Joerger ENTERPRISES, INC.

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MODEL SMC-L

STEPPING MOTOR CONTROLLER AND OPTICAL ISOLATED DRIVER

FEATURES:

- COMPLETE MOTOR CONTROL AND DRIVE CAPABILITY IN A #1 "CAMAC" MODULE
- DRIVERS ARE OPTICALLY ISOLATED AND INTERNALLY BIASED
- ADJUSTABLE LINEAR ACCELERATION AND DECELERATION TIME
- MANUAL MODE OF OPERATION

The JOERGER ENTERPRISES INC. Model SMC-L is a self contained stepping motor controller and optically isolated driver packaged in a single width CAMAC module. It's features provide the ability to satisfy most stepping motor applications. The module has adjustable linear acceleration and deceleration to provide an efficient method of driving high torque loads at their maximum speed. The speed range is 50pps to 2000pps with other ranges available if required. The four drivers are capable of switching up to 4 amps per phase at 28 volts. To simplify installation the drivers are biased internally. This means the only components required are the current limiting resistors, which must be determined in each application to satisfy the current and voltage requirements of the motor. The drivers feature low saturation voltage to limit the power dissipation inside the module. Three external, high level logic inputs are used to test the status of the external system, a clockwise limit, counterclockwise limit, and a signal that indicates power is being applied to the motor. Logic is provided that will inhibit the driver if a limit signal is received and the motor is requested to, or is stepping in that direction. The number of steps is determined by a 16 bit command word that is in 2's compliment. Bit 16 determines direction and the remaining 15 bits contain the number of steps to be performed. An interrupt structure is provided to improve system integration. A LAM F.F will be set by either a CW or CCW limit or when the counter reaches zero, indicating the end of a cycle.

The motor may also be clocked with external signals using the modules drivers. CW and CCW inputs are provided that is decoded to the four phase code required by the drivers and will drive the motor independently of the dataway. The motor may also be driven manually by means of a front panel switch. This can also be very useful for setup or for operation without the main system running. The manual mode speed is approximately 50pps. To provide the ability to drive motors that require more than 4 amps, two types of output signals are provided that can be used by an external motor driver. CW and CCW pulse trains are available and also a clock signal and direction bit. These signals contain the acceleration time and

speed information generated by the module. The CW, CCW signals can also be used to monitor the module externally with an up-down counter. To truly monitor the system, however, we recommend monitoring the motor itself and not the driver. Using a synchro to digital converter or an incremental encoder attached to the motor itself provides more dependable results. Please feel free to consult the factory for more information about this type system.

OUTPUTS: (Logic outputs are TTL compatible, Logic "1" = 0 volts)

Motor Drivers	Four phase, unipolar drive, internally biased, capable of 4 amps at 28 volts, diode protected.
Internal Motor Power	+24 volts from the dataway is available at the motor. This is fused at 3 amps.
Frequency and Acceleration	To monitor the frequency of the output and the acceleration time,
Test Points	Test points are available at the front panel and in the connector.
CW Output, CCW Output	To monitor both CW and CCW Steps. Motor steps on trailing edge. Can also be used to drive an external high current motor driver.
Direction Bit and Clock	These two signals can be used to drive external motor drivers that require sign/clock inputs.
Active	To indicate when a cycle is in progress.

INPUTS:

Clockwise Limit Counterclockwise Limit External Power	Logic "0" = 8v min., Logic "1" = 6v max. These signals must be in the logic "1" state for operation, thus either a limit signal or a broken wire would indicate an abnormal condition
CW Input, CCW Input	The motor can be driven externally in the CW or CCW direction by a TTL signal (logic "1" = 0 volts). The motor steps on the trailing edge of the pulse.
Stop Input	A logic "1" (0 volts) will abort the cycle and reset the module.
Manual Control:	A three position toggle switch is provided to step the motor in the CW or CCW direction. An OFF position is provided to disable this feature. The switch is gated with the CW and CCW limits so that the motor cannot be driven when a limit condition exists.
Front Panel Adjustments:	
Acceleration/Deceleration	A multi-turn pot adjusts acceleration and equal deceleration time from 20msec. to 2 sec.
Maximum Frequency	A multi-turn pot adjusts maximum frequency from 50pps to 2000pps. (Other frequencies can be provided, consult factory.)

CAMAC COMMANDS:

N.F0.A0	Reads count register onto read lines R1-16.
N.F0.A1	Reads status register onto read lines R1-5.
N.F1.A0	Reads out the control register on read lines R1-15.
N.F1.A15	Reads module identity in BCD: 00.260.X
N.F8.A15	Tests LAM, Q=1 if LAM F.F. is set and unit enabled.
N.F10.A15	Resets LAM F.F.
N.F16.A0.S1	Loads 2's compliment data into count register from write lines W1-16. Strobe S2 initiates the cycle. Note, the limit and bit "16" must not be in conflict or the cycle will not begin and A Q=0 will be returned. Resets LAM F.F.
N.F17.A0	Loads the control register with data from the write lines 1-16. W1-8 selects the speed with all zeros selecting the minimum speed. W9-16 selects the acceleration/deceleration time with all zeros selecting the longest acceleration time.
N.F24.A15	Disables L response.
N.F25.A0	Stops motor, aborts cycle, resets unit.
N.F26.A15	Enables L response.
N.F27.A0	Tests module status to determine if module is ready for another operation. Q=1 if module is ready.
N.F27.A1	Tests contents of count register, Q=1 if CTR=0.
X Response	X=1 for all valid commands.
Q Response	Q=1 for F0, F1, F16, F17 and in response to F8 and F27.
L Response	An interrupt is generated if the LAM F.F. is set and the unit is enabled. It is inhibited by N.
Z.S2, Power Up	Resets the count register, the LAM F.F., the control register and disables the LAM response.

VISUAL INDICATORS:

N	Module is addressed.
Active	Module is active.
CW	A clockwise limit exists.
CCW	A counterclockwise limit exists.
EXT. PWR.	External power is on.
CTR = 0	The counter is at zero.

POWER REQUIREMENTS: +6v, 490ma; +24v, 27ma; -24v, 27ma.

SIZE:	Model SMC-L #1 CAMAC module. Connector, Cannon DD50P, mating half DD50S
TEMPERATURE RANGE:	0° C to 50° C

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