

1.

NAME

DAC – Digital-To-Analog (DAC) Motors

DESCRIPTION

spec has built-in C code to treat DAC devices as motors, so that the standard commands to read and position motors will get and set values using the DAC registers. The “move” of a DAC motor is instantaneous – the DAC register is written at once with the value corresponding to the target position. The DAC hardware supported includes ISA boards with either byte or word access, PCI boards with word access and VME modules using A16 addressing mode. (The CAMAC DSP E250, KS 3112/6 and KS 3195 DAC modules, which can also be used as DAC motors, are currently configured differently than the modules described here.)

DEVICE CONFIGURATION

Each DAC module should be configured on the Devices screen of the configuration editor. Currently supported DAC controller types are:

- DAC as motor (ISA - byte access)
- DAC as motor (ISA - word access)
- DAC as motor (VME A16 addressing)
- DAC as motor (PCI)

For the byte-access mode for ISA cards, spec first writes the high-order byte to one plus the register address, then writes the low-order byte to the register address.

The specific PCI DAC cards currently supported are the Measurement Computing models PCI-DDA02/12, PCI-DDA04/12, PCI-DDA08/12, PCI-DDA02/16, PCI-DDA04/16, PCI-DDA08/16, PCI-DAC6702 and PCI-DAC6703. Recognition for other boards will be added in response to user requests.

The Acromag model 921x VME modules are specifically detected. For those modules, spec adds 0x80 to the base address and left shifts 12-bit values as required by these modules. Special handling for other boards will be added as users request.

MOTOR CONFIGURATION

The controller type for all the above DAC motors should be selected as DAC on the Motors screen of the configuration editor. Unit numbers (for unit/channel configuration) are assigned starting with unit 0 for the first DAC motor controller selected on the Devices screen. Channel numbers also start at zero.

The second alternate motor parameter screen is important in the DAC configuration. Type little m twice to get to that screen. To select particular features for the DAC motor, enter the appropriate strings from the list below as “Generic Parameters”. (To enter a string, type a single quote '. To delete an entry, type ^D.)

twelve	- twelve-bit DAC
sixteen	- sixteen-bit DAC
binary	- binary output
twos	- two's complement output
bipolar_2.5	- output from -2.5V to +2.5V
bipolar_5	- output from -5V to +5V
bipolar_10	- output from -10V to +10V
unipolar_2.5	- output from 0 to +2.5V
unipolar_5	- output from 0 to +5V
unipolar_10	- output from 0 to +10V

For the mutually exclusive options, the last one in the list of generic parameters will take precedence.

Do not use the first four parameters for PCI cards. spec can determine which model is being used by the PCI IDs and knows what output format is associated with the particular model.

The “bipolar” and “unipolar” options are so far only used with the PCI-DDA models to program the DAC control registers.

For all DAC types, the steps-per-degree parameter and user-offset parameter should be adjusted to set the range and offsets for user units. The following table shows parameters appropriate for 12-bit DACs with the range notation as above:

Range	Steps/Unit	Offset
bipolar_2.5 V	819.2	-2.5
bipolar_5	409.6	-5
bipolar_10	204.8	-10
unipolar_2.5	1638.4	0
unipolar_5	819.2	0
unipolar_10	409.6	0

Parameters appropriate for 16-bit DACs:

Range	Steps/Unit	Offset
bipolar_2.5	13107.2	-2.5
bipolar_5	6553.6	-5
bipolar_10	3276.8	-10
unipolar_2.5	26214.4	0
unipolar_5	13107.2	0
unipolar_10	6553.6	0

For example, for a 16-bit DAC with a range of -10 to +10 Volts, set the steps-per-unit parameter to 3276.8 and the user offset to be -10 for the user units to be Volts.

The following DAC motor controller configurations are obsolete. One of the above interface types should be chosen instead, and the mode (12- or 16-bit and binary or two's complement output) should be selected using the generic parameters, as described above.

DAC 12-Bit D/A (ISA - binary output)

DAC 16-Bit D/A (ISA - binary output)

DAC 12-Bit D/A (ISA - two's complement)

DAC 16-Bit D/A (ISA - two's complement)

Likewise, the motor channel controller types DAC_B12, DAC_B16, DAC_T12 and DAC_T16 are obsolete and should be replaced with DAC.