

# SINGLE/DUAL AXIS MOTION CONTROL

## ADVANCED MICRO SYSTEMS'

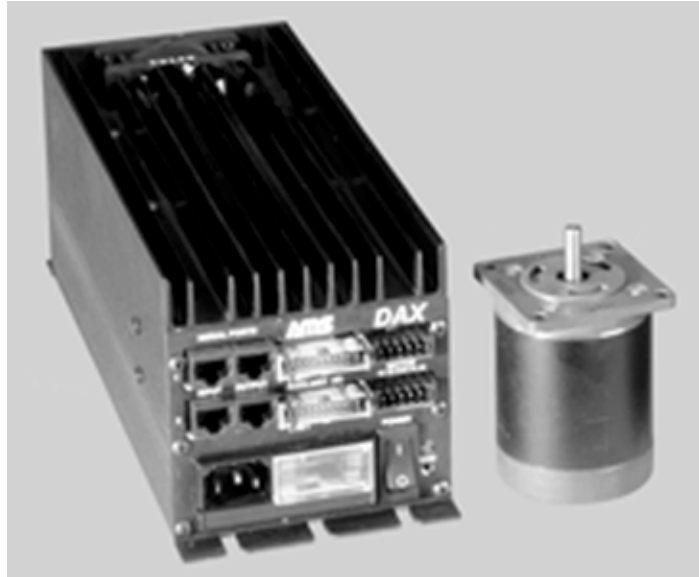
Models SAX (Single Axis) and DAX (Dual Axis) are full function stepper motor control systems. These units are designed for a wide variety of industrial applications that require precise, reliable and cost effective motion control. The SAX/DAX are based on the integration of AMS's high performance step and direction controllers, 2.5 Amp per phase programmable current chopper drivers and integral 40 volt power supply.

Communication is through the use of high level commands issued via RS-232 or RS-422 protocol. Built-in intelligence and memory (2K bytes per axis) make it simple to execute programs from a host computer, dumb terminal or stand-alone configuration.

The small chassis size with finned heat sink, built-in fan and convenient A.C. power entry module simplifies design integration. Extensive signal buffering, optical isolation and a differential serial communications interface provide optimal reliability in industrial environments.

## PERFORMANCE FEATURES

- RS-232 communications
- RS-422 Party Line mode
- Assignable serial address
- Speeds up to 23,000 SPS
- Full/Half Step mode sequence
- Speeds alterable "on the fly"
- Bi-directional ramping
- Independently programmable accel/decel ramps
- Programmable run/hold current
- Five buffered User ports
- 2K bytes of non-volatile memory
- Optically isolated Home/Limits
- Go on strobe
- Single step attribute
- Read position while moving
- Self-contained Home routine
- Dual speed Jog inputs
- Go and Soft Stop inputs
- Programmable Trip Point
- Absolute/Relative position commands



## PROGRAMMABLE CURRENT

Each axis has a programmable current feature that controls motor winding current to within 1% resolution. Independent settings for "RUN" and "HOLD" currents permit full motor torque when stepping. Automatic power down to the hold current value minimizes motor power dissipation when the system is in an idle mode of operation.

## PROGRAMS

Using a host computer or dumb terminal, programs (up to 2K bytes per axis) can be stored in non-volatile memory. For stand-alone use there is a "GO" switch input. Additional input ports can test and branch to multiple motion sub-routines. Two programmable outputs are available to drive solid state relays and other devices. A separate "TRIP" function provides automatic program branching when a specified motion is passed. Additional control inputs include soft stop, dual speed jog and step by step monitoring of travel limits to protect expensive hardware.

## ASCII BAUD RATES

Baud rates for communications are selectable up to 38.4k BPS. Options include:

300	1200	2400	4800
9600	19.2k	38.4k	

Factory units are set at 9600 BPS.

## SERIAL INTERFACE

Each SAX/DAX module features full duplex serial communications. An optional RS-422 Party Line interface implements a differential transmission and receiver pair that provides reliable communication in industrial environments. This protocol permits simultaneous communication (to 32 axes) with minimum command processing latency.

## COMMANDS

ASCII	DESCRIPTION
ESC	ABORT/TERMINATE
@	SOFT STOP
^C	RESET
A	PORT READ/WRITE
B	JOG SPEED; SLOW, FAST
C	RESTORE/INITIALIZE
D	DIVIDE STEP RATES
E	ENABLE AUTO PWR DOWN
F	FIND HOME (SPS)
G	GO FROM ADDRESS
H	STEP RESOLUTION
I	INITIAL VELOCITY (SPS)
J	JUMP TO ADDRESS N + 1 (X)
K	RAMP SLOPE
L	LOOP ON PORT
M	MOVE AT CONSTANT SPEED
O	SET ORIGIN
P	PROGRAM MODE
Q	QUERY (LIST) PROGRAM
R	INDEX TO TARGET POS.
S	STORE PARAMETERS
T	TRIP POINT SET
+	+ INDEX COMMAND
-	-INDEX COMMAND
V	SLEW VELOCITY (SPS)
W	WAIT N MILLISECONDS
X	EXAMINE PARAMETERS
Y	HOLD/RUN CURRENT
Z	DISPLAY POSITION

## AUXILIARY INPUT AND OUTPUT (each axis)

Twenty contact header connectors provide auxiliary inputs and outputs. Buffered signals use optical isolation or TTL buffers.

PIN	SIGNAL	TYPE	PIN	SIGNAL	TYPE
1	Port 2	input	2	+5v	power
3	Port 4	output	4	Home	input *
5	Moving	output	6	Limit A	input*
7	Port 5	output	8	Limit B	input*
9	Port 3	input	10	Jog-	input
11	Port 1	input	12	Jog +	input
13	Jog	input	14	Trip	output
15	GND	power	16	Soft Stop	input
17	Go	input	18	Port 4	input
19	+5v	power	20	Optocom P/S	input

\*Optically isolated

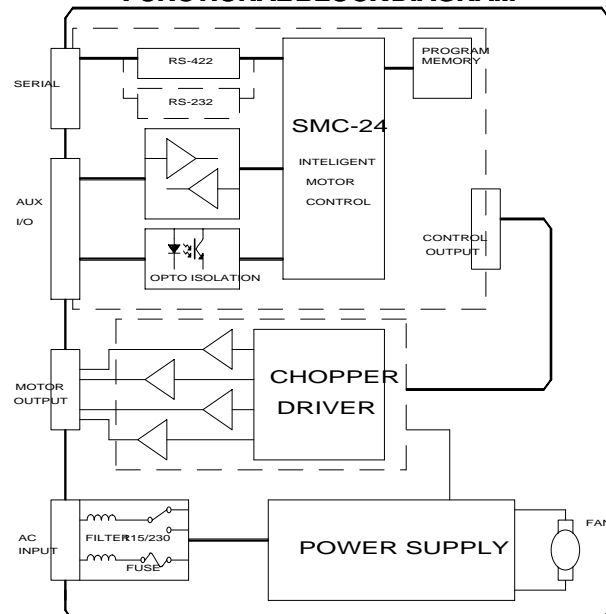
## SIN-8, RS-232 TO RS-422 ADAPTER MODULE

The optional SIN-8 adapter module is used to convert single ended RS-232 communication signals to differentially driven RS-422 levels. A switch on the module selects between Single and Party Line mode. A direct "Any Axis Moving" signal is produced on the RS-232 "Carrier Detect" output.

## POWER ENTRY MODULE

The Power Entry Module, located on the front panel, provides an internationally approved A.C. power connector, built-in RFI line filter, fuse and voltage selection option. The line filter traps undesirable noise on the A.C. power line and stops it from entering or exiting the SAX/DAX. A 6 foot long, 3 conductor U.L./CSA approved line cord is supplied with each unit. (Note: the SAX-4X4 is designed for O.E.M. applications and does not include a Power Entry Module or line cord).

## FUNCTIONAL BLOCK DIAGRAM



## ELECTRICAL SPECIFICATIONS

AC Power Input	SAX	115-230	v/50-60Hz	50va
	DAX	115-230	v/50-60Hz	100va
Power Supply		40	Volts	
Chop Rate (Internal Driver)		20	KHz	
Motor Drive Current	MIN	0.2	TYP	2.0
Output Signals			MAX	2.8
High level (Voh)			5	Volts
Low level (Vol)			0.3	Volts
Low current (Iil)			30	Ma.
Input Signals				
High level (Vih)	3.6		5.2	Volts
Low level (Vil)			0.8	Volts
Low current (Iil)			2	Ma.
Optical Inputs				
LED current			5	Ma.
LED drop			1.5	Volts
Internal series resistor		1k		ohm
RS-422 Input level		5	25	Volts
RS-422 Outputs		5	25	Volts
RS-232 Loads			1	Axis
RS-422 Load		2	32	Axis

\*open collector with internal pull-up to VCC, over driven.

The RS-422 implements drivers rated for EAI RS-485 transmission and limits receiver count to 32 with a maximum cable length of 4,000 feet. RS-232 units are rated for 1 receiver and a maximum cable length of 50 feet.

## PHYSICAL SPECIFICATIONS

Size:	SAX/DAX:	4"W x 4"H x 10.7"L
	SAX-4X4:	4"W x 4"H x 4"L
Weight:	SAX:	4 lbs. 10 oz. (2.1 Kg.)
	DAX:	6 lbs. 8 oz. (3.0 Kg.)
	SAX-4X4:	3 lbs. 5 oz. (1.7 Kg.)
Temperature:		
Operating:		0 to 55 degrees C
Storage:		-45 to 85 degrees C

## EASIDISKETTE

AMS supplies, at no charge, an applications development diskette featuring:

- \*Program Editor
- \*Microsoft "C" Source Code
- \*Dumb Terminal Emulation
- \*Speed, Distance, Accel./Decel. Plots
- \*Syntax Checker/Loader
- \*Pull-Down Menus
- \*Quick Basic Inf. Prgm.

## ORDERING INFORMATION

SAX-232	Single Axis/RS-232 Motor Control System
SIN-7	RS-232 Communications Cable
SAX-4X4	Compact Size SAX-232 (less A.C. Power Entry Module and Line Cord)
DAX-422	Dual Axis, RS-422 Motor Control System
SIN-8	RS-232 to RS-422 Adapter Module

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