Status Bit From Event

Derive beam status

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This note describes how to form the normal beam status bit 0x9F based on a clock event. Specifically, clock event 0x52 announces one kind of beam that should be installed as bit 0x9F, where 0 means "beam," and 1 means "no beam." This was done for node062D in Linac.

There are three basic steps involved in this solution. First, add the appropriate byte address to the BADDR table that refers to the byte in the event bit map array containing the clock event status of interest. For this case, event 0x52 implies byte A, bit 2, since 0x52 divided by 8 produces 10, or 0xA, with a remainder of 2. The bit map table of clock events is in low memory based at 0x2FA0. But for a PowerPC-based system, the low memory is mapped to 0x00E00000, so that the proper address for installing into BADDR is 0x00E02FAA. In node062D, this address was installed as the second entry in BADDR, at 0x4800A004. This is the entry that corresponds to Byte 1.

Second, now that we have the byte containing the event bit in the BBYTE table, byte 1, we can use a combined binary entry in the Data Access Table to invert the status sense, so that the ultimate value for Bit 0x9F will be 0 when the event status is a 1.

The format of a CSTAT table entry includes up to 8 "specs" for describing how to form status bits into a word of data that can be assigned to the reading field of analog channel. Each spec occupies 4 bytes and has the following form:

Field	*Size*	*Meaning*
byteNo	2	Byte# to be sampled from the BBYTE table
flgShift	1	shift count in low 6 bits, with flags in upper 2 bits
mask	1	Mask to be applied to status byte value before shift

The two flag bits specify two options:

Flag	*Meaning*
0x80	Complement status byte value before applying mask, shift.
0x40	Use exclusive (not inclusive) OR when combining spec results.

Since the status byte in this case covers events 0x57—0x50 in bits 7–0, use the complement flag and a shift count of 5 (to shift left from bit 2 to bit 7, to match the need for Bit 0x9F). So the entry uses a single spec as follows: 0001 8504

The meaning of this is to sample status Byte 1 from BBYTE, complement it, AND it with the mask 0x04, shift the result left 5 bits, and OR into the result word. In node062D, there was already a series of channels defined to hold combined binary status words. These 13 channels were in the range 0x0700—070C. Since channel 0x070D seemed to be free, it was easiest to use it for the purpose. Add a new entry into CSTAT following the 13 entries already defined. Add one to make a count of 0x000E in the combined binary entry in the Data Access Table, so we have channels 0x0700—070D being targeted. The result is that the reading of channel 0x070D has the proper value in its low byte.

The third and last step is to update the BBYTE entry that includes to the status 0x9F, which in status Byte 0x13 (0x9F/8 = 0x13, with remainder 7). This data Access Table entry can target only a single entry in BBYTE, such as:

```
0405 0013 4800 A000
0000 0000 0000 0001
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The address 0x4800A000 is the base of the BADDR table. It is used here because it holds the address 0x480170D1, which is the low byte of the reading field of channel 0x070D, and we need to copy it into the BBYTE entry holding status Bits 0x9F—0x98 in bits 7–0.