ANTENNA ITEM MONITOR LIMIT CHECKING
Preliminary Specification

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I.   Introduction

The limit checking on the monitor points will be performed
by a virtual computer with the instructions given in this memo.
The virtual machine's operating memory is a short (32 word) push
down stack (Last-in-first-out). The command memory is a list of
commands of variable length. The command opcode is in the left
byte of the first instruction word, and the required first para-
meter in the right byte. Any further parameters required are
full-word parameters immediately following the first.

The antenna item command list will be executed once for
each antenna in the system in such a fashion that all the refer-
ences to monitor points have the appropriate antenna address in-
serted.

II.   Commands Of The Virtual Machine

1. Load Monitor Points

The first (byte) parameter specifies which word
or words of the de-multiplex area are to be loaded -
leftmost bit selects single or double, offset from
antenna entry is given by the other bits. The full-
word parameter gives the DSA and MPXA, right justi-
fied. The requested monitor value is pushed on the
stack.

2. Load Constant

The first bit of the byte parameter specifies
single or double load. The one or two word constant
follows. The constant is pushed on the stack.

3. Load Computed Value

The byte parameter gives the type of block from which the value is to be loaded, except the left-most bit specifies single or double load. The code is:

0	Array control block
1	Arm control block
3	Subarray control block
4	IF group control block
5	Antenna control block
9	Preamp Ad control block
10	Preamp BC control block
17	IFA control block
18	IFB control block
19	IFC control block
20	IFD control block
25	IFA Frontend control block
26	IFB Frontend control block
27	IFC Frontend control block
28	IFD Frontend control block
33	L Frontend control block
34	C Frontend control block
35	U Frontend control block
36	K Frontend control block

Word parameter has offset within block.

4. Stack Arithmetic - Byte Parameter Gives Operation as follows:

Stack Operations

0	Swap top two entries
1	Duplicate top entry
2	Over - puts duplicate of second item on top of the stack
3	Discard top of stack

Unitary operations - replace top element by operated upon element

16	Twos complement
17	Double twos complement
18	Ones complement
19	=0? (set 1 for true)
20	≥ 0?
21	<0?
22	Convert 4 BCD digits to binary
23	Add one to top of stack

Binary operations - replace top two elements
   by their function

32	Add
33	Double Add
34	Subtract
35	Double Subtract
36	Multiply
37	Divide
38	OR
39	Exclusive OR
40	And
41	Extract
42	= (replace by 1 if top two elements are equal, else by 0)
43	< (true if second element < first)
44	>

5. Shift commands

     These operate on top one or two elements of stack.
The byte parameter has following meaning:

Bit	8	Simple/rotate	(I/O)
	9	Left/Right	
	10	Logical/arithmetic	
	11	Single/double	
	12		
	13		
	14	Shift value	
	15		

6. Compare with limits. If the top of the stack is
between the two word parameters (assumed in ascending
order) in value, it is replaced by zero. If not, it
is replaced by one.

7. Conditional skip, exit, or flag
     Examine byte parameter. Bits have meaning as
follows:

8	Count errors, if set Flag error if reset
9	Error count to be reset if top of stack is zero
10	Error count to be reset if count value exceeded

11   Flag error but do not
        print

12   Skip to branch flag only

13   If cal observation set
        cal flag

If top of stack is 0 and bit 9 is set, reset
error counter in de-multiplex area. Then, if top of
stack is zero skip to branch flag (if bit 12 is
set) or to end of definition. If top of stack
is 1 (error condition) take action described in
the remaining bits and as described in the re-
maining parameters. The first word parameter is
DCS address of associated monitor point - DSA and
MPXA. The second word parameter is error code,
left 4 bits are severity code. The third word is
a code. The right 8 bits tell type of block to
flag status in same code as "load computed value",
with addition of 2 - redundant items. The left
byte tells offset of status word within specified
block. The fourth word parameter is the error
count comparison limit.

An OP code of 0 is a branch flag. The byte
parameter is 0, to indicate an intra-definition
transfer point, 1 to indicate a new definition
(stack is to be set empty), and #FF to indicate
end of list.

When a condition is in error, examine two
"ignore" tables. One will contain antenna
addresses, and if the antenna in question is
found in this table, all errors from that antenna,
except severity 4, will be ignored. The second
table will have a condition specified by com-
plete DCS address - Antenna Address, DSA, MPXA,
and if the full associated address is in this
table, the error will be ignored.

When a condition is in error, examine the
cal indicators (SCB word 10) for 'C' or 'T' to
indicate cal mode or test mode respectively, and
set the flag appropriately. Cal mode status is
changed only for Cal observations and only if
the bit in the flag command is set - otherwise
flags go only in the 'general observation' byte.
For test observations the test flags only are
set.

When a message is to be produced, first search a message table to see if the fault message has been written lately. If not, use the error code to read a sector of a disk file which will contain two 100 character messages, and print the line

'**(fault) faultcode--AntID--AntAddr--DSA-MPXA--(100charactermessage)'

where (fault) is   WARNING
                   FAULT   Depending on
                   FAILURE(Bell)   severity code
                   DANGER (Bell)

and enter the condition in the table - the entry is

    Word 1   Ant Addr. DSA, MPXA
    Word 2   Severity, error code
                                            s
    Word 3   Time of last occurance (10   of seconds)
    Word 4   Time last message was printed

    If the fault is already in the table, update the time and examine the time since last print. If this exceeds a time dependent on severity code as given below print

    '**STILL**(fault)faultcode--AntID--AT Ant Addr--DSA-MPXA'

    Severity   1   2   3   4

                        m   m   m   s
    Time   30   5   1   10

When a new entry is to be put into the table, and the table is full, the eldest entry (time since last occurance) is to be removed.

    A typical simple limit check - in this case check DS1, MPXA=#17 for valid range #3F00 to #4100 - would be coded, for example:

        C001   Start
        0100   Load
        0117   Point
       ⎛0401   Duplicate
       ⎜0200   Load
       ⎜3F00   Value
       ⎜042C   >?
       ⎨0400   Swap (restores analog value to top of stack)
       ⎜0200   Load
       ⎜4100   Value
       ⎜042B   <?
       ⎝0426   OR

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0700    Flag error
0117        Associated monitor point
200A        error code 10, severity 2
0B11        Flag IF A block
0000        not used
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The bracketed commands above may be simply replaced by

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0600    Compare with limits
3F00        lower limit
4100        upper limit
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