WARWASHT	00000	0X0000 0X0000	000000	0X0000 0X0000	0X00 0x11	0X00 0x00	0000	0X00 0X00
351	, , <u>, , , , , , , , , , , , , , , , , </u>	000000	000000	000000	000000	OxFE	0700	OXOO	0000
352_ 353	START SHEATH FOR BACKGROUND CAPTURE WAIT FOR SB COMPLETE	SB OXOOOO	0X0000 0X0000	0X0000	0X0000 0X0000	0x31 0xFF	0X00 0X00	0000 0000	0X00 0X00
354	TIMER DELAY Turk off Ep plump on Spa	000000	000000	000000	000000	0x00	0x00	0x00	0x00
355	TURN OFF EP PUMP ON SPA	EB	0X0000	000000	000000	Dx34	0x00	0000	OXOO_
156. 157	WAIT FOR EB COMPLETE MOVE PIPETTE DOWN TO ASPIRATE POSITION IN TEST TUBE	0X0000 TD	0X0000	000000	00000X0 0000X0	OxFF OX13	0000		0X00 0X00
158	I WAIT FOR TO COMPLETE	OXOOOO AS	0X0000 0X0000	000000	000000	OxFF	0x00 1	0000	0000
59 60	START ASPIRATION FOR SAMPLE TRANSFER Walt for as and RC Complete	AS	RC 0X0000	L 0000000	0X0000	Ox17	0x00	0000	OXXX
161	! TIMER DELAY	0000X0	0X0000	0X0000 0X0000	0X0000 0X0000	0xFF 0x00	28 28 28 28	0X00	0X00 0X00
61 162 163	TURN OFF FP PUMP ON SPA. SP PUMP ON FRA	I EB	EB	00000X0	000000	10x34	0x0	0000	0000
163 164	WAT FOR EB'S COMPLETE (SPA AND FBA)	OXOOOO TW	DB	0X0000 0X0000	0X0000 0X0000	0xH 0x15	0xH 0x00	ÖXÖÖ OXOO	ÖXÖÖ ÖXÖÖ
65	TO MICHE MELL	0X0000	<u>0x0000</u>	OXOCOC	nxnnnn	TOXEE	0x00	0000	MOO
65 66 67	NOSIN CITING CIT	0X0000	0X0000 0X0000 0x0000	000000	000000	0x00	OXFF I	0000	0X00 0X00
68	DRAIN FLOWCELL	DF OXOOOO	OXOGICK)	0X0000 0X0000 0X0000 0X0000	0X0000 0X0000	0x00 0x26 0xH	0x00 0x00	ÖXÖÖ ÖXÖÖ	0X00 0X00
69	PRIME SHEATH SUPPLY LINE	15	0X0000 0X0000 0X0000	I OXOOXOO I	000000	10x20 :	0x00	0X00	0X00
70 71	PRIME ALL PUMPS	0X00000 PP	0X0000 PC	0X0000 0X0000	000000		0,00		0000
71 72 73	THURLISE I UPT J	0X0000 0X0000	0X0000	00000	0X0000 0X0000	0xF	0x00 0x00	0X00 0X00	0X00 0X00
73 74	PRIME INNER LINES #1	000000	000000	000000	0X0000 0X0000	L0x00	ŎĸŦ	0X00 0X00	000
14	CRUSE IMMERITATES #1	TR 0X0000	PI 0X0000	0X0000 0X0000	000000	0x00 0x00	Ox24 OxFE	00X0 00X0	0X00 0X00
75	811		UAUUUU				— <u>—</u>		BH2

FIG. 8H2

										רוט. אחב
SMTST	TOSM	TVALUE	TFUNC	SENS	STST	SMSK	END	BRAN	DEST	TRANSLATED PARAMETERS
000000	<u> </u>	000000		000000	0X00	0X00	0X001F	000000	0X0000	0X00, 0X00, 0X00 (F, 0X0000, 0X0000),
000000	<u> </u>	0X0000	0000	000000	0X00	0000	0X001F 0X001F	000000	000000	0X00, 0X00, 0X00 E 0X0000, 0X0000)
0X0000 0X0000	0x36	T0X0000	0000	00000 00000	0X00 0X00	0X00 0X00	0X001F	0X0000 0X0000	0X0000 0X0000	0X90, 0X00, 0X001F, 0X0000, 0X0000\ 0X00, 0X00, 0X001F, 0X0000, 0X0000\
000000	0	T0X0000	0000	0X0000	0000	1 OXOO	0X001F	0X0000	0X0000	0X00, 0X00, 0X00 [F, 0X0000, 0X0000]
0X0000	Ŏ	000000	0X00 0X00	000000 000000	0X00 0X00	0X00 0X00	0X001F 0X001F	0X0000	0X0000 0X0000	0X00, 0X00, 0X00 (F, 0X0000, 0X0000).
10X0000	Ö	0X0000	OXOO .	000000	0000	0X00	0X00000	0X0000 0X0101	0x3136	0X00, 0X00, 0X001F, 0X0000, 0X0000}, 0X00, 0X00, 0X0000, 0X0101, 0x31361,
] "		T		UIIV V					l	
000000 000000	0x36	0X0049 0X0000	0x04 0x00	000000 000000	0X00 0X00	0X00 0X00	0X001F 0X0000	0X0000 0X0101	0X0000 0x3136	0X00, 0X00, 0X001F, 0X0000, 0X0000}, 0X00, 0X00, 0X0000, 0X0101, 0x3136},
000000	l ö	0x2000	0x04	000000	0000	0000	0x0040	0X0000	000000	DX00, DX00, DX0040, DX0000, DX0000)
000000	, û	0x2000	0x04	000000	0000	0X00	0x0101	000000	000000	0000,000,000,000,000,00000,000000
000000 000000	0x00 0x00	0X0000	0X00 0X00	0X0000 0X0000	0X00 0X00	0X00 0X00	0x4040 0x4040	0x0040 0x0040	. <u>333</u> 334	0X00, 0X00, 0x4040, 0x0040, 333].
000000	0	000000	0000	000000	0000	0000	0X001F	0X0101	330	0X00, 0X00, 0x4040, 0x0040, 3341 0X00, 0X00, 0X001F, 0X0101, 3303
I										1
00000XO	0x29	0x0020	0x03	00000	_0000	OX00	0000000	0x0000	163	<u>0X00, 9X00, 0X0000, 0x0000, 163},</u>
10X0000	0x28	0x0020	0x03	000000	0X00	0X00	000000	0x0000	163	0X00, 0X00, 0X0000, 0x0000, 163),
1000000 1000000	 	0x00A0 0x0000	0x04 0x00	0X0000 0X0000	000	0X00 0X00	0x0000 0x001F	0X0000 0X0000	0X0000 0X0000	0,000, 0,000, 0,0000, 0,0000, 0,00000} 0,000, 0,000, 0,0001, 0,00000, 0,00000, 0,00000
0X0000	0x2c	000000	OXOO.	000000	0000	0000	000101	000000	0X0000	_0X00_0X00_0X0101_0X00006_0X0000f
000000	Ť	0X004A	Ox42	_0x00000	00000	0000	000000	0x0080	0x0000	0000, 0200, 000000, 0200000, 0200000,
0X0000 0X0000	0	0X004B 0X004C	0x44 0X42	0X0000 0X0032	0X00 0X00	0X00_ 0X01	0X0101 0X0000	000000	0X0000 345	0X00, 0X00, 0X0101, 0X0000, 0X0000, 0X0000, 0X0000, 0X0000, 0X000, 0X0000, 0X0000000, 0X000000, 0X000000, 0X0000000, 0X0000000, 0X00000000
10X0000	0x2c	000000	OXOO	0X0000	0000	0X00	000101	0X0000	0X0000	OXOO, OXOO, OXO101, OXOOOO, OXOOOO}.
10X0000	0	000040	0x42	0x0000	0000	0x00	000000	0x0080	000000	0X00, 0x00, 0X0000, 0x0080, 0X0000)
0X0000 0X0000	i d	000000	0X00	0x9000 0X0000	0x05 0x00	0x40 0X00	0x0101 0x0000	0X0001 0X0101	0X5344 349	0x05, 0x40, 0x0101, 0X0001, 0X5344}, 0x00, 0x00, 0x0000, 0x0101, 349},
. 0 X00 000	Ŏ	0X0000	0000	029000	0x05	Ox41	0X0101	0x0001	OX574C	0x05, 0x41, 0X0101, 0x0001, 0X574C
0X0000 0X0000	0	000000	900 900 900	0x9000 0X0000	0x05 0x00	0x42 0x00	0x0101 0x0000	0x00001	0X574D	0x05, 0x42, 0x0101, 0x0001, 0X57401
000000	Ŏ	000000	OXOO	000000	0000	0000	0X001F	0x0101 0x0000	0X5753 0X0000	0X00, 0X00, 0x0000, 0x0101, 0X5753) 0X00, 0X00, 0X001F 0X0000, 0X00001
1 0X0000	Ô	000000	0000	000000	0000	OX00	0X001F	0X0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00001
0X0000 0X0000	0x33 0x32	0X0000 0X0000	0X00 0X00	0X000X0	0X00 0X00	0X00 0X00	0X001F 0X001F	0X0000 0X0000	<u> </u>	0X00, 0X00, 0X001E 0X0000, 0X00001.
. 0X0000	0x32	000000	0000	000000	ÖXÖÖ —	OXOO .	0x001F	000000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00005; 0X00, 0X00, 0x001F, 0X0000, 0X00005.
0X0000 0X0000	0x32	OX0000	0X00	0X0000	0000	0000	0X001F	OX0000	0X0000	0X00, 0X00, 0X00 IF 0X0000, 0X0000).
0X0000 1 0X0000	0x32 0x32	0X004E 0X0000	0x42 0X00	0x0000 .0X0000	0x00	0x00 0x00	0X0010 0x001F	0x0000 0x0000	0x4258 0X0000	0x00, 0x00, 0X0010, 0x0000, 0x4258
i 000000	032	1000000	XXXX	0X0000	0000	0000	0X001F	0X0000	- 0000X	0X00, 0X00, 0x001F 0X000G, 0X0000}, 0X00, 0X00, 0X001F, 0X000G, 0X0000F,
000000	0x32	000000	0000	0X0000	0X00	0X00	0X001E	0X0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00001.
, 000000 , 000000	0x32 0x32	0X0000 0X0000	0X00 0X00	0X0000 0X0000	0X00	0X00 0X00	0X001F 0X001F	000000 000000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000} 0X00, 0X00, 0X001F, 0X0000, 0X0000}
0X0000 0X0000	0x32 0x32	10X0000	i oxoo i	000000	OXOX	OXOO	0x8606	000000 000000	00000	0000, 0000, 000011, 000000, 0000001,
OXOOOO	0x32	0x0065	0x42	_0X0000	0000	0000	I 0X0010	0X0000	000000	0X00, 0X00, 0X0010, 0X0000, 0X0000%
0X0000 0X0000	0x32 0x32	0X0000 0X0000	0X00 _0X00	00000X0	0X00 0X00	0X00 0X00	0X001F 0X8606	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000F, 0X00, 0X00, 0X8606, 0X0000, 0X0000F.
00000X0 I	0x32	0X0000	OXXO	000000	OXOO	0000	0X001F	000000	000000	0X00, 0X00, 0X00 1F, 0X0000, 0X00000
0X0000	Ox32	000000	0000	000000	OXOO	0000	0X00.1F	0000000	000000	OXDO: 0X00: 0X001F 0X0000: 0X00001
0X0000	0x32 0x32	0X0000 0X0000	0X00 0X00	0X000X0	0X00	0X00 0X00	0X001F 0X001F	0X0000 0X0000	00000XQ 00000XQ	0X00, 0X00, 0X00 1F, 0X0000, 0X0000} 0X00, 0X00, 0X00 1F, 0X0000, 0X0000},
0X0000	0x32	OX0000	OXOO 1	0X000X0	OX00	0000	0X001F	0X0000	00000X	0X00, 0X00, 0X00 IF, 0X0000, 0X00001.
0X0000	_0x32	10X0000	0000	000000	OXXO	0X00	0X001F	OX0000	0X0000	0X00, 0X00, 0X00 1F, 0X0000, 0X00001,
0X0000 10X0000	0x32 0x32	OXXX	888 888	0X0XXX 0X0XXX	0X00 0X00	0380	0X001F 0X001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X00 F. 0X0000, 0X0000 } 0X00, 0X00, 0X00 F. 0X0000, 0X0000 }
0X0000	0x32	0X0000	0X00	0X0000	0000	OX00	0X001F	OX0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00005.
000000	0x32	0X0000	0000	000000	0000	0000	0X001F	0X0000	0X0000	QXQQ, QXQQ, QXQQQE, QXQQQQ, QXQQQQ,
0X0000	0x32 0x32	0X0X00 0X0000	0X00 0X00	0X0000 0X0000	0X0 0X0	0X00 0X00	0X001F 0X001F	0X0000 0X0000	0X00X0	0X00, 0X00, 0X001F, 0X0000, 0X0000) 0X00, 0X00, 0X001F, 0X0000, 0X0000}
<u></u>		VAVVVV	- VAVV	WWWW		VAVV	AVAN II	UAVVAAV	UNVVVV	!
8H1										† 812

FIG. 811

STAT INDE	STATE DESCRIPTION	SPACMD	FBACMD	STMCMB	OBACMB	SPASTAT	FBASTAT	STMSTAT	OBASTAT
376		0X0000	000000	000000	000000	OXFF	<u>0</u> x00	ÖXÖÖ	0000
377 378	PRIME INNER LINES #2	PL 0X0000	0x0000	0X0000 0X0000	000000	OX22	0x00	0000	0X00 0X00
378 379 380	PRIME ASPIRATION LINE	TR OXDOOO	0X0000 PA	00000X0	00000	0xFF 0x00	0x00 0x26	0X00 0X00	0X00
381		000000	0X0000 0X0000	0X0000 0X0000	0X0000	0x00 0xF	CxFF CxOO	0X00 0X00	0X00
382	DEBUBBLE	0X0000	T DE	0X0000	0X0000	0X00	0x30	0X00	0X00 !
383 384	TURN ON RINSE PUMP AND RINSE PIPETTER	0X0000	OXOOOO RP	0X0000 0X0000	0X0000 0X0000	0x00 0x00	0xFF 0x25	0X00 0X00	0X00 0X00
185 386		0X0000 0X0000	0X0000 6X0000	0X00000	0X0000	0xFE 0x00	0x00 0xFF	0X00 0X00	_0X00_i
387	CLEAR PIPETTER.	(P	T HC	000000	000000	OX16	0000	0000	0000
388 389		0X0000	000000	0X0000	0X0000 0X0000	OXFF Ox00	OXOO OXFF	0X00 0X00	0000
390	MOVE TO NEXT TUBE POSITION	0X0000	000000	_MN	0X000X	OX00	0000	0X32	0000
391 392	BRANCH TO "16" (GO RESUME) FIND WA (NASH)	0X0000 0X0000	0000000	0X000X0	000000	0X00 0X00	0X0X0	0X00 0X00	0X00 0X00
793 794	END WA (WASH) START ZZ (SLEEP)	0X0000 0X0000	000000	0X0000 0X0000	0X0000	0,000	0000	0X00 0X00	0X00 0X00
394 395	START CS: RESET HICS	RE OXOGO	0X0000 RE	RE	0X0000 RE	OXOO OXFF	0x00 0xFF	OXOO OXFF	0 <u>000</u> 0XFF
396	END 7Z (SLEEP) START SS, RESET HILCS MAKE SURE OUTPUT IS CLEAR (STMIC RETURNS 'T' OR 'F')	0x0000	0x00000	1	0000000	0x00	0x00	0x00	0X00
397 398	MILLIAMENT RESIDENT OF SELECTION OF SELECTIO	0x0000 0x0000	0x0000	0x0000	0x0000 0x0000	0x00 0x00	0x00 0x00	0x54 0x46	0000
398 399	GOT, 1-7 JESO, BRANCH TO FND OF GO SFOJERICE LOOP BACK TO LOOKINGFORT I SET FRONT PANEL LIGHTS (BUTTON GREEN, LED BLUE)	OXXXXX	0.0000	0x0000	000000	0X00	0000	0x46 0x00	0X00 0X00
400 401	SELEKONT PANEL UGHTS (BUTTON GREEN, LED BLUE) Tell stim to find rack	0XXXXXX PH	0X0000 0X0000	0X0000	0X0000 0X0000	0X00 0X00	0XX0 0X00	0XFF 0X00	0000
402	IF 31 FROM STM GOTO WATCHTILSTMATIDLE SS No rack - Endssbranchtarget	0X000X0	0X00000	0X0000	OXOOOO	OXXO	0000	0X31	6000
403 404	NO RACK ENDSSBRANCHTARGET	0X0000 0X0000	000000	0X0000 0X0000	0X0000 0X0000	0X00 0X00	0X00 0X00	0X39 0X00	0X00 0X00 0X00
405	KOOP BACK WATUNTII STMATIDLE SS (WAIT FOR SPA IDLE AS WELL)	0X0000	0X0000	0X0000	0X0000	OxFF	0000	OXFF	ÖXÖÖ
406 407	MOVE TO NEXT TUBE POSITION (FIRST TUBE ASPIRATE POSITION) TO TEST TUBE	0X0000 TT	0X0000 0X0000	OXOOOO	0X0000 0X0000	0X00 0x11	0X00 0x00	0X32 0X00	0000
408		ÓX0000	1 0X00000	000000	000000	OXFF	0x00	ÓXÓÓ	0X00 0X00 0X00
410	START SHEATH FOR BACKGROUND CAPTURE WAIT FOR SB COMPLETE TIMER DELAY TURN OFF EP PUMP ON SPA	SB 0X0000	0X0000 0X0000	ÜXÜÜÜÜÜ OXOOXO	0X0000 0X0000	0x31 0xFF	0000 0000	OXOO OXOO	0000
411 412	TIMER DELAY	0X0000	0X0000	000000	000000	0x00	0x00	0x00	0000
413	WAT FOR EB COMPLETE MOVE PIPETTE DOWN TO ASPIRATE POSITION IN TEST TUBE	0X0000	0X0000 0X0000	0X0000	0X0000 0X0000	0x34 0xFF	0x00 0x00	0X00 0X00	0X00 0X00
414 415	MOVE PIPETTE DOWN TO ASPIRATE POSITION IN TEST TUBE	0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	OXT3 OXF	0x00	0000	0000
416	WAIT FOR TO COMPLETE START ASPIRATION FOR SAMPLE TRANSFER	AS	RC	OX0000	000000	Ux17	0x00 0x00	0X00 0X00	0X00
417 418	WALL FOR AS AND RC COMPLETE THER DELAY	0X0XX0 0X0XX0	000000	0X0000 0X0000	0X0000 0X0000	OXH AZAA	OXH OXOO	0X00 0X00	1 00X0
419	TURN OFF FP PLIMP ON SPA SP PLIMP ON FRA	В	0X0000 EB	0X0000	000000	0x00 0x34	0x00	OX00	0X00
420 421	WATT FOR EB'S COMPLETE (SPA AND FBA) To waste well	0X0000 TW	DB 0X0000	0X0000 0X0000	0X0000	0xF 0x15	0xH 0x00	0X00 0X00	0000
422	TO HIS IL III.	0X0000	000000	000000	000000	I OxFF	0x00	OXOO	0000
#23 #25 #25 #26	TURN ON RINSE PUMP AND RINSE PIPETTER	<u>0</u> X0000 IR	OXOCOO	0X0000	00000	0x00 0x00	SE	0X00 0X00	0000
125	FORM MIXINGS SWILL (SW SOLAR LALL) HALL	000000	000000	0X0000	000000	l OxFF	0x00	0X00 I	0000
捌	CEAR PIPETTER/HOME OF AND SP/MOVE TO NEXT TUBE	0X0000 CP	OXOOOO	OXOOOO Min	0X0000	0x00 0X16	5 8	0X00 0X00	0000
43	THE MALL IN THE STATE OF THE ST	000000	000000	000000	0X0000 0X0000	OXFF OxOO	0:00	0X00 0X00	0000
428 429 430		0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	000000	0x00	0xF 0x00	OXFF	0000
4311	MAKE SURE SPA AND STM ID E	0x0000	0X0000	OX0000	OX0000	l OxFF I	0000	OXFF	OXO0 !
432 433	SEND CR TO STM: HOME PIPETTER Home STM Carriers	PH 0X0000	000000	0x0000	000000	OXXO FFXO	0000	OX33 OXFE	0X00 -0X00
434	FND OF SS SECUENCE Swwarelp from Short Standby Period - Turn Strobe on	0X0000	000000	OX0000]	0X0000	OXO0	0000	0X00	0X00 E
435		0X0000	000000	OX0000	0X0000	OX00	0X00 T	_0X00	OXO0
	Į8J1								812

FIG. 812

			_				_			HG. 812
SMTST	TOSM	TVALUE	TFUNC	SENS	STST	SMSK	END	BRAN	DEST	TRANSLATED PARAMETERS
OXOOOO	0x32	000000		7000000	0X00	0000	OXO01F	000000	- OXOOXO	OXOO, OXOO, OXOOTE, OXOOOO, OXOOOO,
000000	0x32	0X0000	0000	0X0000	0000	0000	0X001F	000000	000000	0X00, 0X00, 0X00 1F, 0X0000, 0X00001
0X0000 0X0000	0x32 0x32	0X0000 0X0000	000	0X0000 0X0000	0X00 0X00	0000	0X001F 0X001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001E 0X0000, 0X00001 0X00, 0X00, 0X001E 0X0000, 0X00001
0X0000	0x32	0XXXX	OX00	0X9000	0000	0000	0X001F	0X000X0	0X0000	OXOO, OXOO, OXOO 1F, OXOOOG, OXOOOO).
000000	0:32	000000	0000	0)(0000	0000	0000	0X001F	000000	000000	0000, 0000, 00001 ; 000000, 000000 }
0X0000 0X0000	0x32 0x32	0X0000 0X0000	0X00 0X00	0X0000 0X0000	0X00 0X00	0X00 0X00	0X001F 0X001F	0X0000 0XD000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00005 0X00, 0X00, 0X001F, 0X0000, 0X0000
0X0000	0x32	0XXX000	0000	000000	0X00	OX00	0X001F	OX0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00005
000000 000000	0x32 0x32	000000	0X00 0X00	0X0X00 0X0XX0	0X00 0X00	0X00	0X001F 0X001F	000000	0X000Q 0X000Q	0X00, 0X00, 0X001F, 0X0000, 0X0000\ 0X00, 0X00, 0X001F, 0X0000, 0X0000\
00000	- 0x32	000000	0000	000000	0000	OXOO	OXOO1F	000000	000000	0X00 0X00 0X001F 0X0000 0X0000
000000	0x32	UKCOOO	OXXO	OXOBOD	OXOO	OXOO	OXODIF	.00000C	OXOOOO	OXOO OXOO OXOOTE OXOOOO OXOOOO!
000000 100000	0x36	0X0000 0X0051	0X00 0x44	0X0000 0X0000	ÖXÖÖ OXOO	0000	0X001F 0X001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000), 0X00, 0X00, 0X001F, 0X0000, 0X0000)
000000	1000		OXOO	000000	0000	0000	000000	000101	0x3136	OXOO, 0X00, 0X00000, 0X0101, 0x3136).
000000) OXOOGO	0000	000000	0000	0000	000000	0x0000	0x0000	0X00,0X00,0X0000,0x0000,0x0000},
000000 000000	OxFE OxFE	0X0000 0X0000	0X00 0X00	00000X0 0000X0		0X00 0X00	0x0000 0x0000	0x0080 0x0000	0X00X0 0X0000	0X00, 0X00, 0x0000, 0x0080, 0X0000) 0X00, 0X00, 0x0000, 0X0000, 0X0000),
000000		000052	0x44	000000	ÓXXX	OXOO -	UXCA4A	0X0000	000000	0X00, 0X00, 0XCA4A, 0X0000, 0X0000),
000000		OXOXXO	0000	000000	0000	0000	0x0101	0000000	000000	0X00, 0X00, 0x0101, 0X0000, 0X0000).
0X0X0X0		<u>00000XO (</u> 01 0X000XO	OXOO	000000		OXOO	0x0101 0x0101	0x0008 0x0008		0X00, 0X00, 0x0101, 0x0008, 400) 0X00, 0X00, 0x0101, 0x0008, 434
0X0000		000000	0X00	0x0000	0x00	0X00	0x0000	0x0101	397	0x00, 0X00, 0x0000, 0x0101, 397;
OXOOOO) <u>0</u> 00000	ÖXÖÖ	00,6000		ÖXÖÖ	0X005F	000000	0X0000	I OXO9, OXOO, OXOO5F, OXOOOO, OXOOOO).
0X0000 0X0000) 0X0000) 0X0000	0X00 0X00	0X0000 0X0000	0X00 0X00	0X00 0X00	0X0101 0X0101	00000X0 0000X0	0X0000 405	0X00, 0X00, 0X0101, 0X0000, 0X0000), 0X00, 0X00, 0X0101, 0X0008, 405}.
000000) OXOOOO	0000	000000	0000	0000	1 0X0101	000008	434	0X00, 0X00, 0X0101, 0X0008, 434).
0X0000) 0X0000 1 0X0053	0000	0X0000 0X0000		0000	OXOO1F	OXO101	402	0X00, 0X00, 0X001F, 0X0101, 402;
0X0000 0X0000	0x36) 0X0053 0X0054	0x44 0x44	000000	0X00 0X00	0X00 0X00	0x8A0A 0x001F	0X0000 0X0000	0X000X 0X000X	0X00, 0X00, 0x8A0A, 0X0000, 0X0000} 0X00, 0X00, 0X001F, 0X0X00, 0X00X0F
00000X0		0000X0 [0000	000000	0X00	0000	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000)
0X0000 0X0000		000000 000000 (OXCO	000000 000000		0X00	0X001F 0x001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000} 0X00, 0X00, 0x001F, 0X0000, 0X00003;
0X000X		OXOOOO	0000	<u> </u>	0X00	0000	OXOO IF	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000).
OXOOOX		0x0055	0x42	000000	0x00	0x00	0x0000	0x0000	0X0000	0x00, 0x00, 0x0000, 0x0000, 0X00001.
0X000X0 0X000X0		00000X0 (00000X0 (0000	000000	OXOO OXOO	0X00	0x001F 0x001F	0X0000 0X0000	0X0000 0X000X	0X00, 0X00, 0x001F, 0X0000, 0X0000), 0X00, 0X00, 0X001F, 0X0000, 0X00007.
OX0000) 0X0000	0X00 0X00	0X0000	0X00	OX00	0X001F	0X0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00001,
000000) 0X0000	0X00 0X00	0X0000 0X00X0	0X00 0X00	0000	OXOO IF	0X0000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000},
0X0000 0X0000) 0XCO00) 0X0O00	-000	000000	0X00	0X00 0X00	0X001F 0x8606	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X00 F, 0X0000, 0X0000 , 0X00, 0X00, 0x8606, 0X0000, 0X0000 },
DXDOOO) 0x0056	0x42	00000	0000	0000	000010	000000	000000	0X00, 0X00, 0X0010, 0X0000, 0X00001
0X0000 0X0000) 0X0000) 0X0000		000000	0000	0000	OXOO1F OYSENE	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000}, 0X00, 0X00, 0X8606, 0X0000, 0X0000},
000000		000000	0000	000000 000000	10000	0X00 0X00	0X8606 0X001F	0X0000	000000	DX00, 0X00, 0X001F, 0X0000, 0X00003.
000000	(1 <u>1.0</u> 00000	0000	000000	OXXO	_ OXOO	OXOOTF	OX0000	000000	0X00, 0X00, 0X001E,0X0000, 0X0000)
000000 000000) 0X0000 0X0000	0000	00000	000	0000	0X001E 0X001F	000000 000000	000000	0X00, 0X00, 0X00 E 0X0000, 0X0000; 0X00, 0X00, 0X00 E 0X0000, 0X0000;
000000		0000000	OXXOO	000000	0000	0000	OXOO1F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000).
000000	0.20			000000		0000	.0X001F .0X001F	000000	000000	0X00, 0X00, 0X001E 0X0000, 0X0000
000000 000000	0x36 (000000	0X00	-0X0000 -0X0000	0X00	0000	0X001F	000000	0X0000 0X000X0	_0X00, 0X00, 0X001E 0X0000, 0X0000! _0X00, 0X00, 0X001E 0X0000, 0X0000!
000000		000000	0000	000000	0000	OX00	0X001F	.000000	000000	OXOO, OXOO, OXOO1E OXOOOO, OXOOOO),
00000X0 00000X0	<u> </u>		0X00	000000		0000	OXOO1F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000
00000		0X0058	0x44 0x44	000000	0000	0000	0x8A0A 0x001F	0X0000 0X0000	0X0000 0X0000	0X000 0X000 0x840A, 0X00000 0X00000) 0X000 0X000 0X001F 0X0000 0X000001
000000	.0v2F	030059	0x44	000000	ÓXÓO	OXOO	AOARXO	000000	000000	OXOO OXOO OXRAAA OXOOOO OXOOOO
0000X0 000000		0X0000 0X0000	0X00 0X00	0X0000 0X7046	0000	0X00 _0X01	0X001F 0X0101	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000), 0X00, 0X01, 0X0101, 0X0000, 0X0000),
·		- warrin		VA/U4D	WAUU .					
811								, <u>1</u> 875		

FIG. 8J1

A. DE	STATE DESCRIPTION	SPACMD	FBACMD	STMCMD	OBACMD	SPASTAT	FBASTAI	STAISTAT	OBASTAT
36 l		000000	000000	OXOOXO	0X0000	OXÕO	0X00	OXXO -	ōxōo -i
37 18 39	TREASURATION TO THE TRACE	000000	000000	000000	000000	0000	OXOO OXOO OXOO	OXO0	OX00
8	UNCONDITIONALLY BRANCH TO GO END OF SW	0X0000 0X0000	0X0000 0X0000	ÖXÖÖÖÖ ÖXÖÖÖÖ	0X0000 0X0000	ÖXÖÖ	I OXUO	0000	0000
40	MY WAKEUP FROM INTERMEDIATE STANDBY PERIOD – TURN STROBE	000000	0X0000	000000	0X000X0	OXXXX	0000	OXOO	0X00
41	THE HOLD THE SHIP STREET STREET	0X0000	000000	<u> </u>	1 0X0000	ÖXÖÖ	ÖXÖÖ	ÖXÖÖ	ŎXŎŎ I
42		DX0000	OX0000	0X0000	OX0000	OXXX	0000	0X00	00000
43 44	UNCONDITIONALLY BRANCH TO GO	000000	000000	0X0000 0X0000	0X0000 0X0000 0X0000	0000	0000	0000	0000
94 45	END OF MW LIV WAKEUP FROM LONG STANDBY PERIOD – TURN STROBE ON	0X00X0 0X000X0	0X0000 0X0000	000000	OYOOO	0X00 0X00	OXOO OXOO	OXXX	0x00 0x00
16 16	EN MARCOL FROM COME STANDOTT ENGOY - TOTAL STROOL ON	000000	000000	0X0000	000000	OXOO	NYOO	0X00	0000
7		OXOOXO	000000	000000	ÓXÓGÓĞ	I OXOO	0X00 0X00 0X00 0X00	0200	OXOO
18 19	UNCONDITIONALLY BRANCH TO GO	0X0000 0X0000	000000	0X0000 0X0000 0X0000	0X0000 0X0000 0X0000	0X00 0X00	OXOO_	0300 0300 0300	nxon
19	END OF LW	0X0000	0X0000	000000	000000	0X00	0X00	0X00	ÖXÖÖ
50 51	SD SHUTDOWN - AUTO SHUTDOWN AFTER STANDBY TIMER EXPIRED TURN STROBE OFF	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X0000 0X0000 0X0000 0X0000	0000	0X00 0X00	0000	0000
2	TOWN STROOT OF T	000000	000000	000000	UNDADO	0000	UVUU	OXOO OXOO	0000
3	END OF SD	000000	000000	000000	000000	0000	0X00 0X00	0000	OXOO
4	END OF SD START DL (DILUENT); TO TEST TUBE	1	000000	OXOOO0	000000	0x11	1 0x00	OXO0	Loxoo j
5	' '	000000	0X0000	000000	I INKLICURE	OxFF	0x00	OXO0	0000
ģ.	START SHEATH FOR BACKGROUND CAPTURE	SB	0X0000	000000	0X0000	0x31	0000	OXOO	OXOO
7 8	WAIT FOR SB COMPLETE	000000 000000	0X0000 0X0000	000000	000000	OxFF OxOO	0,00	0X00 _0x00	OXOO
7	TIMER DELAY Tirn off ep pump on spa	EB	0X0000	000000	0X0000 0X0000	0x34	0x00 0x00	OXO0	0x00 0X00
Ô	WAIT FOR FR (OMP) FTF	0X0000	ÖXÖÖÖÖ	000000	000000	ÖXFF	0x00	OXOO	0000
1	MOVE PIPETIE DOWN TO ASPIRATE POSITION IN TEST TUBE	TĎ	000000	0X0000	OX0000	I OX13	0x00	OX00	0000
2	WAIT FOR ID COMPLETE	000000	0X0000	0X0000	OX0000	l Oxff	0x00	OX00	0000
3	HAT OF EP PIMP ON SPA WAT FOR EB COMPLETE MOVE PIPETIE DOWN TO ASPIRATE POSITION IN TEST TUBE WAT FOR TO COMPLETE START ASPIRATION FOR SAMPLE TRANSFER WAT FOR AS AND RC COMPLETE TIMER DELAY TURN OFF EP PIMP ON SPA, SP PIMP ON FBA WAT FOR EB'S COMPLETE (SPA AND FBA) TO WASTE WELL	ÀS 0X0X000	RC 0X0000	0X0000 0X0000	0X00X2 0X00X0 0X00X0 0X00X0 0X00X0 0X00X0 0X00X0	Ox17	0x00 0xFF	0000	ÖXÖÖ
5	TIMED NET AV	000000	000000	0X0000	AYOOOO	0x00	11XU 00X0	0000	0000
6	TIRN OFF FO PIMP ON SPA SP PIMP ON FRA	EB	I EB	000000	000000	0x34	0x00	0000	OXOO
7	WAIT FOR EB'S COMPLETE (SPA AND FBA)	000000	000000	1 OXOOOO	0X0000	OXFF	ÖXF	0000	0000
9	TO WASTE WELL	0X0000	DB 0X0000	0X0000 0X0000	000000 000000	0x15 0xFF	0x00	0000	0000
		000000	0X0000	1 0X0000	00000X0	OXF	0x00	0000	0000
0/1	TURN ON RINSE PUMP AND RINSE PIPETTER	0X0000 TR	0X0000 RP	000000	0X0000 0X0000	0000	OMF	0000	0X00
72	<u> </u>	000000	000000	0X0000 0X0000	000000	OxFE	0x25 0x00	0X00 0X00	0000
3		000000	000000 C	000000	000000	T 0x00	OXFF	0000	0000
3	CLEAK PIPETTER/HOME CP AND SP		1 HC	0x0x000	0X0000	0X16	0xFF 0X00	0000	OX00
5		0X0000	000000	000000	00000X0	OXFF	0x00	OXO0	0X00
6		0X0000 0X0000	0X0000 0X0000	0X0000 0X0000	0X000X0	0x00	OxFF	OXO0 OXFF	0000
1	DETDIEVE TRIDE WHIMOED, DOANTH TO VILL TWILL IN TO TOYOUT	VÄUVUV	UNUUUU	UNUUUU	UNULUN	0x00	0x00	WATE	0X0 0
79.	RETRIEVE TUBE HUMBER; BRANCH TO KILL ("KL") IF 10 (DXOA) Term otherwise	AYAAAA	000000	กมกรกม	AYOOO	nxnn	กรับบ	NA	nynn !
78 79	MOVE TO NEXT TUBE POSITION	0X0000 0X000X	ÖXÖÖÖÖÖ	0X0708 MN	0X0000 0X0000	0X00 0X00	0X00 0X00	0x0A 0x32	0X00 0X00
0	BRANCH 10 "16" (GO RESUME)	000000	0X0000	0000000	000000	0X00	OXXX	OXO	0X00
31	END OF DE SEQUENCE	0X0000	OX0000	0000000	0X00000	0000	0000	0X00	0000
۱,,	START KL (KILL); SEND OR TO STM; HS TO FBA+C240; HOME	n#i	l ar	l_m	AVGAAA	0.42	0.51	APAA	AVAA
?	PIPETTOR: FLASH STANDBY H.ASH STANDBY	PH 0x0000	HS 0X0000	CR OYOOOO	000000	0x12 0x00	0x21 0x00	0X33 0X00	0000
))	TEASTI 3 I ANDO 3 SEND SMCSISINSHUTDOWN MESSAGE TO SM; NO EXIT	UKUUUU	UNUMU	000000	0X0000	1 VXVV	VXVV	UAUU	0000
W.	CONDITION.	0x0000	000000	000000	0X0000	0x00	0x00	0000	0000
5	END OF KL SEQUENCE	000000	0X0000	000000	0X0000	OXOC	0X00	0000	0000
6	BX BACKGROUND ERROR EXII		B	L 0X0000	000000	OXOO	0000	0X00	0000
1	DUMMY	000000	000000	0X0000	000000	0000	OXÓO	0000	ÓXOO
				1		•			·

FIG. 8J2

ļ	ļ.,	ar pe	Truste	OFFI	PTNT	U Nen	run	nn eu	DEPT	Thussel sten nanassettene
IA1	FV.	ALUE	TFUNC	SENS	STST	SMSK	END	BRAN	DEST	TRANSLATED PARAMETERS
† ōx	ŧσ	X0000	0X00	OXOTOO	OXOO	0X00	0 00101	0X0000	-0000000!	OXOO, OXOO, OXO10 F, OXOOOO, OXOOOO).
		XÖÖÖÖ	0000	ÖXÖÖÖXÖ	ÖXÖÖ	ÖXÖÖ	ÖXÖİĞİ	000000	0X0000	0X00, 0X00, 0X0101, 0X0000, 0X0000},
		X0000X	UXXX	0X0000	0000	0000	0x0000	0x0101	OX474F	0X00, 0X00, 0x0000, 0x0101, 0X474F\$,
		X0000	0000	000000	0300	0000	0X0101	000000	000000	0X00, 0X00, 0X0101, 0X0000, 0X00001,
		X0000	0X00 0X00	0X7046 0X0000	0X00 0X00	0X01 0X00	0X0101 0X0101	0X0000 0X0000	0X0000 0X0000	0X00, 0X01, 0X0101, 0X0000, 0X0000], 0X00, 0X00, 0X0101, 0X0000, 0X0000},
		X0000	0X00	000000	0X00	OXOO -	000101	0X000X0	000000	0000, 0000, 000 101, 000000, 000000
		00000	0000	0XXXX	0000	0000	000000	0x0101	0X474F	0X00, 0X00, 0x0000, 0x0101, 0X474F},
10)	10	X00001	0000	000000	0000	0000	0X0101	- 0X00000	000000	(X00, 0X00, 0X0101, 0X0000, 0X0000),
		<u> </u>	0X00	000046	0000	0001	0X0101	000000	000000	0X00, 0X01, 0X0101, 0X0000, 0X0X00)
		<u>X0000</u> X0000	0000	0X0000 0X0000	0X00	0000	0X0101 0X0101	0X0000 0X0000	00000X0 00000X0	0X00, 0X00, 0X0101, 0X0000, 0X0000 0X30, 0X00, 0X0101, 0X0000, 0X0000
		X0000	0X00 0X00	0X0000	0X00 0X00	0X00 0X00	0x0000	0x0101	0X474F	0X00, 0X00, 0x0000, 0x0101, 0X474FX
l ő	Ηŏ	XXXXX	0X00	OXOOCO	0000	- OXOO	T ÖXÖTÖT	000000	0000000	0X00, 0X00, 0X0101, 0X0000, 0X0000/,
		X0000		OXB030	0x05	0x43	0x0001	000101	453	
10	T	XUUUU	OXOU	0X7000	0000	0X01	0X0101	000000	UXUUUU	0X00, 0X01, 0X0101, 0X0000, 0X0000}.
		X0000		000000	0000	0000	0X0101	0X0000	000000	0X00, 0X00, 0X0101, 0X0000, 0X0000).
		0000XI		0X0000 0X0000	0X00 0X00	0000	0X0101 0X001F	0X0000 0X0000	000000	0X00, 0X00, 0X0101, 0X0000, 0X0000), 0X00, 0X00, 0X001F, 0X0000, 0X0000
T N	18	X00000	0000	000000	0X00	ÖXÖÖ	ÖXÖÖ1F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000},
		XÖÖÖÖ		OXOOOO	ÖXÖÖ	ÖXÖÖ	0x001F	<u> 000000</u>	0X0000	0X00, 0X00, 0x001F, 0X0000, 0X0000},
10	10	X0000	0000	T0X0000	0000	0X00	0X001F	000000	0X0000	(XXXX, 0XXX, 0XXXXXX, 0XXXXXXX, 0XXXXXXX, 0XXXXXXX, 0XXXXXXX, 0XXXXXXX, 0XXXXXXXX
ŢŅ	Ţ	X005A	0x42	0X0000	0x00	1 0x00 _	0x0000	0x0000	000000	[0x00, 0x00, 0x0000, 0x0000, 0X0000], _
18	18	XXXXXX	0000	0X0000 0X0000	0X00	OXXO	0x001F 0X001F	0X0000 0X0000	000000	0X90; 0X00; 0X001F; 0X0000; 0X0000; 0X80; 0X00; 0X001F; 0X0000; 0X0000;
۱'n	-17	X0000 X0000	00X0 00X0	OXDOOX	0000	0X00	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X00001.
Τă	٦ď)X0000	0X00	0X0000	OXOO	0X00	0X001F	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X00001
		XOOOO		0X000X0	0000	ÖXÖÖ	0X001F	000000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000}.
)XXXXXX		000000	0000	0000	0x8606	000000	000000	0X00, 0X00, 0x8606, 0X0000, 0X0000},
10	- Ç),00 67	1 0x42	000000	0000	0000	1 0X0010	0X00000	000000	0000, 0000, 000010, 000000, 000000),
		X000X X000X		0X0000 0X0000	0X00 0X00	0X00 0X00	0X001F 0X8606	0X0000 0X0000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000X, 0X00, 0X00, 0X8606, 0X0000, 0X0000X,
18	+7)X0000	ÖXÖÖ	000000	0000	1 7000	0X001F	000000	1 800000	T 0X00, 0X00, 0X001F, 0X0000, 0X0000Y.
Τă	ΤČ	ŰXÖÖÖĞ	ŎXŎŎ	ÖXÖÖÖÖÖ	TÖXÖÖ	0000	ÖXÖÖÖİF	ÖXÖÖÖÖÖ	ÖXÖÖÖÖÖ	<u> </u>
10	10)X000XC	0000	T 0X0000	0000	OXOU	UXOOTF	000000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000}.
)X00000		0X0000	0000	0,000		0X0000	000000	0X00, 0X00, 0X001F, 0X0000, 0X0000),
		0X0000 0X0000		0X0000 0X0000	0000 0000	0X00 0X00	0X001F 0X001F	0X0000 0X0000	0X0000 0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000}, 0X00, 0X00, 0X001F, 0X0000, 0X0000}.
		3XXXX XX		0X0000	1 0000	- XXXX	T OXOO IF	000000	 300000	1 0X00, 0X00, 0X001F, 0X0000, 0X0000
		OOOOXC		0X0000	ÖXÖÖ	0000	TÖXÖĞİF	000000	0X0000	0XXXX, 0XXXX, 0XXXXXII, 0XXXXXX, 0XXXXXXX,
10	\mathbf{T}	0000XC	0X00	0X0000	0000	0000	0X001F	0X0000	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000).
0	{	0X0000	0X00	0X0000	0000	0X00	0X001F	0X000X0	0X0000	0X00, 0X00, 0X001F, 0X0000, 0X0000),
1,	1,	ስ ሃብ ሳርካ	نديم أ	άγοσος	OVOD	UAVV	.00001	OVONO-	O-ADAC	DAUG UAUU UAUUU UAUUU UAUUU
		0 X00 5D 0 X00 5E		000000 000000	0000	0X00 0X00	OXOOTF	0X0008 0X0000	0x4B4C 0x0000	[0X00, 0X00, 0X0101, 0X0008, 0x4B4C], [0X00, 0X00, 0X001F, 0X0000, 0X0000].
				000000	0X00	0000	000000	OXOTO	0x3136	0X00, 0X00, 0X0000, 0X0101, 0x31361,
		ÖXÖÖÖÖ		TÖXÖÖÖÖ	ÖXÖÖ	TÖXÖÖ	ÖXÖÖ1F	0X0000	000000	0X0X0, 0X000, 0X0001F, 0X00XX0, 0X000001,
T	T							Ĭ .		
10) [(0X005F	0x44	0x0000	0x00	0000	0x8E0E	000000	0X0000	0x00, 0X00, 0x8E0E, 0X0000, 0X0000}.
10	4	0x0000	0x00	0x6001	0x10	0000	0x0101	000000	0X0000	Ox10, OX00, Ox0101, OX0000, OX0000).
1,	4,	ሊለየለላ	I NAM	DYNAMA	NAM .	OYAA	1 mmm	000000	0X00000	
1	1 (0x0000 0x0000	0x00 0x00	0X0000	0X00	0X00 0X00	0x0000 0X001F	000000	000000	0X00, 0X00, 0X0001F, 0X00000, 0X000001.
Ť	11	00000	(VAUV.) (1x44	000000		0000				0X00, 0X00, 0x0000, 0X0000, 0X0000).
Ť	Ħ	ŎXŎŎŎŎ) ĎŶŎŌ	<u>T ÖXÖÖÖÖ</u>		ÖXÖÖ				0X000, 0X000, 0X0001F, 0X00000, 0X00000},
10	П	0X0060 0X0000	0x44	0X0000 0X0000	0X00 0X00	0X00	0x0000 0x001F	0X0000 0X0000	0X0000 0X0000	

400				F	G.S	3A1
402 404	406 40	28	7	412	414	416
STATE STATE DESCRIPTION ORDER	EHERGIZED (VALVES ONLY)	· IP	MOTOR	SECONA Motor	SP	SENSOR SELECT
OFFE THE TANK CANADATAN DINA CROSS CONTROL	17 AIR CHRG VLV, EBV3,	80FD	80FF 80FF	0 8441	80FF	0000
1 "TP" HOME EVACUATION PUMP / ROTATE OUT TO TUBE 2 PLACE ROLLER ON TUBE (EP -45 DEG)	EBV3.	860C	80FF	044!	80FF	0000
3 DUMMY	LUIJ	80FF	80FF	Ö	80FF	0000
A 'PH' - HOME VERTICAL TO LIFT PIPPETTER AND SEND		80FF	80FE	80FF	80FF	0000
PIPPETER BACK TO BACK SENSOR THEN TO WASTE WELL						
5 HOME ROTATIONAL MOTOR TO BACK SENSOR	ļ	80FF_	80FF	80FE	80FF	0000
6 ROTATE OUT -3 DEG TO WASTE WELL	In MD CUDC 18 if	80FE	80FF	8440	80FF	0000
7 CHECKING PRESSURE	17 AIR CHRG VLV.	80FF	80FF	Ň	80FF	1080
8 RECHARGE 9 DUMMY	J7 AIR CHRG VLV.	80FF 80FF	80FF 80FF	0	80FF 80FF	1080
10 TO - DOWN TO TEST TUBE		OUFF	8643		_over 80FF	0000
11 DUMMY	<u> </u>	80FF	80FF	 	80FF	0000
12 PACE - MIX CAMPLE (RD 1.5 CEC)	J10 BURP VLV, CBV3, EBV3,	80FF	80FF	Ö	80FF	0000
12 "AS" - MIX SAMPLE (BP 1.5 SEC) 13 DELAY BEFORE ASPIRATE	CBV3, EBV3.	80FF	80FF	0	80FF	0000
14 ASPIRATE TO BEGINNING OF FLOW CELL	SI, 17 AIR CHRĞ VLV, CBV3, PBV3	4009	1 80F	Ď	80FF	0000
15 IACTIVATE SBY TO FILL FLOW CELL WHILE PULLING EP DURING FAST	SBV3.	4022	80FF	Ŏ.	80FF	0000
ACTIVATE SBY TO FILL FLOW CELL WHILE PULLING EP DURING SLOW PUSH OF CP DURING ANALYSIS	SBV3,	401D	80FF	0	80FF	0000
17 DUMMY	SBV3.	0	80FF		80FF	0000
18 I TW LIFT PIPPETTER TO 2/3 OF THE TUBE		80FF	0556	ñ	80FF	0000
19 LIFT PIPPETER TO THE TOP AND SPIT AIR	J10 BURP VLV.	80FF	80FE	h h	80FF	0000
20 IROTATE IN TO WASTE WELL	JIV DORB TET	80FF	80FF	8442	80FF	0000
21 DOWN TO WASTE WELL		80FF	8647	0	80FF	0000
22 DIMMY		80FF	80FF	0	80FF	0000
23 PCP" CLEAN FLOWCELL WINDOW FOR 2 SEC	CBV3, SBV3,	4019	1 80FF	0	80FF	0000
24 RAISE PIPPETTER		80FF	D556	0	80FE_	_0000_
25 CLEAR PIPPETTER	J10 BURP VLV.	80FF	80FF		80FF	0000 .
26 UFT PIPPETER		80FF	80FE	0	80FF	0000_
27 DUMMY		80FF	80FF		80FF	0000
28 PPS PRIME SHEATH SUPPLY LINE		80FF	80FF	Į į	80FF	0000
29 DUMMY		80FF	80FF	10	80FF	_0000
	. 		<u> </u>			9A2

418	420	422 م	424 _\ 4	26 ₎ 4	²⁸)	430	132	134 \ 43	6 \
SENSO STATE		MOTOR TEST	SM TEST	TOSM	TVÄLUE	TRINC	END CTRL	BRAN CTRL	DEST
Û	0	0	OXOGOO	OxFF	OXO	000000	0x0007	0x0000	Dx0000
Ō	0	FB	000000	0X11	OXO	000000	0x0007	0x0000	0x0000
0	0	B3	000000	OX11	OXO	OX0000	0x0007	0x0000	0x0000
0	0	F3	0X0000	0X11	OXO	000000	0x0007	0x0000	0x0000
0	n	l FF	000000	OXOO	oxo	nxonon	0x0007	0.0000	:0x0000
ď	† ŏ - -	1#-	0X0000	0X00 0X00	000	000000	0x0007 0x0007	0x0000 0x0000	0x0000 0x0000
Ō	ŤÖ	TB.	0X0000	0000	OXO	0X0000	0x0007	0x0000	0x0000
6	54	F3	000000	0X00	000	000000	0x0001	0x0101	9
5	54	B	000000	0X00	000	000000	0x0001	0x0000	0x0000
0	0	F3	000000	OX12	OXO.	000000	0x0007	0x0000	0x0000
0	0	23	0X000X0	OX13	0X0	000000	0x0007	0x0000	0x0000
0	.0	F3	0X000X0	0X13	OXO	000000	0x0007	0x0000	0x0000
0	0	F3	0X0000	0X17	0x42	0x0004	0x0000	0x00000	0x0000
0	0	F3	0X0000	0X17	OX42	0X0023	000000	0x00000	0x0000
0	0	33	000000	<u> 0X17</u>	0x42	0X0024	0x0000	0x0000	0x0000
0	0	33	000000	OX17	0x42	0X0025	0x0000	0x0000	0x0000
0	0	33	0X0000	OX17	0x00	0x0000	0x0007	0x0000	0x0000
0	0	33	0X0000	OX17	OXO -	0X0000	0x0007	0x0000	0x00000
0	Ó	E3	0X0000	OXOO	OXO	0X0000	0x0007	0x0000	0x0000
Ö	10	F3	0X0000	OXO	OXO	0X0000	0x0007	0x0000	0x0000
0	0	FB	000000	0x00	0X0	0X0000	0x0007	0x0000	0x0000
0	0	<u>E3</u>	0X0000	0000	OXO.	0X0000	0x0007	0x0000	0x0000
0	0	F3	000000	OX15	000	0X0000	0x0007	0x0000	0x0000
Ö	0	33	000000	0000	OX42	0X0027	0x0000	0x0000	0x0000
0	0	E3	000000	0x16	000	000000	0x0007	0x0000	0x0000
	0	[3]	0X0000	0x16	0X42	0X0005	0x0000	0x0000	0.0000
_0	10	<u> </u>	0X0000	0x16	OXO	000000	0x0007		0x0000
Ŏ.	0	<u> </u>	000000	0X16	000	000000	0x0007	0x0000	0x0000
0_	Ŏ	<u> F3</u>	000000	0X00	0X42	0X0028	0x0000	0x0000	0x0000
0_	10	F3	000000	0X20	OXO.	0X0000	0x0007	0x0000	0x0000

FIG. 9B1

STATE ISTATE DESCRIPTION ORDER	ENERGIZED (Valves only)	EP	FIRST Motor	SECOND MOTOR	SP	SENSOR SELECT
301 "PP" PRIME EVACUATION PUMP	EBV3.	0758	80FF	0	80FF	0000 ¦
31 HOLD EBV3 FOR 3 SEC	EBV3,	80FF	80FF	0	80FF	0000
32 DUMMY		80FF	80FF	0	80FF	0000
33 "PI" HOME FP	FBV3,	80FD	80FF	0	80FF	0000
34 PRIME INNER LINE #2	CBV3, SBV3,	DB5C	80FF	0	80FF	0000 i
35 DUMMY		80FF	80FF	0	80FF	. 00000
36 "TR" TURN ON RINSE PUMP FOR 2 SEC		80FF	80FF	0	80FF	0000
37 CHECKING PRESSURE	J7 AIR CHRG	80FF	80FF	0	80FF	10B0 I
38 RECHARGE	JANR CHRG	80FF	80FF	0	80FF	10B0 !
39 FILL SHEALTH TANK FOR 2 SEC.	VÍV	80FF	80FF	0	80FF	0000
40 DUMMY	'-''	80FF	80FF	0	80FF	
41 "HP" HOME EP	E8V3,	80FD	80H	0	80FF	0000 i
42 DUMMY	_	80FF	80FF	0	80H	0000
43 "SB" TRANSFER SHEATH DURING BACKGROUND	CBA3' 2BA3'	401A	80FF	0	80H	0000
44 DUMMY	CBV3, SBV3,	0	80FF	0	80H	0000 i
45 "EB" END BACKGROUND (EP OFF)	CBV3, SBV3	80FF	80FF	0	80FF	0000 1
46 DUMMY	D01/a	80FF	80FF	Ó	80FF	0000
47 "DE" DRAIN FLOWCELL	PBV3,	DESF	80FF	0	80FF	
48 DUMMY	Entro	80FF	80FF	Q	80EF	0000_i
49 "IC" HOME EP 50 PLACE ROLLER ON TUBE (EP -45 DEG) 51 DOWN TO TEST TUBE	EBV3,	80FD	80FF	0	80FF	0000
50 MAKE KOLLEK ON JUBE (EF -45 DE6)	EBV3,	860C	80FF	0	80FF	0000
51 DOWN TO JEST TUBE	PBV3,	80FF	8643	0	80FF	0000 i
52 WASH FLOW CELL WITH IRISOLVE	PBV3,	E061	80FF	0	80FF	0000
53 DUMMY		80FF	80FF	Ŏ	80FF	0000
54 START "ZZ" 55 END "ZZ"		Ò	80FF	Ô	80FF	0000
55 END ZZ		0	80FF	0	80FF	0000
56 'RV' RESET VALVES (SUBROUTINE TO BE USED ONLY DURING BUT TO TURN OFF VALVES)		80FF	80FF	0	80FF	0000
57 DUMMY		80 F F	80FF	0	80FF	0000 j
58 FP CHECKING PRESSURE		80FF	80FF	0	80FF	10B0
59 RECHARGE		80FF	80FF	0	80FF	10B0
60 DUMMY		80FF	80FF	0	80FF	0000
61 "SI" TURN ON SHEATH FILL PUMP		80FF	_80FF	0	80FF	0000
62 DUMMY		80FF	80FF	0	80FF	0000
			<u> </u>	1		<u> </u>
Ļ9C1						9B2

400

FIG. 9B2

ENSOR State	SENSOR Mask	MOTOR Test	SM Test	TOSM	TVALUE	TRUNC	END CTRL	BRAN CTRL	DEST
0	0	B3	0X0000	0X00		OXO	0x0007	0x0000	0x0000
Ŏ	Ō	F3	0X0000	0x00	000029	OX42	0x0000	0x0000	0x0000
0	0	F3	0X0000	0X21	0X0000	0X0	0x0007	0x0000	0x0000
0	0	F3	000000	0000	000000	OXO	0x0007	0x0000	0x0000
Ô	Ö	B3	0X0000	OXOO	0X0000	OXO	0x0007	0x0000	0x0000
Õ	Ō	F3	0X0000	0x22	0X0000	OXO	0x0007	0x0000	0x0000
ñ	Ď.	F3	000000	0x23	0X002A	0X42	0x0000	0x0000	0x0000
6	54	F3	0X0000	0x23	000000	OXO	0x0001	0x0101	38
ζ	54	F3	000000	0x23	000000	_0x0	0x0001	0x0000	0x0000
n	0	F3	000000	0x23	0x0006	0x42	0x0000	0x00000	0x0000
.0	0	F3.	000000	0X23	0X0000	OXO	0x0007	0x0000	0x0000
0	0	F3	000000	0000	000000	000	0x0007	0x0000	0x0000
0	Ö	F3	0X0000	0X24	0X0000	OXO	0x0007	0x0000	0x0000
ñ	0	33	0X0000	OX31	0x0000	0x0	0x0101	0x0000	0x0000
0	0	33	0X0000	OX31	0X0000	OXO	0x0000	0x0000	0x0000
0	0	F3	0X0000	0X34	0x0000	0x0	0x0007	0x0000	0x0000
0	Ő	F3	0X0000	0X34	0X0000	OXO	0x0007	0x0000	0x0000
0	Ŏ	B3	0X0000	OXOO	0X0000	OXO	0x0007	0x0000	0x0000
Ŏ	Ŏ	F3	0X0000	0X26	0X0000	OXO	0x0007	0x0000	0x0000
Ŏ	Ō	F3	0X0000	OXOO	000000	ÖXÖ	0x0007	0x0000	0x0000
Ö	0	B3	0X0000	T0X00	000000	OXO	0x0007	0x0000	0x0000
Ō	0	E3	0X0000	OX00	0X0000	OXO	0x0007	0x0000	0x0000
Ŏ	Ò	B3	0X0000	OX00	0x0000	0x0	0x0007	0x0000	0x0000
Ď	0	T 13	0X0000	OX27	0x0000	0x0	0x0007	0x0000	0x0000
Ŏ	Ō	0	0X0000	OxFF	0x0000	0x0	0x0000	0x0080	0x0000
Ö	Ŏ	Ŏ	0X0000	OXFF	0x0000	0x0	0x0000	0x0000	0x0000
0	0	B	0X0000	0X00	0X0000	OXO	0x0007	0x0000	0x0000
0	0	F3	0X0000	OX26	0X0000	OXO	0x0007	0x0000	0x0000
6	54	13	0X0000	0X00	000000	OXO	0x0001	0x0101	60
	54	13	0X0000	OX00	0X0000	OXO	0x0001	0x0000	0x0000
ŏ	1 0	H	0X0000	0x30	0X0000	OXO	0x0007	0x0000	0x0000
Ŏ	Ŏ	1 F3	000000	0X32	0x0000	0x0	0x0101	0x0000	0x0000
Ö	ð	F3	0X0000	0X32	0X0000	OXO	0x0000	0x0000	0x0000
	t	<u>† </u>		<u>† </u>	<u> </u>	t	 		
3B1					— <u>1</u> 90	<u> </u>			

FIG. 9C1

STATE ORDER 63	STATE DESCRIPTION	ENERGIZED (VALUES ONLY)	EP	FIRST Motor	SECOND Motor	SP	SENSOR SELECT
63	"SO" TURN OFF SHEATH FILL PUMP		80FF	80FF	Ō	80FF	0000
64	DUMMY		80FF	80FF	0	80FF	0000
.65	"TQ" TURN ON RINSE PUMP FOR 2 SEC WITHOUT FILL SHEALTH		80FF	80FF	0	8OFF	0000
_66	CHECKING PRESSURE	17 AIR CHRG VI V.	80FF	80FE	0	80FF	10B0
67	RECHARGE	J7 AIR CHRG VLV	80FF	80FF	0	80FF	10B0
68	DUMMY		80FF	80FF	0	80FF	0000
69	"HC" INITIALIZE EVACUATION PUMP	J7 AIR CHRG VLV, EBV3,	80FD	80FF	0	80FF	0000
70	PLACE ROLLER ON TUBE (EP -45 DEG)	EBV3,	860C	80FF	0	80FF	0000
71	DUMMY		80FF	80FF	0	80FF	0000

902

FIG. 9C2

SENSOR State	SENSOR Mask	MOTOR Test	SM Test	TOSM	TVALUE	· TFUNC	END CTRL	BRAN CTAL	DEST
0	0	F3	0X000X0	0X33	000000	OXO	000101	0X0 0 00	0X0000
0	0	F3	OXDX00	OX33	000000	OXO	0X0000	0 X00 00	0X0000
0	0	B	000000	OX23	0X002B	OX42	OXOOOXO	0700000	000000
6	54	13	CX0000	OX23	0X0000	OXO.	0X0001	000101	68
5	54	B.	0X00000	0X23	000000	OXO	000001	0X0000	0X0000
0	0	F3	0000000	0X23	000000	OXO	0X0007	000000	000000
0	0	F3	- 0X00000	0X27	000000	OXO	000007	000000	000000
0	0	B 3	0X00000	0)(27	000000	OXO	0X0007	0X0000	0X0000
0	0	F3	0X0000	0X27	0X0000	OXO	000007	0X0000	000000

⁴9C1

FIG.10A1

	502 50 <i>4</i>	00	509								
	502 504	506 5	0B	510	512 5	514 }	516 / l				
STAT ORB	E STATE DESCRIPTION	ENERGIZED (YALVES ONLY)	EP	FIRST [*] Motor	MOTOR	SP	SENSOR SELECT				
0	DLE		0	80FF	80FF	.0	0000				
	"HC" HOME CP AND SP	CBV3,	80FE	80FF	80FF	80FE	0000 ¦				
_2	PLACE ROLLER ON TUBE (CP 45 DEG)	CBV3,	8601	80FF	80FF	80FF	0000				
3	DIMMY		80FF	80FF	80FF	80FE	0000				
4	"PC" PRIME CANNUAL AND SHEATH PUMP	CBV3,	C546	80FF	80FF	CA4B	0000 ¦				
_5	DUMMY		80FF	80FF	80FF	80FF	0000 t				
6]	"PL" PRIME LINES	DRV3, EBV3,	CC4D	80FF	80FF	80FF	0000				
_71	DUMMY		80FF	80FF	80FF	80FF	0000				
8	RINSE PIPETTER RP ON	SBV3, PBV3, EBV3,	80FF	80FF	80FF	(849	0000				
9	OPEN SBY, PBY, AND EBY TO VENT EXCESS PRESSURE (OUT SBV3, PBV3, EBV3,	80FF	80FF	80FF	80FF	0000				
10	DUMMY		80FF	80FF	80FF	80FF	0000				
11	"PA" PRIME ASPARATION LINE	SBV3, PBV3, EBV3,	80FF	80FF	80FF	CE4F	0000				
12	DUMMY		80FF	80FF	80FF	80FF	0000				
13	"HP" HOME CP AND SP	CBV3,	80FE	80FF	80FF	80FE	0000				
14	DUMINY		80FF	80FF	80FF	80FF	0000 1				
15	"RC" DELAY BEFORE RUNNING CP FAST PUSH		80FF	80FF	80FF	80FF	0000				
16	FAST PUSH		4001	80FF	80FF	80FF	0000				
17	SLOW CP PUSH DURING ANALYSIS		4002	80FF	80FF	80FF	0000				
18	DUMMY		0	80FF	80FF	80FF	0000				
19	"DB" PLACE SP ROLLER ON HOSE WITH 45 DEG MOVE		80FF	80FF	80FF	8601	0000				
20	DEBUBBLE FOR 3 SECS	CBV3, SBV3, DRV3, EBV3,	80FF	80FF	80FF	C344	0000				
21	CLMMY		80FF	80FF	80FF	80FF	0000				
22	"DE" DEBUBBLE (SP 10 REV.)	CBV3, SBV3, DRV3, EBV3,	80FF	80FF	80FF	D051	0000				
23	CEMMY		80FF	80FF	80FF	80FF	0000				
24	BEGIN 7Z		0	80FF	80FF	0	0000				
25	END ZZ		0	80FF	80FF	0	0000				
26	*IC" HOME CP	CBV3,	80FE	80FF	80FF	80FF	0000 i				
27	PLACE ROLLER ON TUBE (CP 45 DEG)	CBV3,	8601	80FF	80FF	80FF	0000				
28	CLEAN DRAIN	DRV3, EBV3,	D253	80FF	80FF	80FF	0000				
29	DUMMY		80FF	80FF	80FF	80FF	0000 i				
		- ' 		'	<u>-</u>	· — -					
	Ļ 10B1						10A2 [

500

FIG.10A2

518)	520 ₎	522	₎ 52	24) ;	526) 5:	28	530 <)	532	;	534 ₎	53	36 \
SENSOR STATE	SENSO: Mask		DTOR Est	SIM		TOSM	LAVTAE	:	TPUNE	EN	D CTRL	1	IRAN CTRL	DEST
0	0		0	0X000	_	0xFF	000000		OXO	()x0007		0x0000	0x0000
Ō	Ò	1	Ŧ	00000		0x21	0X0000		OXO		00007		0x0000	0x00000
Ō	lõ		ř –	0X000		0x21	000000		000		0x0007		0x0000	0x00000
Ō	T Ö		Ŧ-	0X000	o l	0X21	OX0000		OXO		x0007		0x00000	0x00000
Ō	Ò		E	00000		0x00	0X0000		0x0)x0007		0x0000	0x0000
Ō	Ŏ		Ŧ	0X000		0x23	OX0000		OXO		0x0007		0x0000	0x00000
()) û		¥	00000	0	0x00	000000		0x0		30007		0x0000	0x0000
Ŏ	0	آــــــــــــــــــــــــــــــــــــــ	Ŧ	00000	\square	0x24	000000		010		0x0007		0x0000	0x0000
Ó	0_	أساسا	E	00000	لـــ	0x00	0x0000	<u> </u>	.0x0		M 0007	[0x0000	0x0000
0	0		Ŧ	00000	0	()x()()	0x0014		0x42		00000		0x0000	0x0000
0	0	1	+	00000	0 l	OX25	0X0000		OXO		0x0007		0x0000	0x00000
0	0		H	00000	0	OOXO	000000		OXO		0x0007		0x0000	0x0000
0	0		+	00000	0	0x26	000000)	OXO		0x0007	L	0x0000	0x0000
0	0		Ŧ	00000		0X00	0X0000		OXO		0x0007		0x0000	0x0000
0	0		+	00000	0	OX27	000000		0X0		0x0007	Ī	0x0000	0x0000
0	0		+	0X000	0	OX28	0x0015	;	0x42		0000xC		0x0000	0x0000
0	0		3F	0X000	0	OX28	0x0016	5	0x42		0x000x0		0x0000	0x0000
0	Q		3F	00000		OX28	0X0000		000		X0007		0x0000	0x0000
0	T 0		3F	OXOOC	0	OX28	0X0000		0x0		0x0000		0x0000	0x0000
0	0		E	00000	0	OX29	000000)	OXO		0x0007		0x0000	0x0000
0	0		E	00000	0	0x29	0X0000)	0x0		0x0007		0x00000	0x00000
0	0		F	00000	0	0X29	0X0000)	000		0x0007		0x0000	090000
0	0		E	00000		0X00	000000		0 X 0		0x0007		0x00000	0x0000
0	0		-	0X000		0X30	000000		OXO		0x0007		0x00000	0x0000
0	0		0	00000		()xFF	000000		OXO		0x00000		0x0080	0x0000
00	0		0	00000		0xFF	0X00000		OXO		0x0000		0x00000	0x0000
0	0		F	00000		0X00	000000		OXO		0x0007		0x0000	0x0000
0	0		<u>}</u>	00000		0X00	0X0000		OXO		0x0007		0x0000	0x0000
0	0		}F	00000		0X00	000000		OXO		0x0007		0x00000	0x0000
. 0	0		Ŧ	0X000	0	0X31	0X0000)	OXO		0x0007		0x0000	0x0000
 10A1	<u>.</u>	_		ــــــــــــــــــــــــــــــــــــــ	_ ೬ -		1	'-‡10	0 B2	!				J

FIG.10B1

STATE STATE DESCRIPTION ORDER "RV" RESE! VALVES TO OFF (USED INSTEAD OF "RE" DURING "BO" IN	ENERGIZED (VALVES ONLY)	EP .	FIRST MOTOR	SECOND MOTOR	SP	SENSOR Select
30 HYPERTERMINAL)	PL-1-14-	80FF	80FF	80FF	80FF	0000
31 DUMAY 32 "IS" STANDBY POSITION FOR CP AND SP	CBV3,	80FF 80FE	80FF 80FF	80FF 80FF	80FF 80FE	0000
33 PLACE ROLLER ON TUBE (CP AND SP 45 DEG) 34 DUMMY	CBV3,	8601 80FF	80FF 80FF	80FF 80FF	8601 80FF	0000
35 "EB" END CONSTANT VELOCITY SP MOVE 36 DUMMY		80FF 80FF	80FF 80FF	80FF 80FF	80FF 80FF	0000
JO DOPHIL		ourr	OUTT	OUT:	1700	1000

1082

500

FIG.10B2

SENSOR State	SENS80 Mask	MOTOR TEST	SM TEST	TOSM	TVALUE	TFUNC	END CTRL	BRAN CTRL	DEST
0	0	FF	0X0000	0X00	0XC000	OXO	0X0007	0X0000	OX0000
0	0	FF	0X0000	0X30	OX0000	OXO	0X0007	000000	000000
0	0	FF	000000	0000	000000	OXO	0X0007	000000	000000
0	0	BE	0X0000	0000	000000	OXO	0X0007	1 0X000X0 1	000000
0.]	0	FF	0X000X0	0X21	000000	000	0X0007	0X0000	000000
0	0	+	0X0000	0X34	0X0000	OXO	0X0007 0X0007	- 0X0000 0X0000	000000
0	0	FF	OXOOOO	0X34	000000	0X0	0X0007	000000	000000

10B1

				60 V	o Fl	G. 1	1A1
			K	V			
602 604	6 06	608	610	612	614	616	618
STATE STATE DESCRIPTION	 	DAND) SM	CM	CI	<u> (() </u>	RC
O TRESET IN GENERAL	0000000000	OXEFFFFF.	OX80FF	OX80FF	OX80FF	OX8OFF	000000
1 START M1; START HC 2 END HC	00000000	OXFFFFFFF	0X80FD 0X80FF	0X0000 0X0000	OX80FF	OX80FF	000000
3 ISTART HR	000000000	ÖXFFFFF	00000	000000	L OX80FF L OX80FF	0X80FF 0X80FF	000000
4 END HR	0000000000	LOXFFFFFFFF	1 0X80FF	0X0000	OX80FF	OX80FF	- 1000000 :
	000000000	QHI HI	000000	000000	0X00900	0X000X	OXOOOO
6 BRANCH IF BUFFFR FULL SIGNAL OK TO SEND RACK; WAIT FOR COMPLETE	000000000	OXHITH	000000	000000	000000	0X0000	000000
7 (SIGNAL (IREADY)	0X00000010	OXFFFFFFF	0X0000	0X0000	OX8OFF	0X00000	0X00000
8 DFLAY 200 MS 9 INNSIGNAL ON TO SEND BACK: FFED IN 2 SEC	000000000	OXFFFFFFF	000000	000000	000000	000000	0X0000 t
	0X00000000 0X00000000	OXFFFFFFF	0X0000 0X0000	0X0000 0X0000	0X0900 0X80FF	0X0000 0X0000	0X0000 0X0000
10 FNO IS 11 WAT I NO OTHER RACK	000000000	TOTAL	0X0000	000000	000000	0X0000	000000
12 I RUN RACK IN	0X00000000	OXFFFFFF	ÖX80FF	ÖXÖÖÖÖ	0X0900	0X0900	00000
EXTRA SECOND TO MAKE FLUSH. READ	0000000000	OXFFFFFFFF	0X80FF	0X0000	000900	0X0900	000000
13 RACK ID FOR TRANSMISSION 14 STOP CONVEYOR: CHECK IF ROOM AT CUTPUT SIDE	000000000	OXEFFFFFF	OX80FF	000000	1	l	000000
13 (196) 9 (194) 4 (19	000000000	OXFFFFF	0X8040	000000	OX80FF OX80FF	0X80FF 0X80FF	000000
16 JGDI RACK	000000000	OXFFFFFFF	OXOOOO	000000	1 000000	000000	000000
17 NO RACK 18 END M1; FND U2	0X00000000 0X00000000	WHITE	000000	0X0000	00000	0X0000	000000
19 ISTART MN: MOVE TO NEXT TUBE POSITION	0X00000000	OXFEREN	000800	<u> </u>	OYROLE	0X0000 0X80FF	000000
20. LCOMPLETE THE MOVE AND GET TURE NUMBER	0000000000	ÖXFFFFFF	0X80FF	0X0000 0X0000	OX80FF OX80FF	0X80FF	000000
21 STABILIZE BEFORE READING TUBE DETECTOR	000000000	OXFFFFFF	0X80FF	ÖXOOOO	0X80FF	ÖX8ÖFF	OXOOOO !
STORE TUBE DETECTOR VALUE, BRANCH TO SCAN IF TUBE PRESENT	0X000000000	OXFFFFFFF	AYONEE	nyanaa	OVECT	OYOOFF	awaana I
23 ILINCONDITIONAL BRANCH TO ENDIAN	0X00000000	OXFFFFFFF	OX80FF OX80FF	0X0000 0X0000	0X80FF 0X80FF	OX80FF OX80FF	0X0000
24 I SCAN BARCODE	000000000	TOXFFFFFFF	0X80FF	0X0000	0X80FF	UXBUEL	000000
25 TEND MR: SEND COMPLESION TO MC	000000000	OXFFFFFFF	OX80FF	000000	ÖX8ÖF	OX80FF OX80FF	000000
26 ISTARTER 27	000000000	CXFFFFFF	1 (1)(8)(1)	000000	OX80FF	OXXOFF	000000
28	0X00000000 0X00000000	OXEFFE	0X8004 0X80FF 0X80FF	0X0000 0X0000	0X80FF 0X80FF	0X80FF 0X0900 0X0900	000000
29 1	000000000	WHITE WHITE	OYROFF	000000	OX80F	010900	00000
30 END ER: SEND COMPLETION TO MC	_1.000000000	LOXEFFFFFF	CXXXXFF.	000000	OX8OFF	OXXOFF	000000
31 BEGIN 8C	000000000	OXFFFFFFF	000000	000000	000000	000000	0X0000
33 LEND BC	000000000	OXEFEEFE	0X0000	000000	000000	0X0000 0X0000	0X0000 0X00000
34 I BEGIN CR: RUN INFEED CONVEYOR IN REVERSE	0X00000000	OXFFFFFFF	QX80FF	000000	0X0100	OX8OFF	000000
35 THOME SAMPLE CARRIER WHILE DISCHARGE RITHS	0000000000	OXFEFFFFF	OX80FD	_OX80FD	0X80FF	00000	0X00000 3
36 MOVE SAMPLE LEVER TO ELECT POSITION 37 HOME SAMPLE LEVER	000000000	OXITITIES	000044	000000	OX80FF	000000	000000
37 HOME SAMPLE LEVER	000000000	OXFFFFFFF	OX80FD	0X0000	OX80FF	_000000	000000
- 11	1B1				 ·		11A2

FIG. 11A2

620	622	624 E	626	628	3 60	30 632	63(4 636	638	640
SENSEL	SIST	SMSK	MIST	SMTST	TOSM	TVAL (TENC	ENDCTL)	BRNCTL	DEST
+										
	0000	0,000	OXOO OXFF	0X0000 0X0000	OXFF	OX0000 OX0000	0000	0x0000	0x0000	0.0000
0X0000	0000	0X00 0X00	OXFF	000000	Q	000000	0X00 0X00	0x0007 0x0007	0x0000	0x0000 0x0000
0X0000	0000	0000	CXFF	000000	0	00000	0000	0x0007	0x0000	0x0000
000000	0000	0000	OXFF	000000	0	000000	0000	0x0007	0x00x0	0x0000
0x0030	0x04	0v04	CaFF	000000	ň	OXOOOA	0X42	000000	0x0101	12
0X0230	OXOO	0004	OXFF	000000	n	0000000	0000	000001	0x0101	12
OX0030	0X00	0X04	OXFF	0X0000	0	0X0000	0X00	0X0001	000000	0x0000
	0000	0000	OXFF	OX0000	0	OXOOOB	0X42	000000	000000	0X0000
OX0000	00X0	0000	OXIF	0X0000	Ď	0X000C	0X42	0x0000	0X0000	- 0X000X0
0X0030	QX04	0X04	ÖXFF	ÖXÖÖÖÖ	ŏ	000000	0000	000006	0X0001	5
OX0040	LÖXIF	OXIF	OXIFE	000000	Ö	OXOOOD	OX42	0x0001	0X0000	0X0000
OX0040	OXIF	OX1F	0X00	000000	Ö	0X000E	0x43	0x0007	0x0000	17
0x0040	0X00	Ox1F	0X00	000000	0	0X000F	0x42	0x0006	0x0000	0x0000
OX0230	0X01	0X01	OXFF	0X0000	0	0x0000	0x00	0x0006	0x0001	17
000000	0000	0000	OXFF	0X0000	Ō	0X0000	3 0000	0x0007	0x0000	0x0000
OX0000	0x00	0x00	0x00	0X0000	0x31	QX0010	0X43	0x0000	0x0101	18
. OXOOXO	0000	OXOO	OXFF	000000	0x39	0X0011	0X42	0x0101	0X0000	000000
0X0000	0000	OXXO	OXFF	0X0000	0	0X0000	OXOO	0x0000	0000X0	OX0000
1 0X0000	0000	_0X00	OXFF	000000	0	0X0000	0000	0x0007	0x0000	0x0000
0xE000	0000	OXIF	0X00	000000	0	000000	DX00	0x0007	0x0000	0x0000
000000	0000	0000	OXO0	000000	0	0X0012	0x42	0x0007	0x0000	0x00000
OXIOAO	0x05	0X48	0000	0X0000	Ð	0x0000	0x00	0x0202	0x0001	74
0x0000	OXXO	0x00	0X00 0X00	ÖXÖÖÖÖ	Ŏ	ŎXŎŎŎŎ	ÖXÖÖ	ŎxÕÕÕÕÕ	0x0202	<u>24</u> 25
0X4000	0000	OX1F	0X00	0X0000	0	000000	OXOO	0x0007	0x0000	0x0000
OXOOOXO	0000	0000	OXFF	0X0000	OX32	0X0000	0X00	0x0007	0x0000	0x0000
000000	0000	0X00	OXFF	0X0000	0	0X0000	OX00	0x0007	0x0000	0x0000
0X0000	0000	0000	OXFF	0X0000	0	0X0000	0000	0x0007	0x0000	0x0000
0X0230	0X02	0002	0000	000000	0	0X0013	0x43	0x0007	0x0000	30
000000	0000	0X00	0000	000000	0	0X0014	0x42	0x0007	0x0000	0x0000
000000	0000	0000	OXFF	0X0000	OX33	0X0000	0X00	0x0007	0x0000	0x0000
00000	0X00	OX1F	0000	000000	0	0X0000	0000	0x0007	0x0000	0x0000
<u> </u>	0000	0000	0000	000000	0x44	0X0015	0X42	0x0000	0x0000	0x0000
000000	0000	0000	0000	000000	() ()	000000	0)(00	0x0007	0x0000	0x0000
1 0x0000 1 0x0000	0000	0x00	Ox00 OxFF	0X0000 0X0000	0x30	0X0016	0002	0x0007	0x0000	0x0000
0x0000	0000	0x00	OxF	000000	0	0x0000 0x0000	0x00 0x00	0x0007 0x0007	0x0000 0x0000	0x0000 0x0000
1 0x0000	0X00 0X00	0x00	OxFF	0X0000	0	0x0000	0x00	0x0007 0x0007	0x0000	0x0000
1	I NYVV	0x00	UALI			UXVVVV	<u> </u>		1 0,000	1 0,0000
111A1	- -			11B2			_		· · 	· · · · · · · · · · · ·

FIG. 11B1

ATE STATE DESCRIPTION	DOR	DAND	SM	CM	a	CO	RC
8 RUN CARRIER OUTPUT BUFFER MOTOR UNTIL SENSOR	0X00000000	OXFFFFFFF	ÖX80FF	<u> </u>	-0X80FF	0X0000	000000
NOT BLOCKED OR UNTIL TIME OUT							
9 RON CO A LITTLE LONGER 0 End Cr	000000000	WITH	OXXQFE	000000	OX80FF	000000	0x0000
O FND CR Begn IC (IS CLEAR); IF OUTPUT SENSOR NOT BLOCKED	0X00000000 0X00000000	0355555	0X80FF 0X80FF	0X0000 0X0000	0X80FF 0X80FF	0X80FF 0X80FF	0x0000
1 BRANCH TO 'IS (I FAR = TRUF"	UNUVUUUUU	UARITITI	OVOOLL	OVOCIO	VACUIT	UAOUFF	0x0000
RUN CARRIER OUTPUT BUFFER MOTOR UNTIL SENSOR NOT BLOCKED OR UNTIL TIME OUT. IF TIMEOUT							
Z BRANCH TO "IS CLEAR = FALSE"	000000000	OXFFFFFFF	OX80FF	000000	OX80FF	000900	0x0000
3 RUN CO A LITTLE LONGER	0X000000000	ÖXFFFFFFF	ÖX80 FF	ÖÖÖÖÄÖ	ÖX8ÖH	<u> </u>	0x0000
4 S CLEAR = IRUE; SEND T' BRANCH TO END IS 5 S CLEAR = FALSE; SEND F	0000000000	OXEFFFFF	OX80FF	000000	0X80HE	OX80H	0x0000
5 DUEAK = FALSE; SEND F	000000000	OXFFFFFFF	OX80FF	000000	OX80FF	OX80FF	0x00000
6 END IS 7 Begin wr	000000000	ÖXEEFFEFF	OX80FF	000000	0X80FF	OX80FF	0x0000
7 BEGIN WR	0X00000000 0X000000000	OXFFFFFF	0000X0 0000X0	0X0000	000000	000000	0x0000
9 ENDWR	UNCLARATION	OXFEFFFF	000000	UVUVVI	0000X0 0000X0	0X0000 0X0000	0x0000
Ö BEGN ZZ	0000000000	 	XXXXX	00000	00000	- XXXXXX -	0x0000
1 END ZZ	000000000	ÖXFFFFFFFF	000000	000000	CX0000	ÖXÖÖÖÖÖ	0x0000

11B2 j

FIG. 11B2

SENSEL	STST	SMSX	MTST	SMTST	TOSM	TVAL	TFNC	ENDCTL	BRNCTL	DEST
OX0230	0000	0001	0 X 00	000000	0	OX0017	0X42	0X0001	CX0000	000000
0)(0000	0X00	0)(00	0000	000000	0	00018	0X42	000007	<u> </u>	000000
0X0000 0X0230	ÖXÖÖ OXOO	ÖXÖÖ OXO1	0X00 0X00	0X0000 0X0000	0X33 0X30	0X0000 0X0000	OXOO OXOO	0X0101 0X0101	0X0000 0X0001	0X0000 44
0X0230	0000	0X01	0000	00000	0	0X0019	0X43	000001	000000	45
0X0000	0X00	0000	0X00	000000	Ŏ	OXOOTA	0X42	0X0007	000000	0X0000
0000X0 0000X0	0X00 0X00	0X00 0X00	0000	0X0000 0X0000	0X54 .0X46	0X00000 0X00000	0X00 0X00	0X0000 0X0101	0X0101 0X0000	000000
00000	0000	0000	0X00_	000000	.VA40	000000	OXOO	000101	000000	000000
0X0030	0X04	0X04	OXFF	000000	0	1 0X0000	0000	0X0001	000000	000000
000000	OXXX	0000	OXFF	000000	0X52	0X001B	0842	000000	000000	000000
000000	0000	0000	OXFF	0X0000 0X0000	0	000000	0X00 0X00	000000	0X0000 0X0080	000000
0X0000	ÖXÖÖ	0000	0000	1 00000	OXFF	000000		000000	0,000,000	UXU000
0X0000	0000	0000	0X00	000000	OXFF	0X0000	0000	000000	0X0000	0X0000
			1	1				1		
<u>11B</u> 1	•	1	1	1	1	, ,		1	I	l

MULTI-LEVEL CONTROLLER SYSTEM

RELATED APPLICATIONS

[0001] This application is a divisional of U.S. patent application Ser. No. 11/950,311, filed on Dec. 4, 2007, which is a divisional of 10/716,842, filed Nov. 18, 2003, which claims the benefit, under 35 USC §119(e), of U.S. Provisional Application No. 60/427,445 and U.S. Provisional Application No. 60/427,527, which are incorporated by reference herein.

FIELD OF THE INVENTION

[0002] The present invention relates generally to a state machine architecture and more specifically to a method and system for analyzing particles in a dilute fluid sample.

BACKGROUND OF THE INVENTION

[0003] Most processes consist of several process segments that fit together in a physically and temporally consistent manner. For example, a fluid control and imaging system, such as a urinalysis system, includes process segments for receiving a sample, aspirating the sample, and injecting the sample into a fluidics system where images are taken as the sample flows in a proper manner. To produce meaningful data, the sample receptacle, the aspirator, the valves, the pumps, and the optical components have to be in the proper positions at the proper times, and various fluids have to be released at the right time. Typically, these process segments are controlled on a real time basis by a single processor according to instructions in software or firmware. The instructions usually entail responding to various inputs by considering "hard-coded" branching conditions. This type of "hard-coded" branching takes the form of a "case statement" in which each case corresponds to a state and a relatively complicated "if" statement determines the response to inputs when in the given state.

[0004] In this type of real time operation, the process segments do not all happen completely simultaneously. For example, although the sample may be received and aspirated at the same time the flow cell is being flushed with a cleaning solution, the aspiration and the flushing take different lengths of time to complete, and therefore do not start and end at the same time. Furthermore, how long each of these processes will take to complete cannot always be predicted accurately because a process may have a random component (e.g., sample concentration will determine the time required to capture a fixed number of images) or a catastrophic unplanned event, such as the aspiration needle getting stuck or the cleansing fluid not being loaded correctly. Since the success of a process depends on each process segment running smoothly, this type of catastrophic unplanned event not only disrupts a process segment but also turns an entire process run into wasted effort if the event is not handled properly. Further, there is extra inefficiency associated with troubleshooting once it is determined that a run was erroneous because it is difficult to know exactly which process segment was in progress at a certain point in time.

[0005] In addition to the above disadvantages with a single-processor hard-coded real time controller, there is an additional source of inefficiency stemming from the need for a process engineer to collaborate with a software engineer to adjust the process parameters. While the process engineer understands the process and knows how the components ought to be set, implementation of the process usually

requires a software engineer. Thus, typically, the process engineer has to explain the process and what he wants to accomplish to a programmer, who then revises the code. This process engineer—software engineer communication link not only takes time but also creates more opportunities for error based on miscommunication or misunderstanding.

[0006] For the above reasons, a system and method of controlling a process more efficiently is desired.

SUMMARY OF THE INVENTION

[0007] A system includes a controller, at least one system component, and a processor for controlling the controller according to a table. The table includes a first column containing instructions in a first language that is not readable by the controller, and a second column containing corresponding instructions in a second language that is readable by the controller for controlling the system components, wherein the corresponding instructions in the second column are translated versions of the instructions in the first column. The controller controls the at least one system component according to the instructions in the second column.

[0008] Other objects and features of the present invention will become apparent by a review of the specification, claims and appended figures.

BRIEF DESCRIPTION OF THE DRAWINGS AND APPENDICES

[0009] FIG. 1 is a flow chart of an exemplary urinalysis process that may be used with the invention;

[0010] FIG. 2 is a block diagram showing the main components of an exemplary urinalysis system:

[0011] FIG. 3 is a perspective view of an exemplary bench top module analyzer unit that may be used for the invention;

[0012] FIG. 4 is a schematic diagram of the analyzer unit;

[0013] FIG. 5 is a schematic presentation of the leveled system architecture in accordance with the invention;

[0014] FIG. 6 provides an exemplary set of run sequences that the host controller sends to the level-1 controller;

[0015] FIG. 7 demonstrates how the level-1 controller executes a run sequence once an activating signal is received from the host controller;

[0016] FIGS. 8A-8J (collectively "FIG. 8") depict exemplary tables that may be used for a level-1 controller in a urinalysis process; and

[0017] FIGS. 9A-9C ("FIG. 9"), 10A and 10B (FIG. 10), and 11A and 11B ("FIG. 11") depict exemplary tables that may be used for level-2 controllers in a urinalysis process.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] The invention is particularly applicable to urinalysis processes and it is in this context that the invention will be described. It will be appreciated, however, that the system and method in accordance with the invention has greater utility since the system and method may be used with other types of processes that can be modeled as one or more state machines. The present invention may be incorporated into an in-vitro urinalysis diagnostic device that utilizes the technologies disclosed in U.S. Pat. Nos. 4,338,024 and 4,393,466.

[0019] Generally, there are two types of state machines: synchronous state machines and asynchronous state machines. Synchronous state machines carry out segments of a process (or a time-slice of a process) synchronized to the

beat of a clock. Thus, if a process were to be divided into a series of one-minute time slices, the pre-assigned tasks for each of those time slices are triggered at each clock signal. An advantage of a synchronous state machine is its stability, which stems from everything being synchronized to the clock. However, this synchronization can be a limitation of a synchronous state machine because synchronization often does not result in the fastest process runs. Furthermore, choosing the right clock speed can be tricky, for some parts of the process might want a faster clock speed than other parts. If the clock speed is too slow, certain events that start and finish between consecutive clock signals can get missed.

[0020] Asynchronous state machines provide a faster solution than the synchronous state machines. Asynchronous state machines, which do not operate to the beat of a clock, usually consist of a block of logic elements whose output is fed back as an input through a delay line. Thus, the output and next state of an asynchronous state machine is determined from a combination of the current state and the current input. The fact that the next state is immediately determined once the current state value transits the delay line allows the process to be run fast if the delay is shortened. However, these asynchronous state machines are not without a disadvantage. Since every change in the input test condition is immediately reflected at the output of the combinatorial logic and starts a new state propagating through the delay element, the asynchronous state machines can be unstable. Background information and details about asynchronous and synchronous state machines may be found in Tinder, Richard F., Engineering Digital Design (Academic Press, January 2000).

[0021] The invention offers a hybrid-type state machine that has the stability of the synchronous state machine and the speed of the asynchronous state machine but does not suffer the disadvantages of either. This hybrid-type state machine is implemented in the form of a multi-level controller system wherein one or more controllers may be present in each level. If there are multiple controllers in one level, the controllers in the same level behave independently of each other. The behavior of each controller is dictated by a state record formalism, which may be implemented in a spreadsheet/table. The spreadsheet has multiple fields, with each row being a "state record." Some fields test certain conditions, and the "next state" is identified based on the test result. The controller then transitions to the next state and carries out the values/commands of the fields in this next state.

[0022] Each controller in the multi-level controller system behaves according to its own spreadsheet. For example, for a system that includes one controller at the first control level and three controllers at the second control level, there would be four spreadsheets. The controller at the first control level issues commands to the three controllers at the second control level, the three controllers execute their tasks according to the commands, and send at least one signal back to the controller at the first control level when their tasks are complete. Although the three controllers do not necessarily finish their tasks at the same time, the controller at the first control level waits to hear back from all three controllers (or however many it needs to hear back from) before moving on to the next state in the spreadsheet for the first control level. Thus, while the three controllers at the second control level execute their tasks independently of each other, the controller at the first control level synchronizes the states to a degree by waiting to hear back from the three controllers before proceeding to the next state.

[0023] This hybrid-type state machine is like a synchronous state machine in that the controller at the first control level moves from a current state to a next state when a predetermined set of tasks are accomplished or conditions are met. However, this hybrid-type state machine is not restricted to the beat of a clock like a synchronous state machine. Rather, it can execute a process as fast as its components can execute their discrete tasks. By using faster processors, the hybrid-type state machine can be made to execute a process almost as fast as an asynchronous state machine.

[0024] The hybrid-type state machine also has characteristics of an asynchronous state machine. For example, it tests conditions to decide the next step, and as soon as these conditions are met it advances to the next state. However, it does not suffer the instability problem like an asynchronous state machine because the first level synchronizes the process segments at certain points in the process (i.e., at the end of each state), and because of the state record formalism all possible states and state transitions are specified. The state record formalism that is implemented in a spreadsheet with fields specifies all the parameters so that certain points of the process are synchronized.

[0025] Another advantage of this multi-level controller architecture is that the syntax at every level except the lowest level can be made the same, drastically simplifying the programming process. At each level in this multi-level controller system, the controller only "knows" and cares about what is in its spreadsheet; it does not know about all the details happening at the levels above or below its own level. For example, a three-leveled system may include 1) a high control level that executes run sequences, and 2) a middle control level that executes the states in each of the run sequences and issues commands to 3) a low control level that controls motors, actuators, and valves according to commands in the states. In this system, the high control level only knows to send a run sequence command to the middle control level, and to move to the next run sequence state once it hears back from all the controllers in the middle control level that it needs to hear back from. The high control level is unaware of all the details of the states in the middle control level, the existence of low control levels below the middle level, the function of the low control level and each of the valves and the motors, etc. Likewise, the middle control level only knows to send out certain commands to the low control level in response to a command from the high control level, and to determine the next state when it hears back from the low control level.

[0026] A benefit of using the spreadsheet is that if a process engineer's terminology (e.g., motor #2 on/off, test sensor #12, valve #3 on/off) is used in the fields of the spreadsheet, the process engineer can adjust the settings of a process run without getting help from a programmer. By inputting values into the fields of the spreadsheet(s), the process engineer can specify states and run sequences for each level by himself. The spreadsheet allows the process to be broken down into process engineering terminology by receiving the input parameters from the process engineer in the language of his preference, and converting these input parameters into a machine-usable code. The converted code may be resented in a section of the spreadsheet, such as a separate set of column (s).

[0027] As used herein, a "state" refers to a process segment that is associated with the controllers and the components of the system being in a certain position/setting or performing a specific task. The "task" can be instructions to do something

active, such as opening a valve, or instructions to do something passive, like waiting. A row in the spreadsheets of FIGS. 8, 9, 10, and 11, for example, represents a state. A "state record" is a collection of the field values or parameters in a row of the spreadsheets in FIGS. 8, 9, 10, and 11. "Parameters" refer to values in a table. A state may be indexed by a "state index" or a "state order." The fields in a state record represent/specify the outputs from the controller when in the given state, along with the tests and conditions that these tests must satisfy to end the state. For example, if a level-1 controller is to issue first level commands to three controllers at a second control level, the level-1 controller will obtain the specific command for each of these level-2 controllers from the respective fields in its state record. These first level commands may identify the run sequence to be executed by each level-2 controller. In this case, each level-2 controller executes the second level states in the identified run sequence. As used herein, controllers in the first control level are referred to as "level-1 controllers," controllers in the second control level are referred to as "level-2 controllers," etc. Also, as used herein, "first level commands" refer to commands issued by a level-1 controller, "second level commands" refer to commands issued by a level-2 controller, etc. "Execution" of states means to move through the states in an appropriate order, taking appropriate actions in each state.

[0028] Multiple states make up a "run sequence." Typically, a run sequence has a specific set of states arranged in a specific order to achieve a specified function, such as sample aspiration or moving a specimen rack from point A to point B. Often, multiple state run sequences at the second control level corresponds to a single state in the first control level.

[0029] "Motors," as used herein, includes both motors that actually move mechanical parts and motors that drive pumps, etc. "Components," as used herein, refer to all physical portions of a system other than a controller. "Commands" are signals traveling from a controller at a higher level to a controller at a lower level, and "status reports" are signals traveling from a controller at a lower level to a controller at a higher level.

[0030] Now, the invention will be further described in reference to the Figures.

[0031] FIG. 1 is a flow chart of an exemplary urinalysis process 10 that may be implemented with the invention. The analysis process 10 begins when a urine sample is received (stage 12) by a sampling system. The received sample is mixed and aspirated into the system and introduced into a fluidics system (step 14). Elements in the flow microscope stain and mix the sample (step 16), then pass it through a flow cell (step 18) where images are taken. A host controller oversees the taking of the images. An imaging computer receives the data from the flow cell (step 20), processes them as needed (step 22), and displays the data (step 24).

[0032] FIG. 2 is a block diagram showing the main components of an exemplary urinalysis system 30. The urinalysis system 30 includes a sampler 32 and a microscopy analyzer unit 34, both of which feed information to a computer 36. A communication link 37 connects the microscopy analyzer unit 34 to the computer 36, which is also connected to a Laboratory Information System (LIS) 38. A specimen rack 40 that carries test tubes of samples travels between the sampler 32 and the microscopy analyzer unit 34. In some embodiments, an automatic rack transfer mechanism transfers the

specimen rack 40 from the sampler 32 to the microscopy analyzer unit 34. In other embodiments, the transfer is done manually.

[0033] FIG. 3 is a perspective view of an exemplary bench top module microscopy analyzer unit 34 that may be used for the invention. The microscopy analyzer unit 34 aspirates samples, collects images from urine samples using digital image capture of analyte images presented in a flow microscope, and performs image processing to isolate individual particles. The microscopy analyzer unit 34 has its own power supply, processor, and controllers, a barcode reader to identify samples, motors to drive the mechanical components of the system, fluidics systems to pipette samples from the test tubes, and a communication link 37 to the computer 36 (see FIG. 2). On the outside, the microscopy analyzer unit 34 includes a platform 42 onto which the specimen rack 40 is placed, and some buttons, e.g., a start button 44. The specimen rack 40 is loaded on a measurement side 44 of the platform 42. Multiple (e.g., five) racks may be loaded at the same time. An input conveyor (CI) moves the rack away from the user and toward a wall 48, where the samples are aspirated by a pipette system (not shown). As each sample is aspirated, a shifter arm incrementally moves the rack toward a return side 46, placing the next sample test tube under the pipette. When all the test tubes are sampled, an output conveyor (CO) near the return side 46 moves the rack forward, away from the wall 48. Where multiple racks are placed on the platform 42, the rack that was at the very back (i.e., near the wall 48) on the measurement side 44 will end up at the front (i.e., away from the wall 48) on the return side.

[0034] FIG. 4 is a schematic diagram of the microscopy analyzer unit 34. The nine connectors 50 along the left hand side of the figure are connected to a level-1 controller 52 (HLC) and a level-2 controller 54 that is controlled by the level-1 controller. In the embodiment shown in FIG. 4, the level-2 controller includes a first level-2 controller 54a (also called the specimen presentation assembly (SPA) controller), a second level-2 controller 54b (also called the fluid block assembly (FBA) controller), a third level-2 controller 54c (also called the specimen transport mechanism (STM) controller), and a fourth level-2 controller 54d (also called the optical Block Assembly (OBA) controller). Each of the level-2 controllers controls certain system components.

[0035] The first level-2 controller 54a controls the aspirator process by sending signals to pipette motors 60, 62, an evacuation pump 64, a sheath pump 67, and some of the valves 68. A pipetting station controlled by the first level-2 controller 54a is located near the front of the microscopy analyzer unit 34. The pipetter, controlled by the pipette motors 60, 62, mixes the sample and aspirates a predetermined amount of the sample. The sample is mixed in its tube, a sampling probe descends to the tube bottom and expels a pulse of air to assure uniform mixing of sediment before being processed by the microscopy analyzer unit 34. After the mixing, the sample is drawn by vacuum into a flowcell through a series of tubes that allow stain to be introduced into and mixed with the urine.

[0036] The second level-2 controller 54b controls the flow cell by sending signals to a cannula pump 70, the sheath pump 67, and some of the valves 68. In the particular embodiment, the valves 68 are controlled by both the first and the second level-2 controllers 54a and 54b. The fluidics components are composed of a stain container (not shown), a sheath container (not shown), and three pumps 64, 67, and 70 that aspirate and circulate the sample, the stain, sheath fluid, and a cleaner

(e.g., IRISolv) into the fluid block and the flow cell. The pumps **64**, **67**, and **70** may be peristaltic pumps or displacement pumps.

[0037] The third level-2 controller 54c sends signals to components that function to transport the specimen rack 40, by sending signals to various arms that move the rack along a path. More specifically, the third level-2 controller 54c sends signals to a front arm stepper motor 76a, a rear arm stepper motor 76b, one or more DC motors 78, to move the specimen rack 40. Sampling from the tubes on the sample platform 42 (shown in FIG. 3) is performed by a pump-driven fluidic subsystem. Any suitable pump, including a displacement pump of the type described in U.S. Pat. No. 7,150,607, may be used to drive the sampling process.

[0038] The third level-2 controller 54c interfaces a barcode reader 90. The barcode reader 90 scans the barcode label on a sample tube and keeps the identification information stored locally. Eventually, the barcode reader 90 sends the scanned identification information to the Laboratory Information System (LIS) 38 via the computer 36.

[0039] The fourth level-2 controller 58 controls the optical components of the flow microscope, which may include motorized positioners 86 within a microscope (not shown) to adjust the position of a flow cell. In the embodiments in which the microscopy analyzer unit 34 utilizes the strobe illumination, the strobe flashes at a high speed, synchronized with the CCD camera 84. The CCD camera 84, which is controlled by the host controller, captures the image during the strobe flash. The level-1 controller indirectly controls the strobe bulb 82. The microscope typically includes components such as diffusion filters, lenses, and other optical elements to focus the light in a desired manner. In the embodiment shown, some of these components are controlled by the fourth level-2 controller 54d.

[0040] After the images are taken, the waste pump 94 discards the fluids into a waste line that leads to the waste chamber. A waste well liquid level sensor assembly 73 detects the liquid level in the waste chamber.

[0041] FIG. 5 is a schematic presentation of the leveled system architecture 100 in accordance with the invention. Unlike in a conventional system, which executes real time operation using a single processor, the leveled system architecture 100 includes multiple levels of processors and/or controllers that control each other and ultimately the system components. For example, the host level controller 56 includes a host processor, the level-1 controller 52 includes the master controller, the level-2 controller 54 includes four controllers 54a, 54b, 54c, and 54d, and the level-3 controller includes one or more controllers that interface between the level-2 controllers and the system components. The motors, pumps, and the valves are controlled by the level-3 controllers, which are programmed in C and typically are not changeable like the state records, which a process engineer accesses to control the operations of the second and the level-2 controllers 52, 54.

[0042] In the embodiment shown, the host level controller 56 includes an Analysis Processor (AP) 56a and a Sediment Module Host (SMH) 56b. The SMH 56b directly controls the level-1 controller 52. The user interface, however, is implemented in the AP 56a. Thus, from the user's perspective, there are two paths for controlling the system: 1) push buttons on the microscopy analyzer unit 34 (see FIG. 3), or 2) enter commands using the user interface (e.g., a GUI) in the AP 56a. The two paths allow the user to control different aspects

of the system. The invention is not limited to the particular configuration of the host level controller 56 shown in FIG. 5. [0043] In this multi-level system architecture 100, the "higher" levels send commands to the "lower levels," which perform certain functions according to the commands and return at least one status report to the "higher" levels that issued the commands. For example, the level-1 controller 56 sends first level commands to the level-2 controller 52, and the level-2 controller 52 sends second level commands to the level-3 controller 54 in accordance with the first level commands from the level-1 controller 56. The level-3 controller 54 performs its functions according to the second level commands from the level-2 controller 52, and returns a status report to the level-2 controller 52 when the functions are completed. The level-2 controller 52 waits to receive all the status reports it expects to receive and, when this happens, sends a status report to the level-1 controller 56 to inform the level-1 controller that the level-2 controller 52 completed its functions. "Completion," as used herein, can mean either a successful completion of the prescribed task(s) or a passage of a prescribed amount of time.

[0044] This leveled system architecture 100 may be used with the urinalysis process 10 described above, although its utility is not so limited. Although not shown in FIGS. 8, 9, 10, and 11, each of the spreadsheets contains a column with a header file generated by the spreadsheet for programming the controller. The header file usually takes the form of a hexadecimal file containing the state record information, and becomes loaded into an EEPROM associated with each of the microcontrollers that implement the level-1 controllers 52 and the level-2 controllers 54. In this way, the process engineer, who does not have to be a programmer, can input field values into the spreadsheet(s), which will automatically generate the code interpreted by the controllers. By entering or modifying values in the spreadsheets for the level-1 controller 52 and the level-2 controller 54, the process engineer can modify the process parameters without relying on a program-

[0045] FIG. 6 provides an exemplary set of run sequences that the host controller 56 sends to the level-1 controller 52. In the embodiment shown, each run sequence is identified by a two-letter code L₁L₂ 600. For each run sequence, there is a beginning state 602, an end state 604, and a general description 606 of what is done in the particular run sequence. For example, in run sequence RH, which is carried out in states 1 through 14, the level-2 controllers 54 are reset. In run sequence 16, which is carried out in states 15 through 99, the system resumes running racks. There is no limitation to the order in which the run sequences are executed, and not all the run sequences need to be executed during a process. Also, some states may be executed in multiple run sequences. For example, Run Sequence PI for "Irisolve Clean," which includes states 350-366, is part of Run Sequence WA for "wash with bleach" (states 356-392). The Sediment Module Host PC portion of the host controller 56 will send signals for Run Sequence PI or Run Sequence WA depending on what the process engineer wants done.

[0046] FIG. 7 is a state machine record interpreter that demonstrates how the level-1 controller 52 and each other level except the lowest level controller executes a run sequence once an activating signal is received from the host controller 56 (or the next higher level controller). Initially, upon activation, the level-1 controller 52 is reset (stage 700) and is in an idle state (stage 702). At this point, the current

state is the state identified in the "beginning state" column in FIG. 6. After the functions of the first state are completed, the controller proceeds to the subsequent stage in the sequence and adjusts the state number (stage 704) so that a state that was "the next state" in the previous state is now "the current state." The controller waits for the subsequent stage to be completed (stage 706), then moves on to the next stage as shown by an arrow 708. After repeating stages 704 and 706 until there is no next state in the sequence, at which point the run sequence is completed and the level-1 controller 52 returns to the idle state in stage 702.

[0047] FIGS. 8, 9, 10, and 11 depict exemplary tables that may be used to implement the urinalysis process 10. The table in FIG. 8 is a level-1 controller state record table 300, which dictates the behavior of the level-1 controller 52. The tables in FIGS. 8, 9, and 10 are level-2 controller state record tables that dictate the behavior of the level-2 controller 54. The tables are arranged so that a state is represented by each row and a signal is represented by each column. In the tables, "SM" refers to the controller or processor at an adjacent higher level. For example, SM from the perspective of a level-1 controller 52 would be the host controller 56, and SM from the perspective of a level-2 controller 54 would be the level-1 controller 52.

[0048] FIG. 8 is an exemplary level-1 controller state record table 300. The state record table 300 is in the form of a spreadsheet with columns indicating different fields and rows indicating different states. The level-1 controller 52 moves from a current state to a next state until the run sequence has been completed. A state index 302 shows a numerical designation for a state that is described in a description column 304. For each state, there are commands 306 that the level-1 controller 52 issues to the level-2 controller 54. In response to the commands 306a, 306b, 306c, and 306d, the level-2 controllers 54a, 54b, 54c, and 54d perform certain functions and return status reports 308a, 308b, 308c, and **308***d* to the level-1 controller **52**. The level-2 controllers **54** execute their functions independently and asynchronously with respect to one another. Since the level-2 controllers 54 may take different lengths of time to complete their respective functions, they will each return their respective status reports to the level-1 controller 52 at different points in time. The level-1 controller 52 does not send a command to execute the next state until all the expected status reports have been returned. There is no restriction to the number of status reports that the level-1 controller 52 needs to receive before moving on to the next state. Values in the status report fields 308 can be changed by a process engineer, and in table 300, "0X00" means no status report is needed.

[0049] In addition to the fields 306, 308 that pertain to communicating with the level-2 controllers 54, the level-1 controller state record table 300 contains field parameters pertaining to communicating with the host controller 56. SMTest 310 refers to a signal that the level-1 controller 52 receives from the host controller 56. A particular value of the SMTest 310 stands for a two-letter code, which is interpreted differently depending on the state of the level-1 controller at the time the two-letter code is received. For example, if the level-1 controller is idle at the time a particular code is received, the level-1 controller will interpret the code as a run sequence shown in FIG. 6. Thus, it will execute the run sequence after accessing the table of FIG. 6 to identify the run sequence. It also sends a signal ToSM 312 to the host controller to inform the host controller that the run sequence is in

progress. Some time later, the host controller will issue another two-letter code to stop the run sequence, for example because all the necessary data have been collected. This time, since the level-1 controller is running at the time the two-letter code is received, the level-1 controller checks to see if the received two-letter code matches the value in the SMTest 310 field. If the value matches the value in the SMTest 310, the level-1 controller will end the state. The level-1 controller will then send a signal ToSM 312 to indicate that the run sequence has ended.

[0050] Tvalue 314 and Tfunc 316 together determine how long a state lasts. More specifically, Tvalue 314 indicates a time frame in some predetermined temporal unit and Tfunc 316 indicates how the time frame indicated in the Tvalue 314 is to be used (e.g., as the maximum run time). If a state is not completed within the time frame defined by Tvalue 314 and Tfunc 316, an error message may be generated to alert the user that an unexpected event happened in this state.

[0051] Sens 318, STst 320, and SMsk 322 pertain to determining the sensor state. There are a number of sensors in the microscopy analyzer unit 34 for measuring or detecting a parameter, and Sens 318 identifies the sensor that is relevant to a particular state. STst 320 identifies the status of the sensor (e.g., on or off). SMsk 322 provides a reference value that is compared against the STst value to determine a course of action. The STst value having a certain relationship with respect to the reference value is herein referred to as a "condition" for taking the subsequent step toward completion.

[0052] The signal from the host controller (SMTest 310), the statuses 308 of the third level controllers, and the status of the sensor (STst 320) relative to Smsk 322 determine the next state. If these values indicate that no branching is to occur, the current state ends and the next consecutive-numbered state index in the current run sequence becomes activated. If the current state ends at the end of a run sequence, a ToSM 312 signal is sent to the host controller 56 to indicate that a run sequence has been completed. The level-1 controller 52 will then remain idle until the host controller 56 issues another SMTest signal, activating a new run sequence. If SMTest 310, the level-2 controller statuses 308, and the sensor status STst 320 indicate that the current state is to branch, thereby satisfying the "predefined condition" for branching, Dest 328 points to the state to branch to and Bran 326 triggers the branching.

[0053] As mentioned above, a process engineer is able to adjust at least some of the parameter values in table 300 because they are parameters that make sense when the system is considered from the perspective of a process engineer. For example, the process engineer may adjust the Tvalue 314 so that a state waits for a longer or shorter period of time before generating an error signal, or adjust values in commands 306 so that a certain valve is open, not closed. The system includes a user interface through which the process engineer can adjust "calibration" values in separate tables (not just the level-1 controller table). These calibration values may be used to control time intervals, motor operation or as threshold settings for sensor readouts.

[0054] The controllers in the urinalysis system 30 convert the parameters input by the process engineer to generate the machine-readable values in column 330. Although a programmer is initially needed to program this conversion method, the programmer does not need to be involved each time a parameter is adjusted.

[0055] When the level-2 controllers 54a, 54b, 54c, and 54d receive commands 306 from the level-1 controller 52, each of the level-2 controllers 54 starts a function in accordance with the received command. As mentioned above, the spreadsheets for the level-2 controllers 54a, 54b, 54c, and 54d have substantially the same syntax as the spreadsheet for the level-1 controller. This similarity extends not only to the fields in the spreadsheets but also to the mode of communication with the adjacent levels. For example, in the same way that the level-1 controller's interpretation of a code from the adjacent higher level depends on the state of the level-1 controller at the time the code is received, the level-2 controller interprets an input differently depending on whether it is in an idle state or an active state when the code is received.

[0056] FIG. 9 illustrates what the first level-2 controller 54a does upon receiving a command from the level-1 controller 52. A first level-2 controller state record table 400 contains the commands to be sent to the valves 68, the pipette motors 60, 62, an evacuation pump 64, and the sheath pump 67 (see FIG. 4) in columns labeled Energized Valves 406, First Motor 410, Second Motor 412, EP 408, and SP 414, respectively. The positions of the valves and pumps are indexed by a state order 402, each of which has a description 404. The "SP" here is a dummy field that is not used in the particular embodiment, as indicated by a constant value in all the states.

[0057] The first level-2 controller 54a uses a pressure sensor to measure the pressure inside the air storage. This air is used to mix the specimen, for example by air-blasting. Sensor Select 416 identifies the sensor, Sensor State 418 indicates the status of the selected sensor, and Sensor Mask 420 contains a reference value. MotorTest 422, which detects the status of the motor, is one of the factors considered to determine what to do next. A motor may be in one of a few states, the exact number depending on the motor type. For example, a motor may be 1) running and not where it is supposed to be, 2) running and where it is supposed to be, or 3) stopped where it is supposed to be. The value in the MotorTest 422 indicates which of the three states the motor is in.

[0058] Unlike the level-1 controller 52, the first level-2 controller 54a does not test for specific messages from a higher-level controller, which in this case would be the level-1 controller 52. Thus, SM Test 424 is set at a value 0X0000. However, the statuses of the valves and motors are reported to the level-1 controller, as indicated by non-zero values in ToSM 426. Tvalue 428 indicates a time out value associated with each respective state and Tfunc 430 indicates how the time out value is to be used. Based on the value in MotorTest **422** (i.e., whether they satisfy the predefined condition with respect to the reference value), Tvalue 428, and Tfunc 430, the first level-2 controller determines whether the state is to end or not. If the state is to end, the value in the column labeled End Ctrl 432 indicates how the particular state is to end. If the state is to branch, a Bran Ctrl 434 briggers the branching and a Dest 436 points the state or the run sequence to branch to.

[0059] FIG. 10 depicts a second level-2 controller table 500 that may be used to direct the second level-2 controller 54b to execute certain functions. The second level-2 controller table 500 is indexed by a state order 502, each of which has a State Description 504. The second level-2 controller table 500 is similar to the first level-2 controller table 400 (see FIG. 4 above) in that it controls valves 68. In addition, it controls the sheath pump 67 and the cannula pump 70. MotorTest 522 detects the status of the sheath pump 67 and the cannula pump

70. Energized Valve 506 identifies the fluid block valves that are to be energized. Command columns 509 include a CP 508, which indicates a signal to be sent to the cannula pump, and an SP **514**, which indicates a signal to be sent to the sheath pump. Dummy Motor 510 and Dummy Motor 512 are unused in the embodiment shown, as indicated by a constant value 80FF in both columns. The Dummy Motor fields may be used if more motors are added to the system. Likewise, the columns relating to sensor selection, such as Sensor Select 516, Sensor State 518, and Sensor Mask 520 are unused in the embodiment shown because the second level-2 controller does not use a sensor. The unused fields may be used if a component, such as a sensor, is used with the second level-2 controller 54. The motor states are tested and the status codes are compared to the test value in Motor Test 522. There is a two-way communication from the second level-2 controller 54b, the level-1 controller 52, as shown by the signals in ToSM 526. There is no signal transmitted from the level-1 controller 52 to the second level-2 controller 54b, however, as indicated by the constant value 0X0000 in SMTest 524.

[0060] Tvalue 528 indicates a time out value associated with each respective state and Tfunc 530 indicates how the time out value is to be used. If the current state does not end because the predefined conditions in EndCtl are not satisfied before the amount of time indicated by the time out value expires, an error signal may be generated. Depending on whether values of Motor Test 522, Tvalue 528, and Tfunc 530 satisfy this predefined condition or not, the state will either end or branch. The value in the column labeled End Ctrl 532 indicates the conditions to be satisfied for the particular state to end. If the state is to branch, a Bran Ctrl 534 indicates a condition or manner of branching and a Dest 536 points the state or the run sequence to branch to. In state 24, Dest=0, indicating that the next state is an idle state (state order 0).

[0061] FIG. 11 depicts a third level-2 controller state record table 600 for the third level-2 controller 54c, which controls the specimen rack 42 (see FIG. 3). The third level-2 controller state record table 600 is indexed by state order 602 and a description 604. As described above in FIG. 3, there are at least two conveyors in the system: an input conveyor (CI) and an output conveyor (CO). CI pushes the specimen rack toward the wall 48 of the microscopy analyzer unit 34 (see FIG. 3). The rack then shifts sideways incrementally to allow sampling of the different test tubes. A shifter arm (SM), controlled by the stepper motor 76a in FIG. 4, shifts the specimen rack 40 from the CI to the CO along this path, stopping to allow each tube to be sampled. Then, the CO moves the specimen rack from the position where CI left it and brings the specimen rack to the front, so that CI and the CO together take the specimen rack on a U-shaped path. A repositioning arm (CM) controlled by the stepper motor **76***b* (in FIG. **4**) could be used to send a command 612 to move the rack from the finishing end of the U to the beginning end of the U so that the CI is able to move the specimen rack again. SM 610, CM 612, CI 614, and CO 616 show signals to be sent to the respective arms in each state. In the exemplary table 600, the columns for 606 and Dand 608, and RC 618 are dummy columns, as indicated by a constant value. These dummy columns may get used if additional components are incorporated into the system.

[0062] A few sensors are used by the third level-2 controller 54c. SenSel 620 identifies a sensor to be tested in each state, Stst 622 indicates the status of the sensor as determined by the test, and SMtst 624 indicates a reference value that is used for testing the status of the sensor. Mtst 626 is the encoded status

of motors 76a, b, or 78a, b (see FIG. 4). SMtst 628 is unused, indicating that the level-1 controller 52 is not tested. Signals in ToSM 630 are sent to the level-1 controller 52 when certain conditions are fulfilled.

[0063] Tvalue 632 indicates a time out value associated with each respective state index and Tfunc 634 indicates how the time out value is to be used. Depending on whether the values of SM 610, CM 612, CI 614, CO 616, and Mtst 626 satisfy the predefined condition or not, the current state will either end or branch. If the state is to end, the value in the column labeled End Ctrl 636 indicates how the particular state is to end. If the state is to branch, a Bran Ctrl 638 triggers branching and a Dest 640 points the state or the run sequence to branch to.

EXAMPLE

[0064] This example illustrates how the multi-level controllers interact with each other to complete a run sequence. Specifically, this example illustrates how the level-1 controller resets the level-2 controllers and has them execute run sequences that prepare the system for processing samples (i.e., execute the first run sequence shown in FIG. 6). As shown in FIG. 6, the run sequence RH entails state indices 1-14 of the level-1 controller state record table 300. During this process, the sheath bottle is filled with a sheath fluid, the pipette position is initialized, and the STM initializes the position of rack motion levers and clears the input and output conveyor. In the first state of this reset process (i.e., FIG. 8, state index=1), the level-1 controller 52 sends a reset signal (RE) to each of the four high level controllers. The four level-2 controllers 54 reset themselves in response to the reset signal, and send back a status report (0XFF). After receiving all four status reports, the level-1 controller 52 sends the signals associated with state index 2. In state index 2, the level-1 controller 52 sends a signal "S1" to the first level-2 controller 54a. The first level-2 controller 54a, which will then start state 61 of the state record table 400, fills the sheath bottle. Since the value "0X0000" indicates that no signal is sent, no signal is sent to the second, third, and fourth level-2 controllers in state index 2. When the sheath bottle starts to get filled, the first level-2 controller 54a returns a completion status "0X32," as shown in the ToSM column of table 400 and the SPAstat column of table 300. The value 0x0002 in the End column 324 indicates that state index 2 will end as soon as the "0x32" status is returned from first level-2 controller 54a.

[0065] State index 3, which has a timeout value 314 of 0x0005 and a Tfunc 316 of 0x42, says to stop filling the sheath bottle when the time out value 314 is reached. The Sens 318 value of 0x0033, STst value of 0x01, and SMsk value of 0x01 indicate that if the sensor identified by 0x0033 reaches a state 0x01, the sheath bottle is full. The End column 324 has a value 0x8383, which means that the state is to end when either the sheath bottle is full or the timeout value 314 is reached. When the current state ends, the level-1 controller proceeds to state index 4, whereby an S0 signal is sent to the first level-2 controller 54a to turn off the filling. Upon receiving the signal S0, the first level-2 controller 54a turns off the sheath pump and sends the signal 0X33 to the level-1 controller 52, which then ends the current state.

[0066] In state index 5, the level-1 controller 52 waits for the first level-2 controller 54a to send a signal 0XFF indicating that the sheath pump is turned off and it is now idle.

[0067] After the sheath pump is filled, the sheath's level is tested in state index 6. The sheath level is tested by identifying

the low sensor selected by 0X0032 in column 318, and comparing it against the calibration table value selected by SMsk value 0x80. If the comparison indicates that the sheath level is low, the process branches to state index 8 according to the Bran 32 and the Dest 8. In state index 8, it is tested whether the sheath is empty. If the sheath sensor 0X0032 in column 318 indicates that the sheath is empty when compared against the calibration table value selected by SMsk value of 0x40, the Bran 326 value and the Dest value 328 direct the level-1 controller to branch to state index 10. In state index 10, the level-1 controller sends a message 0x21 to the host processor to let the host processor know that the sheath is empty. Then, the level-1 controller branches to state index 100, which starts the rack clearing process.

[0068] Referring back to state index 6, if the sensor selected by 0X0032 does not indicate that the sheath level is low, no branching occurs and the next state would be state index 7. In state index 7, the level-1 controller 52 reports that the sheath level is okay to the host processor by sending a ToSM message 0x1F. Then, the level-1 controller 52 executes state index 11

[0069] In state index 11, the level-1 controller 52 sends the commands PH, HS, and CR to the first level-2 controller 54a, the second level-2 controller 54b, and the third level-2 controller 54c, respectively. No signal is sent to the fourth level-2 controller (the OBA controller) because optical bench initialization is not required in the reset run sequence. The first level-2 controller, upon receiving the PH command, starts to lift the pipetter and send the pipetter to a back sensor and eventually to a waste well by executing states 4-9 in table 400. In states 4 and 5, signals are sent to the horizontal motor to move the pipette arm to the back sensor. In state 6, a signal is sent to the motor to rotate the pipetter out to the waste well. Then, air pressure is checked in state 7 by using a sensor 10B0 to compare against a reference sensor mask value. If the pressure is at an acceptable level already, the SPA controller 36b branches to state 9, where a message 0x12 is sent to the level-1 controller to inform that the pressure level is acceptable. If the pressure is not at an acceptable level, the first level-2 controller 54a sets valves and activates the air pump to recharge the pressure to the acceptable level in state 8 before sending the signal to the level-1 controller in state 9.

[0070] The second level-2 controller 54b, upon receiving the HS command, activates the valve CBV3 and sends the signal 80FE to the cannula pump 70 and the sheath pump 67 (see FIG. 4) to put them in standby positions in state 32. The pump roller is then placed on the tube in state 33. Then, a status report signal 0X21 is sent to the level-1 controller 52 in state 34.

[0071] The third level-2 controller 54c, upon receiving the CR command, runs the infeed conveyor in reverse by sending a signal 0X80FF to the SM, 0X0100 to the CI, and 0X880FF to the CO. This is done for a time period defined by Tval=0X0016 and Tfnc=0X02. After this predefined time period, a signal 0x30 is sent to the level-1 controller and state 34 ends.

[0072] Referring back to table 300, an FBAstat value of 0x21 is received in state 11. A Tvalue of 0x0009 and a Tfunc value of 0x44 set a time frame by which the FBAstat value must be returned. The End value 0x005F indicates that if the FBAstat value of 0x21 is not received by the end of the designated time frame, an error signal is generated; if the FBAstat value is received in time, the level-1 controller moves on to state 12.

[0073] In state index 12, the level-1 controller 52 waits to receive a SPAstat value of 0xFF and moves on to state 13 when it does. In state 13, the level-1 controller waits to receive an STMstat value of 0xFF, and moves on to state 14 when it does. In the run sequence Reset High (RH), no signal is exchanged between the level-1 controller and the OBA controller. In state 14, the Reset High run sequence ends.

[0074] With the leveled controller architecture 100 (see FIG. 5) of the invention, each level-2 controller 54 operates independently of each other. However, because the level-1 controller 52 does not proceed to the next state until all the expected status reports have been received from the high level controllers, the level-1 controller synchronizes the high level controllers at certain "check points" in the process. If not all the expected status reports are received within a designated time frame (e.g., Tvalue), an error signal is generated and, optionally, the process halts. Having this "check point" system at the end of each state prevents the entire process run from being tainted with an error. Furthermore, the "check point" system facilitates troubleshooting by allowing the process engineer to know exactly in which state the error occurred.

[0075] While the foregoing has been with reference to a particular embodiment of the invention, it will be appreciated by those skilled in the art that changes in this embodiment may be made without departing from the principles and spirit of the invention, the scope of which is defined by the appended claims.

[0076] For example, it is within the scope of the invention to allow the higher control levels to control a lower control level or the system components "directly" or "indirectly." If the control is "direct," there is no intervening level between the level that is doing the controlling and the level that is being controlled. For example, a level-1 controller usually directly controls a level-2 controller. In contrast, if the control is "indirect," there are one or more intervening levels between the level that is doing the controlling and the level that is being controlled. For example, in a three-level control system, the first control level may be designed so that it is able to control either the second control level or the third control level, depending on the situation.

[0077] In the embodiment including multiple lower level controllers, a command issued by a higher level controller is meant for, or "targeted to," one or more of the specific lower level controllers. In some embodiments, the higher level controller sends a command only to the targeted lower level controllers. In these embodiments, the lower level controllers that are not targeted do not receive the command. In other embodiments, the higher level controller "broadcasts" a commondant of the command in the command

mand to many of the lower level controllers and let recipient lower level controllers determine whether the command applies to them. If a lower level controller determines that the command is not applicable, it will ignore the command.

[0078] Depending on the embodiment, controllers in the same control level are allowed limited or full communication with each other. Sometimes, the communication is limited to inter-level communication between a higher level controller and a lower level controller. A person of ordinary skill in the art will appreciate that numerous variations are possible.

What is claimed is:

- 1. A system comprising:
- a controller;
- at least one system component; and
- a processor for controlling the controller according to a table, the table comprising:
 - a first column containing instructions in a first language that is not readable by the controller; and
 - a second column containing corresponding instructions in a second language that is readable by the controller for controlling the system components, wherein the corresponding instructions in the second column are translated versions of the instructions in the first column:
- wherein the controller controls the at least one system component according to the instructions in the second column.
- 2. The system of claim 1, further comprising:
- a user interface configured to input the instructions in the first column.
- 3. The system of claim 1, wherein the processor is configured to translate the instructions in the first column to the corresponding instructions in the second column.
 - 4. The system of claim 1, further comprising:
 - a user interface configured to modify at least one of the instructions in the first column, wherein the processor is configured to translate the modified at least one of the instructions to the second language for replacing the corresponding instructions in the second column.
- 5. The system of claim 1, wherein the table further comprises:
 - a third column of status reports to send to the processor or a higher level controller;
 - a fourth column of tests for checking whether a predefined condition is fulfilled; and
 - a fifth column defining a course of action if the predefined condition is fulfilled.

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