Interfacing to the VRE (STR8080) Operational software

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The Operational software.

At power-up the VRE is in the reset mode with the DSP halted. When used as part of a Euroball system, the default program will be loaded, and the DSP started.
There are two programs currently available. For Euroball use 'pcs_eball1.dmp', and for Eurogam use 'pcs_egam1.dmp'.

The Interface

The control of the DSP software is carried out by means of mailboxes resident on the VRE, and dual ported RAM on the VRE. A command is written to the mailbox from the VME processor (Resource Manager), this generates an interrupt to the DSP, which can then repond to the command.
All data flow or control commands are sent by the accessing software, and the VRE code responds with the same code in its mailbox, for a correctly completed command or the value 0xAA55 for a command that is not understood. All commands sent to the VRE are processed under interrupt, and so all other activities cease while the command is carried out.

The Commands.

Code	Function	Effects
0x1	Copy the internal X RAM registers to accessible memory.	A block of 256 words of data is copied to the VXI accessible RAM. This includes all control and status registers.
0x2	Copy a limited number of words from accessible memory to X RAM.	The words are those for flow control, and the ROCO number.
0x3	Store a copy of some DSP registers in accessible memory.	The DSP registers D0 - D9, and R0 - R7 are written to module offset address + 0x1E000. (Byte Address)
0x4	Flush the FIFOs	Clear the DT32 output FIFO, and reset the validation queue software FIFO.
0x20	Cancel Diagnostic mode.	At the end of the current event the diagnostic registers will all be initialised to zero. Thus the module returns to normal operation.

0x40	Diagnostic whole event mode. See separate section for description of the RAM set-up for this function.	Data is output to the DT32 from store on every Validation pulse. The data in the store is for complete events, including a valid end sub-event (without this the STR8080 will JAM !!! , and keep the DT32 until more data comes along.)
0x41	Diagnostic whole event force 1 event type 1.	Used to push out 1 event in amongst the other diagnostic events.
0x42	Diagnostic whole event force 1 event type 2.	Used to push out 1 event in amongst the other diagnostic events.
0x43	Diagnostic whole event force 1 event type 3.	Used to push out 1 event in amongst the other diagnostic events.
0x44	Diagnostic whole event force 1 event type 4.	Used to push out 1 event in amongst the other diagnostic events.
0x45	Diagnostic whole event force 1 event type 5.	Used to push out 1 event in amongst the other diagnostic events.
0x80	Diagnostic data insert event mode. See separate section for description of the RAM set-up.	Data is taken from store on every Validation pulse instead of from the VXI backplane.
0x81	Diagnostic data insert force 1 event type 1.	Used to push out 1 event in amongst the other diagnostic events.
0x82	Diagnostic data insert force 1 event type 1.	Used to push out 1 event in amongst the other diagnostic events.
0x83	Diagnostic data insert force 1 event type 1.	Used to push out 1 event in amongst the other diagnostic events.
0x84	Diagnostic data insert force 1 event type 1.	Used to push out 1 event in amongst the other diagnostic events.
0x85	Diagnostic data insert force 1 event type 1.	Used to push out 1 event in amongst the other diagnostic events.

The RAM and Registers.

The DSP internal X RAM is allocated for registers, and event storage. The copy created when command "1" is executed can be accessed from the VXI bus at Module Offset Address + 0x1c000 (byte address) + Register Offset (word address).
In the following table, the Name field is the label used in the DSP software, the Fn2 ? field is to indicate those registers that can be altered by the command "2", and the Function field is a brief description of the register.

Register Offset	Name	Fn2 ?	Function
0	Event_wordcount		Word count of the last event
1	Event_last_seq_fail		Sequencer status of the last failure.
2	Sequencer_status		Sequencer status of the last event.
3	Word_count		current event word count
4	End_sub_event_token		Used during the program to build the token.
6	Token_count		The number of non VXI words to be output to the DT32, calculated after every '2' command.
8	Spare_scalar1		
9	Trace		records the current position of the main program. Used to find out when the program is waiting for the DT32.
12	Event_nibble		The event number nibble read from the backplane LBUS lines.
13	Event_Status		Sequencer status for the current event.
14	Event_validation		Validation Interupt status register copy for the current event.
16	This_Event_number		The event number in use this event.
17	Event_Qualifiers		The qualifier bits set during event number re-syncing.
18	Mask_2byte		A mask used in the program.
19	Mask_1byte		Another mask.

20	Clear_user_LED		The value to clear the user LED, used in the program.
21	Start_token	Yes	Initialised at DSP start to 0x00F80000.
22	Event_tokenL	Yes	Initialised at DSP start to 0x10F80000. LSB event number.
23	Event_tokenM	Yes	Initialised at DSP start to 0x20F80000. MSB event number.
24	End_token	Yes	Initialised at DSP start to 0x30F80000.
25	Function_Enables	Yes	Flags to enable functions in the program. VXI /DT32/Event number/extension. (see later table)
26	Seq_fail_scalar	Yes	Count of the number of failed backplane readout cycles.
27	Event_scalar	Yes	Counts the number of validations processed.
28	Event_number	Yes	The event number counter
43	Delimiter		Initialised with 0xAA55AA55
44	Event_sum		Not currently used
45	Diagnostic_mode		Holds the current Diagnostic mode setting.
46	Diagnostic_control		Holds the current Diagnostic buffer number.
47	Diagnostic_count		Holds the current Diagnostic buffer remaining events count.
48 - 63	Val_FIFO		Software FIFO for the passing of the Interrupt status register after each Validation is recieved.
64 - 249	Event_store		Store for the current event. Used by the program as interim storage between the VXI and the DT32. There is no delimiter, as this is not intended as an area for system diagnostics.

Bit allocation of register “Function Enables”

Bit	Function When Set (Bits ignored in “Whole Event” diagnostic mode)
0	Enables the VXI readout to be executed every Validation. (Enables events to be collected from Diagnostic buffers in “Data only” diagnostic mode)
1	Enables the DT32 to be driven every Validation. (only valid if bit 0 set)
2	Enables the output of the Event number LSB.
3	Enables the output of the Event number MSB (only valid if bit 2 is set)

Allocation of Dual-Port-RAM

The Dual-Port-RAM is used to store current events, and for the Diagnostic mode data buffers, and repeat counters.
This is accessed from the VXI at Module Offset Address + 0x400000 (byte address).

Word Offset	Function
0 - 1023	Memory used for the continuous storage of events. The memory is filled sequentially, and when the end is reached filling continues from the start address. The whole event information, as transmitted to the DT32 bus is written here.
2049	Repeat count for buffer 1
2050	Repeat count for buffer 2
2051	Repeat count for buffer 3
2052	Repeat count for buffer 4
2053	Repeat count for buffer 5
2304 - 2559	Diagnostic Buffer 1 0: Number of words. 1 - 255: Data.
2560 - 2815	Diagnostic Buffer 2. 0: Number of words. 1 - 255: Data.
2816 - 3071	Diagnostic Buffer 3. 0: Number of words. 1 - 255: Data.
3072 - 3327	Diagnostic Buffer 4. 0: Number of words. 1 - 255: Data.
3328 - 3583	Diagnostic Buffer 5. 0: Number of words. 1 - 255: Data.