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Digital Development Memo #267

To: Eldon Hall
From: Alan Green
Subject: Block II Keyboard and Display Program (RETRED44)
Date: 28 July 1965

1. General Remarks

The Keyboard and Display Panel for Block II is very similar to that of Block I. There are still "2 character" displays for major mode, verb, noun; and three "5 character" displays for data (each of these may also have sign). The Keyboard has the following keys: +, -, 0 through 9, CLEAR, ENTER, VERB, NOUN, RESET, KEY RELEASE.

Operationally the Keyboard and Display System Program differs little from the Block I system. Block I operation has been thoroughly described in E-1574 and modified by Digital Development Memo #245. This report assumes a familiarity with the above cited reports, and will serve to point out differences and changes from the Block I operation.

The basic operating format is:

VERB XX NOUN XX ENTER.

If the loading of data is required, the flash is turned on. Each data word is loaded in the form:

±XXXXX ENTER.

A complete list of verb codes and noun codes for program RETRED44 is given in Section 4.

2. New Block II Formats

A. The nouns 01 through 07 used to be thought of as requiring the operator to supply a complete 15 bit address (CADR). In Block II, there is no 15 bit address that uniquely specifies any computer register. Therefore it is necessary to make a distinction between Erasable CADR and Fixed CADR words.

When nouns 01 through 07 are used with normal display, load, or monitor verbs, the Erasable CADR is appropriate (15 bit address). When used with the "fixed memory display" verb (verb 27), nouns 01 through 07 require a Fixed CADR (15 bit address).

B. Input and output channels constitute yet a third field of computer memory that no 15 bit word specifies uniquely. Noun 10 is used as the "channel address to be specified" noun. It can be used with the regular display, load, and monitor verbs.

C. Request executive (now VB 30). This verb is no longer used with noun 01. Rather, all information required to enter a request to the executive must be preloaded into noun 26. The first component is the priority in bits 10 - 14, with bit 1 = 0 for NOVAC; bit 1 = 1, for FINDVAC. The second component is the local 12 bit address (ADRES). The third component is the "Both Bank Constant" (BBCON). Fixed bank code is in bits 11 - 15; erasable bank code, in bits 1 - 3.

D. Request waitlist (now VB 31). Similar to C., except the first component of noun 26 should be loaded with the time delay required expressed in number of 10 msec intervals.

E. Test lights (VB 35). Execution of this verb illuminates the lights on the display panel. In particular: uplink activity, temp, key rlse, V/N flash, operator error, auto, hold, free, no att, gimbal lock, tracker, and prog alm are turned on. Also a "1" is placed into the test alarm outbit, which turns on standby and restart. Also all 8's and +'s are shown on the numerical panel.

After 5 sec, all the above mentioned caution and status lights are turned off, the V/N flash is turned off, and the original major mode number is redisplayed. The remaining 8's and +'s are left on the display panel.

3. New Internal Options

A. GRABWAIT. This is a new special routine for programs in fixed banks only. If the display system is not grabbed, it grabs it and returns to L+1 (L = location from which the TC GRABWAIT was done). If the system is grabbed, it puts the calling job to sleep with L+1 going into the LIST for eventual waking up when the system is freed.

The former routines GRABDSP and GRABUSY or PREGBSY are still available, as in Block I. Their use affords more flexibility, since the calling program is not forced to go to sleep while waiting for the system to be freed.

B. NVSBWAIT. This is a new special routine for programs in fixed banks only. It is called with the verb/noun code in A. If the display system is not busy, it executes the verb/noun and returns to L + 1 (L = location from which the TC NVSBWAIT was done). If the system is busy, it puts calling job to sleep with L - 1 going on top of the LIST for eventual waking up when the system is released.

The former routines NVSUB and NVSUBUSY or PRENVBSY are still available, as in Block I. Their use affords more flexibility, since the calling program is not forced to go to sleep while waiting for the system to be released.

4. Verb and Noun Codes

The Verb list is nearly the same as in Block I. Note that "Request Executive" is now VB 30 (see Section 2C); "Request Waitlist" is now VB 31 (see Section 2D); and the new "Test Lights" (verb 35) has been added.

The Noun list has been made nearly the same as Block I. In most cases, the scale factors have been kept as in Block I, for a first pass. Note the new "Channel to be Specified" (noun 10) has been added.

A. VERB CODES

REGULAR VERBS

- 01 DISPLAY OCTAL COMP 1 (R1)
- 02 DISPLAY OCTAL COMP 2 (R1)
- 03 DISPLAY OCTAL COMP 3 (R1)
- 04 DISPLAY OCTAL COMP 1, 2 (R1, R2)
- 05 DISPLAY OCTAL COMP 1, 2, 3 (R1, R2, R3)
- 06 DECIMAL DISPLAY
- 07 DP DECIMAL DISPLAY (R1, R2)
- 10 SPARE
- 11 MONITOR OCT COMP 1 (R1)
- 12 MONITOR OCT COMP 2 (R1)
- 13 MONITOR OCT COMP 3 (R1)
- 14 MONITOR OCT COMP 1, 2 (R1)
- 15 MONITOR OCT COMP 1, 2, 3 (R1, R2, R3)
- 16 MONITOR DECIMAL
- 17 MONITOR DP DECIMAL (R1, R2)
- 20 SPARE
- 21 LOAD COMP 1 (R1)
- 22 LOAD COMP 2 (R2)
- 23 LOAD COMP 3 (R3)
- 24 LOAD COMP 1, 2 (R1, R2)
- 25 LOAD COMP 1, 2, 3 (R1, R2, R3)
- 26 SPARE
- 27 FIXED MEMORY DISPLAY
- 30 REQUEST EXECUTIVE
- 31 REQUEST WAITLIST

REGULAR VERBS (cont.)

- 32 C(R2) INTO R3, C(R1) INTO R2
- 33 PROCEED WITHOUT DATA
- 34 TERMINATE CURRENT TEST OR LOAD REQUEST
- 35 TEST LIGHTS
- 36 FRESH START
- 37 CHANGE MAJOR MODE

B. NOUN CODES

NORMAL NOUNS

SCALE AND DECIMAL POINT

00	NOT IN USE	
01	SPECIFY MACHING ADDRESS (FRACTIONAL)	(.XXXXX)
02	SPECIFY MACHINE ADDRESS (WHOLE)	(XXXXX.)
03	SPECIFY MACHINE ADDRESS (DEGREES)	(XXX.XX DEGREES)
04	SPECIFY MACHINE ADDRESS (HOURS)	(XXX.XX HOURS)
05	SPECIFY MACHINE ADDRESS (SECONDS)	(XXX.XX SECONDS)
06	SPECIFY MACHINE ADDRESS (GYRO DEGREES)	(XX.XXX DEGREES)
07	SPECIFY MACHINE ADDRESS (Y OPT DEGREES)	(XX.XXX DEGREES)
10	CHANNEL TO BE SPECIFIED	
11	SPARE	
12	SPARE	
13	SPARE	
14	SPARE	
15	INCREMENT MACHINE ADDRESS	(OCTAL ONLY)
16	TIME SECONDS	(XXX.XX SECONDS)
17	TIME HOURS	(XXX.XX HOURS)
20	ICDU	(XXX.XX DEGREES)
21	PIPAS	(XXXXX. PULSES)
22	NEW ANGLES I	(XXX.XX DEGREES)
23	DELTA ANGLES I	(XXX.XX DEGREES)
24	DELTA TIME (SECONDS)	(XXX.XX SECONDS)
25	CHECKLIST	(XXXXX.)
26	PRIO/DELAY, ADRES, BBCON	(OCTAL ONLY)
27	SELF TEST ON/OFF SWITCH	(XXXXX.)
30	STAR NUMBERS	(XXXXX.)

NOUN CODES (cont.)

NORMAL NOUNS

SCALE AND DECIMAL POINT

31 FAILREG	(OCTAL ONLY)
32 DECISION TIME (MIDCOURSE)	(XXX.XX HOURS [INTERNAL UNITS = WEEKS])
33 EPHEMERIS TIME (MIDCOURSE)	(XXX.XX HOURS [INTERNAL UNITS = WEEKS])
34 MEASURED QUANTITY (MIDCOURSE)	(XXXX.X KILOMETERS)
35 ROLL, PITCH, YAW	(XXX.XX DEGREES)
36 LANDMARK DATA 1	(OCTAL ONLY)
37 LANDMARK DATA 2	(OCTAL ONLY)
40 SPARE	
41 SPARE	
42 SPARE	
43 SPARE	
44 SPARE	
45 SPARE	
46 SPARE	
47 SPARE	
50 SPARE	
51 SPARE	
52 GYRO BIAS DRIFT	(.BBXXXXX MILLIRAD/SEC)
53 GYRO INPUT AXIS ACCELERATION DRIFT	(.BBXXXXX [MILLIRAD/SEC]/[CM/SEC SEC])
54 GYRO SPIN AXIS ACCELERATION DRIFT	(.BBXXXXX [MILLIRAD/SEC]/[CM/SEC SEC])

NOUN CODES (cont.)

MIXED NOUNS

55 OCDU
56 UNCALLED MARK DATA (OCDU & TIME [SECONDS])
57 NEW ANGLES OCDU
60 SPARE
61 TARGET AZIMUTH AND ELEVATION
62 ICDUZ AND TIME
63 OCDUX AND TIME
64 OCDUY AND TIME
65 SAMPLED TIME (HOURS AND SECONDS)
(FETCHED IN INTERRUPT)
66 SYSTEM TEST RESULTS
67 DELTA GYRO ANGLES
70 PIPA BIAS
71 PIPA SCALE FACTOR ERROR
72 DELTA POSITION
73 DELTA VELOCITY
74 MEASUREMENT DATA (MIDCOURSE)
75 MEASUREMENT DEVIATIONS (MIDCOURSE)
76 POSITION VECTOR
77 VELOCITY VECTOR

SCALE AND DECIMAL POINT

(XXX.XX DEGREES, XX.XXX DEGREES)
(XXX.XX DEGREES, XX.XXX DEGREES, XXX.XX SECONDS)
(XXX.XX DEGREES, XX.XXX DEGREES)
(XXX.XX DEGREES, XX.XXX DEGREES)
(XXX.XX DEGREES, XXX.XX SECONDS)
(XXX.XX DEGREES, XXX.XX SECONDS)
(XX.XXX DEGREES, XXX.XX SECONDS)
(XXX.XX HOURS, XXX.XX SECONDS)
(XXXXX., .XXXXX, XXXXX.)
(XX.XXX DEGREES FOR EACH)
(X.XXXX CM/SEC SEC FOR EACH)
(XXXXX. PARTS/MILLION FOR EACH)
(XXXX.X KILOMETERS FOR EACH)
(XXXX.X METERS/SEC FOR EACH)
(XXX.XX HOURS [INTERNAL UNITS = WEEKS], XXXX.X KILOMETERS, XXXXX.)
(XXXX.X KILOMETERS, XXXX.X METERS/SEC, XXXX.X KILOMETERS)
(XXXX.X KILOMETERS FOR EACH)
(XXXX.X METERS/SEC FOR EACH)