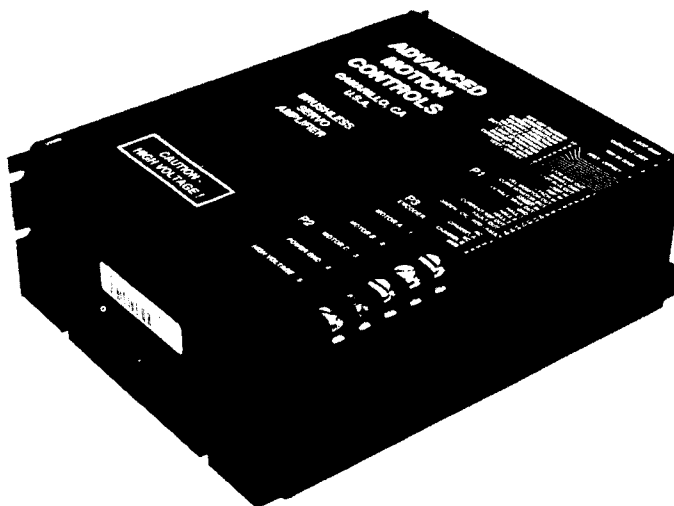


B80A SERIES BRUSHLESS SERVO AMPLIFIERS

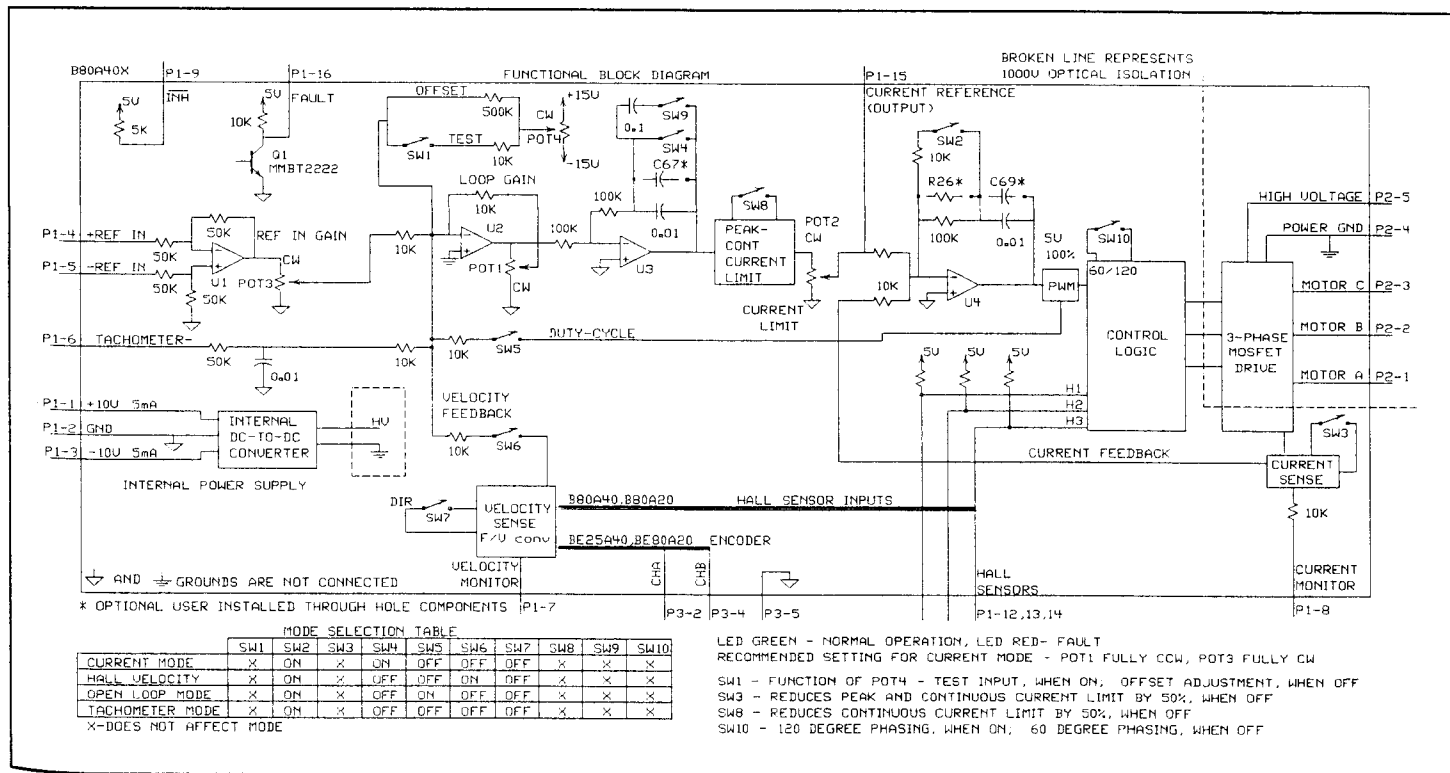
Models: B80A40, B60A40, B80A20, BE80A40, BE60A40, BE80A20

FEATURES:

- * Surface-mount technology
- * Small size, low cost, ease of use
- * Optical input signal isolation
- * DIP switch selectable modes: current, open loop, tachometer, or HALL velocity
- * Four quadrant regenerative operation



DESCRIPTION: B80A Series PWM servo amplifiers are designed to drive brushless DC motors at a high switching frequency. They are fully protected against over-voltage, over-current, over-heating and short-circuits. All models interface with digital controllers or can be used as stand-alone drives. They require only a single unregulated DC power supply. A single red/green LED indicates operating status. Loop gain, current limit, input gain and offset can be adjusted using 12-turn potentiometers. The offset adjusting potentiometer can also be used as an on-board input signal for testing purposes when SW1 (DIP switch) is "On".



ADVANCED MOTION CONTROLS

3629 Vista Mercado, Camarillo, CA 93012 Tel: (805) 389-1935, Fax: (805) 389-1165

POWER STAGE SPECIFICATIONS	MODELS		
	B80A40 BE80A40	B80A20 BE80A20	B60A40 BE60A40
DC SUPPLY VOLTAGE	120-380V	30-190V	120-380V
PEAK CURRENT (2 sec. max., internally limited)	+80A	+80	+60A
MAX. CONT. CURRENT (internally limited)	+40A	+40A	+30A
MINIMUM LOAD INDUCTANCE*	600uH	300uH	600uH
SWITCHING FREQUENCY	20KHz±15%		
HEATSINK (BASE) TEMPERATURE RANGE	-25° to +65°C, Disables if >65°C		
POWER DISSIPATION AT CONT. CURRENT	180W	150W	
OVER-VOLTAGE SHUT-DOWN (self reset)	380V	195V	
BANDWIDTH	2.5kHz		

MECHANICAL SPECIFICATIONS	
POWER CONNECTOR	Screw terminals
SIGNAL CONNECTOR	Molex connector
SIZE (inches)	6.12 x 8.00 x 2.58
WEIGHT	6 lb.

* Low inductance motors require external inductors

PIN FUNCTIONS

CONNECTOR	PIN	NAME	DESCRIPTION / NOTES	I/O
P2	1	MOTOR A	Motor phase A connection	O
	2	MOTOR B	Motor phase B connection	O
	3	MOTOR C	Motor phase C connection	O
	4	POWER GND	Power ground	GND
	5	HIGH VOLTAGE	DC power input	I
P1	1	+10V 5mA OUT	For customer use	O
	2	SIGNAL GND	Reference ground	GND
	3	-10V 5mA OUT	For customer use	O
	4	+REF IN	Differential reference input, maximum +/-50V, 50K input resistance	I
	5	-REF IN		
	6	-TACH IN	Tachometer input, 60K, max. +/-60V	I
	7	VEL MONITOR OUT	Model B80A40: 1V = 125Hz Hall sensor frequency. Model BE80A40: 1V = 22kHz encoder frequency	O
	8	CURR MONITOR OUT	SW3 - OFF 1V = 8A SW3 - ON 1V = 16A	O
	9	$\overline{\text{INHIBIT}}$ IN	Pull to ground to inhibit	I
	10	+V HALL 30mA OUT	Power for HALL sensors, +30mA, short circuit protected, +6V +/-10%	O GND
	11	GND		
	12	HALL 1	HALL sensor inputs, logic levels, internal 2 KOhm pull-up. Maximum low level input is 1.5V, minimum high level input is 3.5V	I
	13	HALL 2		
	14	HALL 3		
	15	CURRENT REF OUT	Monitors the input signal connected directly to the internal current amplifier. 7.5V = maximum peak current	O
	16	FAULT OUT (LED red)	TTL level output. Becomes high during output short circuit, over-voltage, inhibit, and during power-up reset. Fault condition indicated by red LED	O

Continue on next page

CONNECTOR	PIN	NAME	DESCRIPTION / NOTES	I/O
P3 ENCODER MODEL BE80A40 BE80A20 ONLY	1	NC	Not connected	
	2	CHANNEL A	5V CMOS level quadrature encoder	I
	3	NC	Not connected	
	4	CHANNEL B	5V CMOS level quadrature encoder input	I
	5	GND	encoder common	GND

SWITCH FUNCTIONS

SWITCH	FUNCTION DESCRIPTION	SETTING	
		ON	OFF
1	Test / Offset. Sensitivity of the "offset" pot. Used as an on-board reference signal in test mode	Test	Offset
2	Current loop gain	Decrease	Increase
3	Current scaling. When "Off", increases sensitivity of the current sense thus reducing both peak and continuous current limit by 50%	100%	50%
4	Loop integrator. This capacitor normally ensures "error-free" operation in velocity mode by reducing the error-signal (output of summing amplifier) to zero	Shorts out the velocity / voltage loop integrator capacitor	OK
5	Internal duty-cycle feedback for open loop mode	Open loop	No effect
6	Velocity feedback. Connects the internally generated velocity signal from HALL sensors	On	Off
7	Velocity direction. Changes the polarity of the velocity monitor signal		
8	Current reduction. Reduces continuous current limit by 50%	Continuous/peak current limit ratio is 50%	Continuous/peak current limit ratio is 25%
9	Integrator capacitor. Adjusts the value of the integrator capacitor in velocity mode	Increase	Decrease
10	60/120 degree commutation phasing setting	120 degree phasing	60 degree phasing

POTENTIOMETER FUNCTIONS

POTENTIOMETER	DESCRIPTION	TURNING CW
Pot 1	Loop gain adjustment in open loop & velocity modes. Voltage to current scaling factor adjustment in current mode	Increases loop gain
Pot 2	Current limit. It adjusts both continuous and peak current limit while maintaining selected ratio	Increases current limit
Pot 3	Reference gain. It adjusts the ratio between input signal and output variables (voltage, current, velocity)	Increases reference input gain
Pot 4	Test / Offset. Used to adjust any imbalance in the input signal or in the amplifier. When SW4 (DIP switch) is "On", the sensitivity of this pot is greatly increased thus it can be used as an on-board signal source for testing purposes. See section "G"	N/A

TEST POINTS FOR POTENTIOMETERS

Once the potentiometer adjustment is complete, the resistance values can be measured for future adjustments. Test points of the potentiometer wipers are provided and are located next to all four potentiometers. **Make sure the power is off**, then measure the resistance between ground and test points.

OPERATING MODE SELECTION

These modes can be selected by the DIP switches according to the chart in the functional block diagram.

- * Current mode
- * Open loop mode
- * Tachometer mode
- * HALL velocity mode

See section "G" for more information.

VELOCITY CONTROL USING HALL SENSORS

(HALL velocity mode)

The frequency of HALL sensors is proportional to the motor speed. In B80A amplifier series internal circuitry decodes velocity information. This analog signal is available for closed loop velocity control. HALL velocity mode can be selected by the DIP switches according to the chart in the block diagram. Since the frequency of HALL sensor signals is not very high, this mode does not provide good velocity control below speeds 300 RPM. The optimal response can be achieved by adjusting Pot 1 loop gain. Increase it by turning Pot 1 clockwise until the motor breaks into oscillation, then turn it back slightly. Changing the velocity loop integrator value (SW9) might improve the response. The polarity of velocity signal should be the same as the polarity of input signal. For positive input signal the velocity monitor signal should be positive. SW7 can be used to set the right polarity.

SET-UP

See section "G" for set-up instructions and application notes.

CURRENT LIMIT ADJUSTMENTS

These amplifiers feature separate peak and continuous current limit adjustments. The current limit adjustment Pot 2 adjusts both peak and continuous current limit at the same time. It has 12 active turns plus 1 inactive turn at each end and is approximately linear. Thus, to adjust the current limit turn the potentiometer counter-clockwise to zero (using ohmmeter), then turn clockwise to the appropriate value. In many applications it is sufficient to use only the DIP switches for current limit adjustments. SW3 reduces both peak and continuous current limit by 50% when it is "Off". SW8 reduces only the continuous current limit by 50% when it is "Off":

SW8	CONTINUOUS / PEAK CURRENT LIMIT RATIO
ON	50%
OFF	25%

P1-15 is the input to the internal current amplifier stage. Since the output current is proportional to P1-15, the adjusted current limit can easily be observed at this pin without connecting the motor.

The actual current can be monitored at pin P1- 8.

See section "G" for more information.

ORDERING INFORMATION

Models: B80A40X, B80A20X, B60A40X, BE80A40X, BE80A40X, BE60A40X

X indicates the current revision number.

TYPICAL SYSTEM WIRING: See section "G" (G-11).

MOUNTING DIMENSIONS: See section "E" fig. 7 (E-9).