OPERATION
&
SERVICE MANUAL

Model SMA8730

Brushless Amplifier System

GLENTEK

"Solutions for Motion Control"

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Introduction

Glentek's brushless DC motors and amplifiers offer the ultimate in low maintenance and high performance motion-control. Glentek offers a full line of matched motors and amplifiers to meet virtually every motion-control application.

This manual provides all the technical information necessary to install, configure, operate, and maintain our TORQUE-SWITCH™ series, brushless servo-motor amplifier, model SMA8730.

We suggest that you take the time to read this manual from cover-to-cover before attempting to work with these amplifiers for the first time. If at any time you have questions not addressed in this manual, or have any special requirements, please feel free to call and discuss them with a Glentek applications engineer. We are happy to provide both off-the-shelf and custom products. With over three decades in the servo-motor/amplifier business, we have a vast pool of applications knowledge waiting to assist you.

Thank you for selecting Glentek for your motion-control needs. It is our goal to save you time and money, and to provide you with a superior product.

Chapter One: Description, Features and Specifications

1.1 Description:

This brushless amplifier system has been designed to offer you, our customer, a large degree of flexibility and customization with a standard, in stock product. Each amplifier module consists of a standard power output board with a personality module mounted on it. Following is a brief description of this personality module and its mode(s) of operation:

1.1.1 Standard Encoder to Sine Mode (SMA8730-1A-1) - In this mode of operation, the brushless motor is commutated by hall sensors and an encoder, or an encoder which contains three commutation signals (comm. tracks). This personality module can be configured for the following two different types of operation:

VELOCITY MODE - In this mode of operation, the personality module generates a tachometer signal which is used to close a velocity loop in the amplifier.

CURRENT MODE - In this mode of operation, which is also commonly referred to as torque mode, a current in the motor is produced which is directly proportional to the input signal.

1.1.2 Twang Mode (SMA8730-1A-1) - In this mode of operation, the brushless motor is commutated by an encoder only.

These brushless amplifiers come with all industry standard inputs such as "limit, fault output, etc. They are available as stand-alone units only.

1.2 Features:

1.2.1 Amplifier Module (SMA8730-1A-1):

Ergonomic design:	Easy access to connections, adjustments, and test points.
Wide operating buss voltage:	120-340 VDC.
Complete isolation:	Complete isolation from input to output.
Dual signal inputs:	Two single-ended or one differential. Both single-ended inputs may be used simultaneously. All inputs have up to 15,000 A/V gain, and all inputs will accept +/-13VDC except single-ended, which will accept +/- 10VDC.

Dual mode operation:	The standard amplifier may be configured for velocity (RPM) control or current (torque) control.
Current limit:	Maximum motor current is adjustable.
Silent operation:	Carrier frequency is 20KHz.
Short circuit protection:	Complete short circuit and ground fault protection.
LED diagnostics:	Red LED flashes to display various fault conditions and a green LED illuminates to indicate normal operating conditions.
Frequency response: (Velocity Loop)	750 Hz minimum.
Frequency response: (Current Loop)	2 KHz minimum.
Digital limit/enable Inputs:	Three separate logic inputs can stop the motor in either or both directions. Inputs may be configured for active-high or active-low, pull-up or pull-down termination, and a 0 to +5V or 0 to +15V range.
Tachometer output:	DC output proportional to motor RPM.
Fault input/output:	Open-collector output goes low in the event of a fault. This input is configured so that externally forcing this output low will inhibit the amplifier. This allows all fault outputs in a multi-axis system to be connected together (wire-ORed) to shut down all amplifiers should any amplifier have a fault.
Manual and external fault reset:	Push button and a separate input is provided to reset the amplifier after a fault.
High-Speed Electronic Circuit Breaker (HS/ECB):	Instantly shuts down the amplifier in the event of a short across the motor leads or a ground fault condition. (i.e. amplifier exceeds 100A for 10 microseconds)

Low-Speed Electronic Circuit Breaker (LS/ECB):	Shuts down the amplifier if the amplifier is operated above the maximum continuous current rating for a pre-determined period (i.e. 3 seconds).
Over/under voltage and over temperature:	These circuits constantly monitor the amplifier power-supply voltages, and the motor and amplifier-heatsink temperatures. They will shut down the amplifier in the event of any out-of-specification condition.

1.3 Specifications:

This section contains the specifications for the brushless encoder to sine mode D.C. Servo Amplifiers.

NOTE: All data in this section is based on the following ambient conditions: 120 ^{o}F (50 ^{o}C) maximum. Forced air cooling.

1.3.1 Amplifier Module (SMA8730-1A-1):

The amplifier module includes an integral DC power supply which includes a bridge rectifier, buss capacitors, in-rush current protection, cooling fans and a shunt regulator. Forced air cooling is required to meet the maximum power ratings specified below.

1.3.1.1 Input and Output Power:

Input Power/ Buss Voltage(B+)	Output Power (current)	
	CONTINUOUS	PEAK
120VAC/170VDC	30A	60A
240VAC/340VDC	30A	60A

1.3.1.2 Signal Inputs:

Amplifier Model	Signal Input	Maximum Voltage (VDC)	Minimum Impedance (ohms)	Velocity Gain Amp./Volt	Current Gain Amp./Volt
8730	Differential	13	10,000	15,000 (min.)	0-5
8730	Single-ended	+/- 10	10,000	15,000 (min.)	0-5

1.3.1.3 Digital Inputs:

± Limit, Inhibit & Reset:	40/-0.5V max. Terminated by 10,000W.
Fault (as input):	40/-0.5V max. Terminated by 10,000W.
Typical for all digital inputs:	Digital inputs have hysteresis with thresholds at 1/3 and 2/3 of +5V or +15V depending on range select jumper.

1.3.1.4 System:

Drift offset over temperature reference to input:	0.01mV/ ^{o}C max.
Frequency response (Velocity loop):	750Hz min.
Frequency response (Current loop):	2KHz min.
Dead band:	None.
Form factor:	1.01.

1.3.1.5 Outputs:

Fault (as output):	Active low. Open-collector output can sink 500mA max
Abs. motor current	10A/V.
Tachometer :	1000 ohm source impedance, a high input impedance meter must be used (1M ohm / volt).

1.3.2 Mechanical:

Model	L x W x H (inches)	Weight (lbs)
SMA8730-1A-1 (Amplifier Module)	4.25 x 8.81 x 14.50	15.00

Chapter Two: Theory of Operation

2.1 Current Mode vs Velocity Mode:

The fundamental difference between current mode and velocity mode is that in current mode, an external command signal controls the torque of the motor, rather than the velocity. In velocity mode, an external command signal controls the velocity (RPM) of the motor, rather than the torque. In a current mode amplifier, the command signal is proportional to the motor current, thus it is also proportional to the torque of the motor. In a velocity mode amplifier, the current loop amplifier stage is preceded by a high gain error amplifier which compares the command signal and the tachometer feedback signal.

Current mode amplifiers are usually used in Position Control Systems where no tachometer feedback is required. While velocity mode amplifiers are usually used in Classic Cascaded Contol Systems where there are position, velocity and current loops in the system. Velocity loops tend to have a higher bandwidth and operate better near zero speed.

2.2 Protection Circuit:

The High- and Low-Speed Electronic Circuit Breakers(HS/ECB and LS/ECB) protect the amplifier and motor from being damaged by high motor current(specified max. peak and rms current values). The Over Temperature and Over Voltage detection circuits will shut off the amplifier when the temperature of the amplifier or the buss (B+) voltage exceeds a specified limit. Also, there are circuits which limit the motor from running in either or both directions.

Chapter Three: Model Numbering

3.1 Introduction:

This chapter contains the model numbering system for the SMA8730-1A-1 stand-alone amplifiers. The model numbering system is designed so that you will be able to create the correct model number of the amplifier needed.

When placing an order for the SMA8730-1A-1 amplifier system, please contact Glentek sales dept. and have the following information available:

1. Type of motor you will be using and motor specs.

2. Pole pitch of the motor; if linear motor, electrical cycle (The distance from one North magnet to the other North magnet, or South to South). If rotary motor, number of poles.

3. The encoder resolution of your system.
   - Rotary - Pulses per revolution.
   - Linear - Linear distance between encoder pulses. It is important that encoder resolution be for a single channel, not for two channels operating in que.

4. Machine power voltage available at sight i.e. 3-phase, 208.

5. The phase-to-phase inductance of the motor.

6. The maximum speed for motor.

7. BEMF voltage of motor.

8. Max. continuous and max. peak current required at motor.

9. Amplifier mode of operation, current mode or velocity mode.

10. If known, types of inhibit, limits, and reset. If not specified, amplifier will be shipped with type “A” inhibit, limits and reset.

11. Input option will be set single-ended. It may be set differential, although Glentek recommends a single-ended input whenever possible.

From the above information the Glentek representative will issue a Custom Configuration Code for your specific application.

Note: Whenever possible, it is very desirable to have the motor sent to Glentek for initial system checkout at the factory, this tends to eliminate many field problems.

3.2 Amplifier Module:

SMA8730 - YYY - 1A - 1 - ZZ

Amplifier Model Number

Custom Configuration Code
(Factory assigned)

Power Supply Configuration Code
00 = 110-130VAC
01 = 208-240VAC
02 = SPECIAL

Chapter Four: Installation

4.1 Introduction:

This chapter provides information for connecting amplifiers to your system. If you need additional help, contact a Glentek applications engineer.

4.2 Mounting:

Appendix A contains all the wiring diagrams, assembly drawings, and mechanical information necessary to install the amplifiers. The amplifier package should be mounted in a clean, dry enclosure, free of dust, oil, or other contaminants.

NEVER INSTALL THE AMPLIFIER PACKAGE IN ANY LOCATION WHERE FLAMMABLE OR EXPLOSIVE VAPORS ARE PRESENT.

IMPORTANT: Muffin fan(s) are mounted along one side of the baseplate to provide cooling. At least 3 inches must be allowed between the fan side and the side opposite the fans and any other surface. The clearance to any other side of the amplifier package is not critical, although sufficient space should be allowed for easy wiring and servicing.

4.3 Wiring:

4.3.1 RFI/EMI and Wiring Technique:

IMPORTANT: All PWM equipment inherently generates radio-frequency interference (RFI), and wiring acts as antennae to transmit this interference. In addition, motors inherently generate electromagnetic interference (EMI). Unless the wiring is very short, some sort of shielding on the motor wires is necessary to meet FCC RFI/EMI guidelines and to protect other equipment from the effects of RFI/EMI. We recommend that shielded wire be used, or the wires should be run in metallic conduit. The shield or conduit should be connected to the amplifier baseplate, which in turn must be earth grounded. In addition, a conductor of the same gauge as the motor wires must be connected from the motor case to the amplifier baseplate to provide protection from shock hazard. The earth grounding is necessary to meet National Electrical Code (NEC) requirements as well as suppressing RFI/EMI.

Additional RFI suppression may be obtained by placing inductors in each motor lead near the amplifier. Consult a Glentek applications engineer for inductor recommendations. Glentek stocks a complete line of inductors for virtually every application.

IMPORTANT: The signal wiring to hall-sensors and encoder, and the signal inputs to the amplifier are susceptible to noise pickup. Excessive noise pickup will cause erratic amplifier operation. We urge that each signal input be run in a twisted-pair, shielded cable. The hall-sensor signal lines and the encoder signal lines should be run in a three twisted-pair, shielded cable. In each case the shield should be terminated at the amplifier end only to a common terminal. We also recommend that the signal lines be kept as far as possible from any power or motor wires.

4.3.2 Wire Size and Type:

IMPORTANT: To ensure safe operation, Glentek strongly recommends that all wiring conform to all local and national codes.

Recommended Wire Size and Type:

Motor Wires:	12AWG, shielded.
Motor Case Ground:	Same as motor wires, or use metallic conduit.
Main Power:	Same as motor wires.
Signal Input:	22AWG, twisted-pair, shielded.
Logic Inputs/Outputs:	22AWG, shielded with its return lead.
External Tachometer:	22AWG, twisted-pair, shielded.
Hall Sensors :	22AWG, three twisted-pairs, over-all shielded.
Encoder :	22AWG, three twisted-pairs, over-all shielded.

4.3.3 Connector Size and Type:

4.3.3.1 The Power and Motor Connector of the Amplifier Module - TB1 of the Main Amplifier:

- MAGNUM A38 series Single Row Terminal Block (PART# A387208-S2113):
    - Screw Size/Spacing: #8-32 on .435 centers.
    - Terminal Style: PC (Printed Circuit Pin) .
    - Terminal Orientation: V (Vertical) .
    - Number of Screw Terminals: 08 (8 screw positions).

4.3.3.2 The Signal Connector:

The signal connectors are supported by the molex® KK .100" (2.54mm) Centerline Connector System.

- J1 of the Main Amplifier:
  - Mating Connector: molex® 2695 Series .100 (2.54mm) Center Crimp Terminal Housing(P/N: 22-01-3157): red nylon housing.
  - 15 positions.
  - with polarizing rib.

- J4 and J5 of the Encoder to Sine Pre-amp:
  - Mating connector for J4: molex® 2695 Series (P/N: 22-01-3107).
  - Mating connector for J5: molex® 2695 Series (P/N: 22-01-3067).
  - Crimp Terminals for the above mating connector: molex® Crimp Terminals (P/N: 08-55-0102):
  - 15 microinch select gold plated.
  - brass.

4.4 Amplifier Module Connections (SMA8730-1A-1):

4.4.1 Power and Motor Connections - TB-1:

Terminal Name	Terminal	Notes
AC-1	TB-1	AC power input - 1Ø
AC-2	TB-2	AC power input - 1Ø
AC-3	TB-3	AC power input - 3Ø
GROUND	TB-4	Chassis ground
N/C	TB-5	N/C
MOTOR R	TB-6	Phase R of the motor.
MOTOR S	TB-7	Phase S of the motor.
MOTOR T	TB-8	Phase T of the motor.

4.4.2 Signal Connections for the Encoder to Sine Mode Amplifier - J1:

Signal Name	SMA8730 Terminal	Notes
SIGNAL 1+	J1-1	Differential signal input.
SIGNAL 1-	J1-2	Differential signal return.
SIGNAL 2+	J1-3	Single-ended signal 2 in.
COMMON	J1-4	Signal common.
MODE 1	J1-5	Factory use only
COMMON	J1-6	Common.
ABS. I	J1-7	Absolute value of the motor current (10A/V)
LIMIT +	J1-8	Inhibits the motor in + direction.
LIMIT -	J1-9	Inhibits the motor in - direction.
INHIBIT	J1-10	Inhibits the motor in both directions.
FAULT	J1-11	Goes low for a fault, or inhibits the amplifier when forced low.
COMMON	J1-12	Digital common.
RESET IN	J1-13	Resets fault latch.
MTR TEMP	J1-14	Motor over temperature switch input.
MODE 2	J1-15	Factory use only

4.4.3 Signal connections for the Encoder to Sine Mode Pre-amp:

Signal Name	Terminal	Notes
Encoder Input (J4):		
N/C	J4-A	No Connection
A	J4-B	Phase A signal input.
$\overline{A}$	J4-C	Negative phase A signal input.
B	J4-D	Phase B signal input.
$\overline{B}$	J4-E	Negative phase B signal input.
Z	J4-F	Phase Z signal input.
$\overline{Z}$	J4-G	Negative phase Z signal input
COM	J4-H	Common for Encoder.
COM	J4-I	Common for Encoder.
COM	J4-J	Common for Encoder.
Hall Sensor Input (J5):		
+V	J5-A	+VDC for Hall Effect Sensors
HALL 1	J5-B	Hall Sensor 1. Check motor data for phasing
HALL 2	J5-C	Hall Sensor 2. Check motor data for phasing
HALL 3	J5-D	Hall Sensor 3. Check motor data for phasing
COM	J5-E	Common for Hall Sensors
COM	J5-F	Common for Hall Sensors

Chapter Five: Configuration

5.1 Introduction:

Each amplifier has several configuration options. This chapter describes these options and how to implement them. If desired, Glentek will be happy to pre-configure your amplifiers.

NOTE: Each amplifier module is configured and shipped according to the model number (instructions to construct a model number is in chapter three) when the order is placed. It is important for the user to realize that any adjustment on the dip-switches by the user will result in discrepancies between the model number and the actual configuration of the amplifier.

5.2 Logic Input Configuration:

There are five logic inputs: Limit +, Limit -, Inhibit, Reset In, Motor Temp. The first four may be configured for active-high or active-low signals, and pulled-up or pulled-down termination (type A, B, C, and D). The motor-temp may be configured for active-high or active-low signals, and is always pulled-up (type A, and C). All five logic inputs have a selectable 0 to +5VDC or 0 to +15VDC range.

Type "A": Requires grounding of input to disable the amplifier (pull-up, active-low).
Type "B": Requires a positive voltage at input to disable the amplifier (pull-down, active-high).
Type "C": Requires grounding of input to enable the amplifier (pull-up, active-high).
Type "D": Requires a positive voltage at input to enable the amplifier (pull-down, active-low).

5.3 Encoder to Sine Mode Amplifier Configuration:

The following table shows the dip switches that need to be configured for the Type A, B, C, and D configurations. The standard configuration is shown in bold.

	Type A	Type B	Type C	Type D
LIMIT±	**S2-8 - OFF** **S2-5 - ON**	S2-8 - ON S2-5 - OFF	S2-8 - OFF S2-5 - OFF	S2-8 - ON S2-5 - ON
INHIBIT	**S2-7 - OFF** **S2-4 - ON**	S2-7 - ON S2-4 - OFF	S2-7 - OFF S2-4 - OFF	S2-7 - ON S2-4 - ON
RESET IN	**S2-6 - OFF** **S2-3 - ON**	S2-6 - ON S2-3 - OFF	S2-6 - OFF S2-3 - OFF	S2-6 - ON S2-3 - ON
MTR TEMP	**S2-2 - ON**	not available	S2-2 - OFF	not available
FAULT	standard	not available	not available	not available

5.3.1 +15V/+5V Logic Level Configuration (Default: S2-1=OFF):

+15V: S2-1 = OFF.
+5V: S2-1 = ON.

5.3.2 Standard Configuration for Encoder to Sine Velocity Mode and Current Mode:

Dip Switch (S1)	Name	Velocity Mode	Current Mode
S1-8	CURRENT MODE	OFF	ON
S1-7	VELOCITY MODE	ON	OFF
S1-6	TACH LEAD	OFF	OFF
S1-5	TACH REVERSE	ON	ON
S1-4	MTR REVERSE	OFF	OFF
S1-3	COARSE BALANCE	OFF	OFF
S1-2	HALL 60/120	OFF	OFF
S1-1	ENCODER REVERSE	OFF	OFF

5.3.3 Tach Lead (Default: S1-6=OFF):

The tach lead switch is turned ON to add capacitance to the tach lead circuit. This may be needed if you have a large one hook overshoot when monitoring tach out. This switch should remain off unless instructed to turn on by a Glentek engineer.

5.3.4 Tach - Reverse Configuration (Default: S1-5=ON):

The tachometer reverse switch is turned ON to reverse the spinning direction of the motor or prevent the motor from running away in case of incorrect polarity of the feedback signal.

5.3.5 Motor- Reverse Configuration (Default: S1-4=OFF):

The motor reverse switch is turned ON to reverse the spinning direction of the motor for both current and velocity mode. It can also solve the problem when a motor is running away by reversing the polarity of the motor leads without physically reversing the motor leads.

5.3.6 Coarse Balance (Default: S1-3=OFF):

Occasionally it is necessary to turn the coarse balance switch ON to extend the range of the balance pot due to various offsets in the external signal.

5.3.7 Hall 60/120 (Default: S1-2=OFF):

There are four standard sensor configurations: 60^o, $120\ ^o$, 240^o, and 300^o. The $60^o/300^o$, and $120^o/240^o$ sensor spacing are identical except for the direction of motor rotation which results.

To configure the amplifiers for $60^o/300^o$ sensor configuration: S1-2 (ON).
To configure the amplifiers for $120^o/240^o$ sensor configuration: S1-2 (OFF).

5.3.8 Encoder- Reverse Configuration (Default: S1-1=OFF):

The encoder reverse switch is used as part of the phasing procedure. It is turned ON to switch the A and B encoder channels without physically switching the encoder leads.

5.3.9 Rotary Motor (S3) Settings:

Dip Switch (S3)	Name	(DEFAULT) SETTINGS
S3-1	CPLD SETTING	(See 5.3.13)
S3-2	CPLD SETTING	(See 5.3.13)
S3-3	CPLD SETTING	(See 5.3.13)
S3-4	CPLD SETTING	(See 5.3.13)
S3-5	CPLD SETTING	(See 5.3.13)
S3-6	TACH PULSE WIDTH SETTING	FACTORY SET
S3-7	TACH PULSE WIDTH SETTING	FACTORY SET
S3-8	TACH PULSE WIDTH SETTING	FACTORY SET

5.3.10 Linear Motor (S3) Settings:

Dip Switch (S3)	Name	(DEFAULT) SETTINGS
S3-1	N/A	OFF
S3-2	TRAP ONLY (FORCED HALL)	OFF
S3-3	N/A	OFF
S3-4	N/A	OFF
S3-5	RANGE	OFF
S3-6	N/A	OFF
S3-7	N/A	OFF
S3-8	N/A	OFF

5.3.11 Trap Only - Forced Hall (Default: S3-2=OFF) :

The SMA8730 can be configured to run in Trap Mode. To do this, switch S3-2 ON for linear motor and S3-3, S3-4, S3-5 ON for rotary motor.

5.3.12 Range (Default: S3-5=OFF):

The CPLD on the SMA8730 contains either two different encoder resolutions or two different pole pitches. Use S3-5 to switch between each of them.

5.3.13 Encoder Configuration (For Rotary Motors Only) - S3:

POLES	ENCODER	S3-1	S3-2	S3-3	S3-4	S3-5
2	500	ON	ON	ON	OFF	ON
2	512	ON	ON	OFF	OFF	ON
2	625	OFF	ON	OFF	ON	ON
2	1000	OFF	ON	ON	OFF	ON
2	1024	OFF	ON	OFF	OFF	ON
2	1250	ON	OFF	OFF	ON	ON
2	2000	ON	OFF	ON	OFF	ON
2	2048	ON	OFF	OFF	OFF	ON
2	2500	OFF	OFF	OFF	ON	ON
2	4000	OFF	OFF	ON	OFF	ON
2	4096	OFF	OFF	OFF	OFF	ON
4	1000	ON	ON	ON	OFF	ON
4	1024	ON	ON	OFF	OFF	ON
4	1250	OFF	ON	OFF	ON	ON
4	2000	OFF	ON	ON	OFF	ON
4	2048	OFF	ON	OFF	OFF	ON
4	2500	ON	OFF	OFF	ON	ON
4	4000	ON	OFF	ON	OFF	ON
4	4096	ON	OFF	OFF	OFF	ON
4	5000	OFF	OFF	OFF	ON	ON
4	8000	OFF	OFF	ON	OFF	ON
4	8192	OFF	OFF	OFF	OFF	ON
6	500	ON	ON	ON	OFF	OFF
6	512	ON	ON	OFF	OFF	OFF
6	625	OFF	ON	OFF	ON	OFF
6	1000	OFF	ON	ON	OFF	OFF
6	1024	OFF	ON	OFF	OFF	OFF
12	1250	OFF	ON	OFF	ON	OFF
12	2000	OFF	ON	ON	OFF	OFF
12	2048	OFF	ON	OFF	OFF	OFF
12	2500	ON	OFF	OFF	ON	OFF

5.3.13 Encoder Configuration (For Rotary Motors Only) - S3: (Continued)

POLES	ENCODER	S3-1	S3-2	S3-3	S3-4	S3-5
12	4000	ON	OFF	ON	OFF	OFF
12	4096	ON	OFF	OFF	OFF	OFF
12	5000	OFF	OFF	OFF	ON	OFF
12	8000	OFF	OFF	ON	OFF	OFF
12	8192	OFF	OFF	OFF	OFF	OFF
TRAP		X	X	ON	ON	ON
INDEX		X	X	ON	ON	OFF
6	1250	ON	OFF	OFF	ON	OFF
6	2000	ON	OFF	ON	OFF	OFF
6	2048	ON	OFF	OFF	OFF	OFF
6	2500	OFF	OFF	OFF	ON	OFF
6	4000	OFF	OFF	ON	OFF	OFF
6	4096	OFF	OFF	OFF	OFF	OFF
8	1250	ON	ON	OFF	ON	ON
8	2000	ON	ON	ON	OFF	ON
8	2048	ON	ON	OFF	OFF	ON
8	2500	OFF	ON	OFF	ON	ON
8	4000	OFF	ON	ON	OFF	ON
8	4096	OFF	ON	OFF	OFF	ON
8	5000	ON	OFF	OFF	ON	ON
8	8000	ON	OFF	ON	OFF	ON
8	8192	ON	OFF	OFF	OFF	ON
8	10000	OFF	OFF	OFF	ON	ON
8	16000	OFF	OFF	ON	OFF	ON
8	16384	OFF	OFF	OFF	OFF	ON
12	625	ON	ON	OFF	ON	OFF
12	1000	ON	ON	ON	OFF	OFF
12	1024	ON	ON	OFF	OFF	OFF

Chapter Six: Start up and Calibration

6.1 Introduction:

This chapter contains the procedure required for initial start up and amplifier calibration. The SMA8730-1A-1can be configured to run in velocity mode or current mode operations.

Required Equipment: Oscilloscope, voltmeter & battery box. The battery box serves as a step input voltage command, applying and removing a flashlight battery can also be used for this function. Glentek sells a battery box, BB-700, which is ideal for this function.

6.2 Initial Start Up:

When applying power to start up your amplifier system for the first time, we recommend you follow this procedure. If you have already gone through this procedure you can skip to the appropriate calibration procedure.

1. Check for any loose or damaged components.
2. Check that all connections are tight.
6. Be sure that the motor mechanism is clear of obstructions. If the mechanism has limited motion, e.g: a lead-screw, set the mechanism to mid-position.
4. Disconnect the signal and auxiliary inputs.
5. Be sure the Loop-Gain pot(s) are fully CCW.
7. Remove input fuses on the baseplate and apply main power. Check for the correct AC voltage at fuse block. The DC Bus (amplifier supply-voltage) will be 1.4 times this value. If voltage is correct, remove power and reinstall fuses.
7. Work on only one amplifier at a time.

6.3 Phasing Procedures

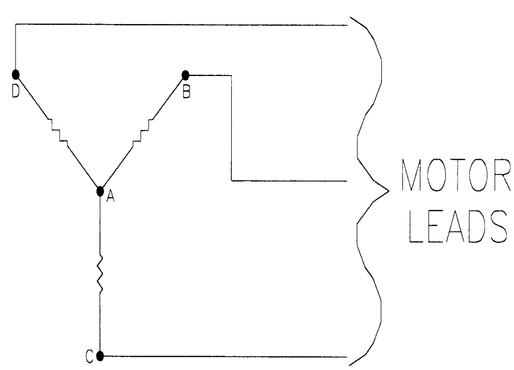


Figure 6.0
Three same value resistors

1. Record dip-switch settings. (S3)
2. Using motor data, connect the Encoder and the Hall Sensors to the amp. If using an encoder w/commutation tracks, connect the encoder to the proper pinouts on J4 and the commutation tracks to the Hall Sensor connection at J5 (Hall 1 = Comm. track 1 etc.) See section 4.4.3 for more details. Also, connect +5 VDC to the encoder. Typically this can be found on the controller.
3. If using a separate encoder and hall sensors, connect the encoder to J4 and the hall sensors to J5. The power for the Hall Sensors is also located on J5. However, you also need to connect +5 VDC for the encoder from an external source (Typically the controller).
4. The encoder signals will also have to be “daisy chained” to the controller. Ensure that the encoder common from the motor is connected at both the amplifier and the controller. Ensure that the shield from the encoder cable is also connected at these points.
5. Connect the three motor leads to a resistor network as per figure 6.0. All three resistors should be the same value.
6. Place one scope probe on point B; connect ground of scope probe to point A. Remove cover from the amplifier. Connect 2nd scope probe to TP1, pin 1 (phase R command) use TP1 pin 5 for scope ground. **TP1 is located on the main power board, on the left-hand side of the amp when viewing it from the front side (cover side). It is the only connector that has 5 pins. Pin 1 is at the top.**
7. Turn loop gain pot (RV7) on amplifier full Clockwise. Turn on B+ power and apply an analog input signal to either sig. 1 or sig. 2 on J1 of the amplifier. To do this, use a battery box, 1.5 VDC, 9 VDC battery, or analog offset signal from the controller.
8. Turn or slide motor. Compare the two sinewaves. Waveforms should be in phase or 180° out of phase. If sinewave is 180° out of phase, reversing motor direction will align it.
9. If the waveforms are not in phase, move the scope probe from point B to point C. Repeat step 7. If is still not in phase, move scope probe to point D and repeat step 7. Repeat this process for TP1-2 (S phase) and TP1-3 (T phase), always rotating or sliding motor in the same direction. Make a note of which color motor lead aligns with which motor phase.(Example: Red = phase R etc.)
10. Remove input signal and remove power from amplifier.
11. Set the amp to “Trap Mode”; S3-2 ON for linear motor; S3-3, S3-4, S3-5 ON for rotary motor. (Refer to 5.3.13 for rotary, 5.3.10 for linear). Set scope probe back to TP1-1 (phase R).
12. Apply power and re-connect the input signal.
13. Observe phasing as done earlier, now however, one waveform will be trape-zoidal.
14. If waveforms are not in phase, remove input signal , turn power off and change the hall sensor wires on J5 until they are in phase. (note: there are six possible combinations)
15. Remove input signal and remove power from unit.
16. Return dipswitches to original position(s), as recorded on step #1.

17. Connect motor leads to amplifier, R, S, T according to your notes.
18. Proceed to step 6.4

Note: All other axis or units that have the same wiring and components will be connected in the same manner. There is no need to repeat this procedure for every system or axis. Just use your notes from the above procedure to make connections.

6.4 Encoder to Sine Mode Amplifier Calibration:

The following pots will be set during calibration:
Note: RV7 is a single turn pot; RV1-RV6 and RV8-RV14 are 12-turn pots.
Note: RV8-RV14 are factory set and should not be adjusted. Adjusting these pots voids warranty.

Pots	Name of Port	Note
RV1	SIG 1 (Differential Input Signal Gain)	Sets the input voltage to RPM ratio, e.g. 10V=2000RPM (velocity mode) or input voltage to torque ratio, e.g. 10V=60A (current mode) required by your system for the differential input.
RV2	SIG 2 (Single-ended Input Signal Gain)	Same as Signal 1 input, except this is for single-ended input.
RV3	TACH (Tach Gain)	Used in conjunction with the compensation pot to set the system bandwidth. Not used in current mode. Shipped set at 100%. (full CW)
RV4	BAL (Balance)	Used to null any offsets in system.
RV5	COMP (Compensation)	Used in conjunction with the TACH pot to set the system bandwidth. Not used in current mode. Shipped set at full CW (minimum bandwidth).
RV6	I LIMIT (Current Limit)	Sets the maximum motor current. Shipped set at full CW (maximum current limit).
RV7	LOOP (Loop Gain)	Used to shut off uncalibrated amplifiers. When the loop gain is CCW, no current is delivered to the motor. Shipped set at full CCW.

6.4.1 Encoder to Sine Mode Amplifier Calibration Procedure - Velocity Mode:

The amplifier, in this configuration, receives an analog, bi-polar input command which is proportional to the required motor velocity.

1. Turn the Current Limit pot (RV6) to mid position and the Loop Gain pot (RV7) full CCW.
2. Apply the main power and fan power.

3. Slowly turn the Loop Gain pot (RV7) CW. The motor should be stopped or turning slowly. If the motor starts running away, turn the Loop Gain pot (RV7) CCW, and switch the TACH REVERSE switch (S1-5) from OFF to ON (or vice-versa) and retest. Leave the Loop Gain pot (RV7) full CW for all remaining adjustments.
4. Set the Balance pot (RV4) for zero motor rotation.
5. Connect an oscilloscope to ABS I (J1-7) and a battery box to Signal 2 Input. The voltage at J1-7 is a function of motor current: 1V=10A for SMA8730. While applying a step input voltage, adjust the Current Limit pot (RV6) for the desired peak current. If the desired peak current cannot be achieved with the pot full CW, increase the input voltage or increase the Signal Gain pot (RV2).

   The purpose of the following procedure is to set the system bandwidth to obtain a critically-damped response with the maximum possible tach gain. There are many possible settings of Tach Gain and Compensation which will yield a critically damped waveform. The optimum setting will occur when the Tach Gain is as CW as possible and the Compensation is as CCW as possible.

   However, the servo-loop may become unstable (the motor oscillates or hunts) with a very low (near CCW) setting of Compensation. In this case, stability is the limiting factor. At no time should the servo-loop be allowed to be unstable.

   Amplifiers are normally shipped with the Tach Gain pot (RV3) set at 100%. This is a good place to start. If you are unsure of where the Tach Gain is set, turn the Tach Gain fully CW (up to 12 turns).

6. Move the oscilloscope to the TACH OUT (J3-C), set the battery box for a steady DC voltage and adjust the input voltage or Signal 2 gain for about 400RPM.
7. Pulse the input and compare the waveform with figure 6.1.
8. Adjust the Compensation pot (RV5) CCW until the waveform is critically damped or one hook overshoot. Then proceed to step 10.
9. If the desired waveform cannot be obtained by adjusting the Compensation pot, back off (CCW) on the Tach Gain pot (RV3) a few turns and repeat step 8.
10. Do not adjust the Tach Gain pot (RV3) or Compensation pot (RV5) for the rest of the calibration procedure.
11. With the battery box still connected at J1-3 and J1-4 for single-ended input (or if your system uses the differential input, move battery box to J1-1 and J1-2), set battery box for a known DC voltage. Adjust Signal 2 Gain pot (RV2) or (RV1 for differential input) to obtain the desired motor velocity.
12. If the motor is rotating in the wrong direction for a given input polarity, turn the Loop Gain pot (RV7) full CCW. Switch the MTR REVERSE switch (S1-4) from OFF to ON (or vice-versa) and the TACH REVERSE switch (S1-5) from OFF to ON (or vice-versa). Then, turn the Loop Gain pot (RV7) back to full CW.
13. Remove the battery box, and repeat only step 4.
14. Calibration complete. Reconnect the signal wires.

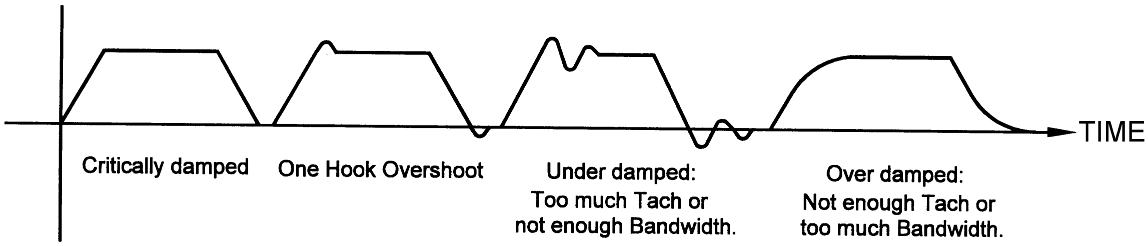


Figure 6.1
Critically damped, One Hook Overshoot, Under and Over damped waveforms

6.4.2 Encoder to Sine Mode Amplifier Calibration Procedure - Current Mode:

The amplifier in this configuration, receives an analog, bi-polar input command which is proportional to the required motor current (motor torque).

1. Turn the Current Limit pot (RV6) to mid position and the Loop Gain pot (RV7) full CCW.
2. Apply the main power and fan power. Slowly turn the Loop Gain pot (RV7) full CW. The motor should be stopped or turning slowly.
3. Set the Balance pot (RV4) for zero motor rotation.
4. Connect the oscilloscope to ABS I (J1-7), and the battery box to the Signal 2 Single-ended Input (J1-3 and J1-4). The voltage on J1-7 is a function of motor current: 1V=10A. While pulsing a step input voltage, adjust the Current Limit pot (RV6) for the desired peak current. If the desired peak current cannot be achieved with the pot full CW, increase the input voltage or increase the Signal 2 Gain pot (RV2).
5. With the battery box still connected at J1-3 and J1-4 for single-ended input (or if your system uses the differential input, move battery box to J1-1 and J1-2), set the battery box for a known DC voltage. Apply ± input signal pulses and adjust the Signal 2 Gain pot (RV2) or (RV1 for differential input) to obtain the desired current gain of the amplifier.
6. If the motor is rotating in the wrong direction for a given input polarity, turn the Loop Gain pot (RV7) full CCW. Switch the MTR REVERSE switch (S1-4) from OFF to ON (or vice-versa). Then, turn the Loop Gain pot (RV7) back to full CW.
7. Remove the battery box, and repeat step 3.
8. Calibration complete. Reconnect the signal wires.

6.5 Calibration Setup Record:

It is good practice to keep a record of all pot settings. Doing so will facilitate calibration on future units and repair on this unit. Although not a substitute for the calibration procedure, it will at least get you "in the ballpark." Remove the power and allow all capacitors to discharge before taking measurements. Note: The balance pot should not be measured in this fashion, set per step 4 in the calibration procedure.

Pot/Dip Switches	**SETTING**
SIG. 1 J3-A to J3-G or H (Ω)	
SIG. 2 J3-B to J3-G or H(Ω)	
TACH J3-C to J3-G or H(Ω)	
COMP J3-D to J3-G or H (Ω)	
CURRENT LIMIT J3-E to J3-G or H (Ω)	
Signal input to Tach ratio: _V Signal / _V Tach	
LIMIT(PULL UP/DN) S2-8	
INHIBIT(PULL UP/DN) S2-7	
RESET(PULL UP/DN) S2-6	
LIMIT(ACTIVE HI/LOW) S2-5	
INHIBIT(ACTIVE HI/LOW) S2-4	
RESET(ACTIVE HI/LOW) S2-3	
MTR TEMP(ACTIVE HI/LOW) S2-2	
+15/+5 S2-1	

Date data taken: / / Serial number S/N:_______________
Model number SMA8730-__________________________________

Chapter Seven: Maintenance, Repair, and Warranty

7.1 Maintenance:

Glentek amplifiers do not require any scheduled maintenance, although it is a good idea to occasionally check for dust build-up or other contamination.

7.2 Amplifier Faults:

If an amplifier should cease to operate and one or more of the fault LED's are lit or flashing, review the sections which follow on the fault in question for information and possible causes.

A FAULT CAN ONLY BE CAUSED BY ABNORMAL CONDITIONS. LOCATE AND CORRECT THE CAUSE OF THE FAULT BEFORE REPEATED RECYCLING OF POWER TO THE AMPLIFIER TO PREVENT POSSIBLE DAMAGE.

7.2.1 Table of Fault LED Conditions:

Input or Fault Condition	RED LED FLASHES	GREEN LED	HALL ERROR LED	FAULT OUTPUT
NORMAL OPERATION	OFF	**ON**	OFF	**PULL-UP**
OVER TEMP (LATCHED)	**ONCE**	OFF	OFF	**LOW**
OVER VOLT (LATCHED)	**TWICE**	OFF	OFF	**LOW**
LS/ECB (LATCHED)	**THREE TIMES**	OFF	OFF	**LOW**
HS/ECB (LATCHED)	**FOUR TIMES**	OFF	OFF	**LOW**
MOTOR TEMP (LATCHED)	**FIVE TIMES**	OFF	OFF	**LOW**
UNDER VOLTAGE (NON-LATCHED)	OFF	OFF	OFF	**LOW**
HALL ERROR (LATCHED)	OFF	OFF	**ON**	**LOW**

7.2.2 Under Voltage Fault:

When the +15VDC is below +12VDC, a level that would cause unreliable operation, the Run LED will turn off, a Fault Output is generated, and the amplifier is inhibited. This is not a latched condition: that is, if the problem is resolved the amplifier will resume operation.

The following is a list of possible causes:
1. Main AC line voltage is too low.
2. Bad rectifier bridge.
3. Bad DC buss filter capacitor.

7.2.3 Motor Over Temp Fault:

When the motor temperature has reached a level that, if exceeded, would damage the motor, the Run LED will turn off, the RED LED will flash five times and a Fault Output is generated, and the amplifier is inhibited. Note: This is a latched condition.

The following is a list of possible causes:
1. The continuous motor current is too high.
2. Binding or stalling of motor shaft due to excessive mechanical overload.
3. Motor rating too small for the load.

7.2.4 High Speed Electronic Circuit Breaker (HS/ECB) Fault:

When the peak output of the amplifier exceeds 100A for 10 micro-seconds, the Run LED will turn off, the RED LED will flash four times and a Fault Output is generated, and the amplifier is inhibited. Note: This is a latched condition.

The following is a list of possible causes:
1. Shorted motor leads.
2. Motor inductance too low.
3. Short from a motor lead to ground.

7.2.5 Low Speed Electronic Circuit Breaker (LS/ECB) Fault:

When the RMS output of the amplifier is exceeded for 3 seconds, the Run LED will turn off, the RED LED will flash three times and a Fault Output is generated, and the amplifier is inhibited. Note: This is a latched condition.

The following is a list of possible causes:
1. Binding or stalling of motor shaft due to excessive mechanical overload.
2. Overload of amplifier output to motor.
3. Large reflected load inertia.

7.2.6 Over Temp Fault:

When the heatsink has reached a level that, if exceeded, would damage the output transistors, the Run LED will turn off, the RED LED will fash one time, a Fault Output is generated, and the amplifier is inhibited.

The following is a list of possible causes:
1. Loss of cooling air - Fans are defective or airflow is blocked.
2. Excessive rise in cooling air temperature due to cabinet ports being blocked or excessive hot air being ingested.
3. Extended operational duty cycle due to mechanical overload of motor or defective motor.
4. The motors thermal switch has been tripped due to excessive overloading.

7.2.7 Over Voltage Fault:

When the DC-Buss voltage reaches a level that, if exceeded, would harm the amplifier or motor , the Run LED will turn off, the RED LED will flash two times , a Fault Output is generated, and the amplifier is inhibited.

The following is a list of possible causes:
1. Main AC line voltage is too high.
2. Decelerating a large inertial load. When decelerating, a DC motor acts as a generator. If the inertial load is large, the generated voltage can pump-up the DC-Buss. If this fault occurs, you may need a Regen Clamp. Consult Glentek.

7.2.8 Hall Error Fault:

When the amplifier fails to receive a hall sensor signal, the Run LED will turn off, the Hall Error LED will illuminate, a Fault Output is generated, and the amplifier is inhibited.

The following is a list of possible causes:
1. Loss of +5 vdc to power Hall Sensor
2. Hall Sensor wire broken or intermittent connection to amp.
3. Hall 60/120 switch in wrong position.

7.2.9 Resetting A Fault:

The fault latch may be reset by pushing the Reset button, activating the Reset input J1-13 or by removing power and allowing the filter capacitor(s) to discharge. Note that the fault latch will not reset unless the fault has been cleared.

7.3 Amplifier Failure:

If an amplifier should fail, that is, if it should cease to operate with no apparent fault, the drawings in appendixes A and B will enable a skilled technician to trouble-shoot an amplifier to even lower levels.

The modular construction of the amplifier allows fast and easy repair. This is especially true due to the plug-in personality module card, since all user adjustments and configuration changes are made on this card. If an amplifier module should fail, simply unplug the pre-amp and plug it into a replacement amplifier.

The lowest-level parts or modules which Glentek recommends for field replacement are:
1. Fuses.

7.4 Factory Repair:

Should it become necessary to return an amplifier to Glentek for repair, please follow the procedure described below:

1. Reassemble the unit, if necessary, making certain that all the hardware is in place.

2. Tag the unit with the following information:
   A. Serial number and model number.
   B. Company name, phone number, and representative returning the unit.
   C. A brief notation explaining the malfunction.
   D. Date the unit is being returned.

3. Repackage the unit with the same care and fashion in which it was received. Label the container with the appropriate stickers (e.g: FRAGILE: HANDLE WITH CARE).

4. Contact a Glentek representative, confirm that the unit is being returned to the factory and obtain an RMA (Return Material Authorization) number. The RMA number must accompany the unit upon return to Glentek.

5. Return the unit by the best means possible. The method of freight chosen will directly affect the timeliness of its return.

Glentek also offers a 24-48 hr. repair service in the unlikely event that your system is down and you do not have a replacement amplifier module.

7.5 Warranty:

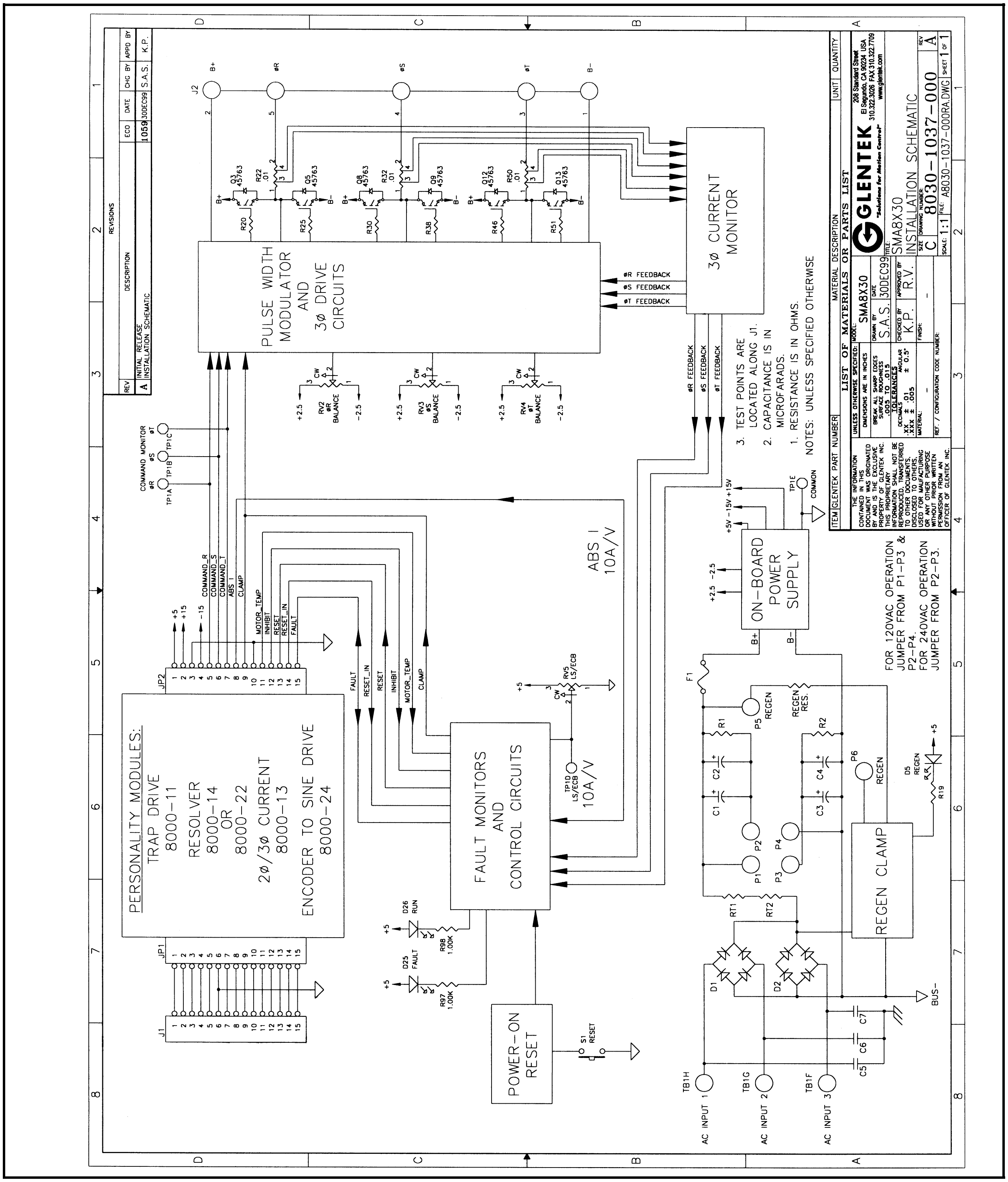
Any product, or part thereof, manufactured by Glentek, Inc., described in this manual, which, under normal operating conditions in the plant of the original purchaser thereof, proves defective in material or workmanship within one year from the date of shipment by us, as determined by an inspection by us, will be repaired or replaced free of charge, FOB our factory, El Segundo, California, U.S.A. provided that you promptly send to us notice of the defect and establish that the product has been properly installed, maintained, and operated within the limits of rated and normal usage, and that no factory sealed adjustments have been tampered with. Glentek's liability is limited to repair or replacement of defective parts.

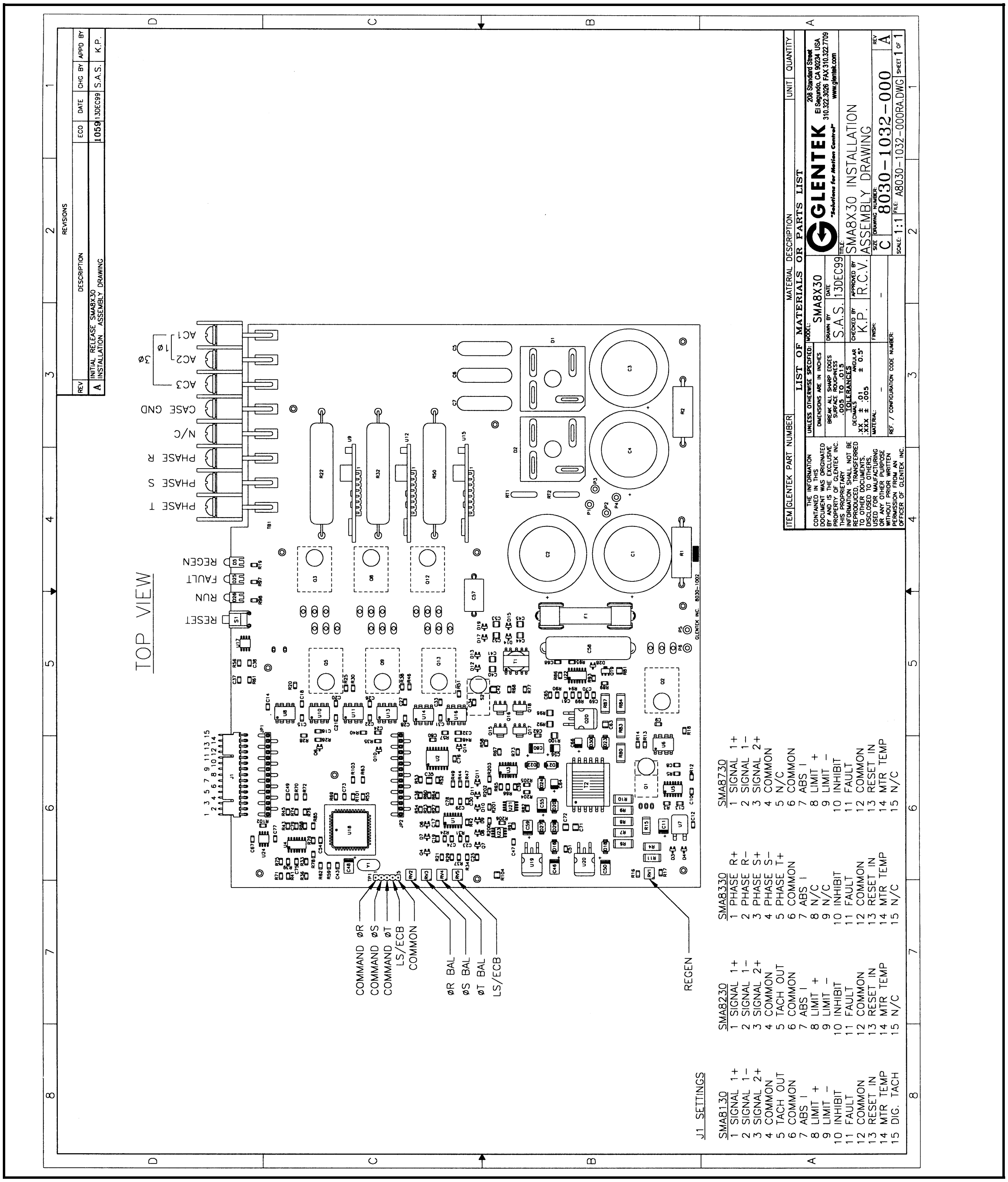
Any product or part manufactured by others and merely installed by us, such as an electric motor, etc., is specifically not warranted by us and it is agreed that such product or part shall only carry the warranty, if any, supplied by the manufacturer of that part. It is also understood that you must look directly to such manufacturer for any defect, failure, claim or damage caused by such product or part.

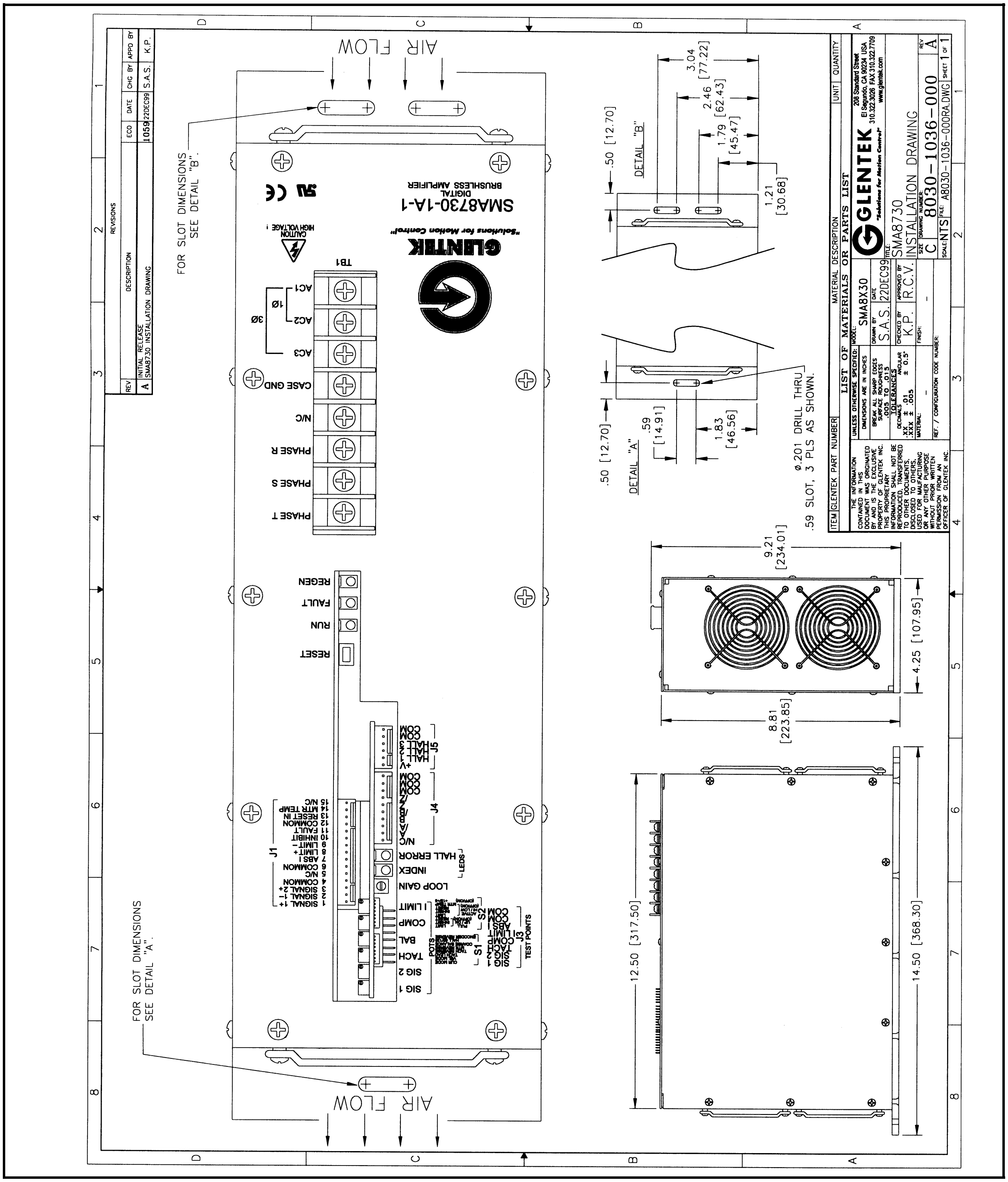
Under no circumstances shall Glentek, Inc. or any of our affiliates have any liability whatsoever for claims or damages arising out of the loss of use of any product or part sold to you. Nor shall we have any liability to yourself or anyone for any indirect or consequential damages such as injuries to person and property caused directly or indirectly by the product or part sold to you, and you agree in accepting our product or part to save us harmless from any and all such claims or damages that may be initiated against us by third parties.

Appendix A

Amplifier Drawings

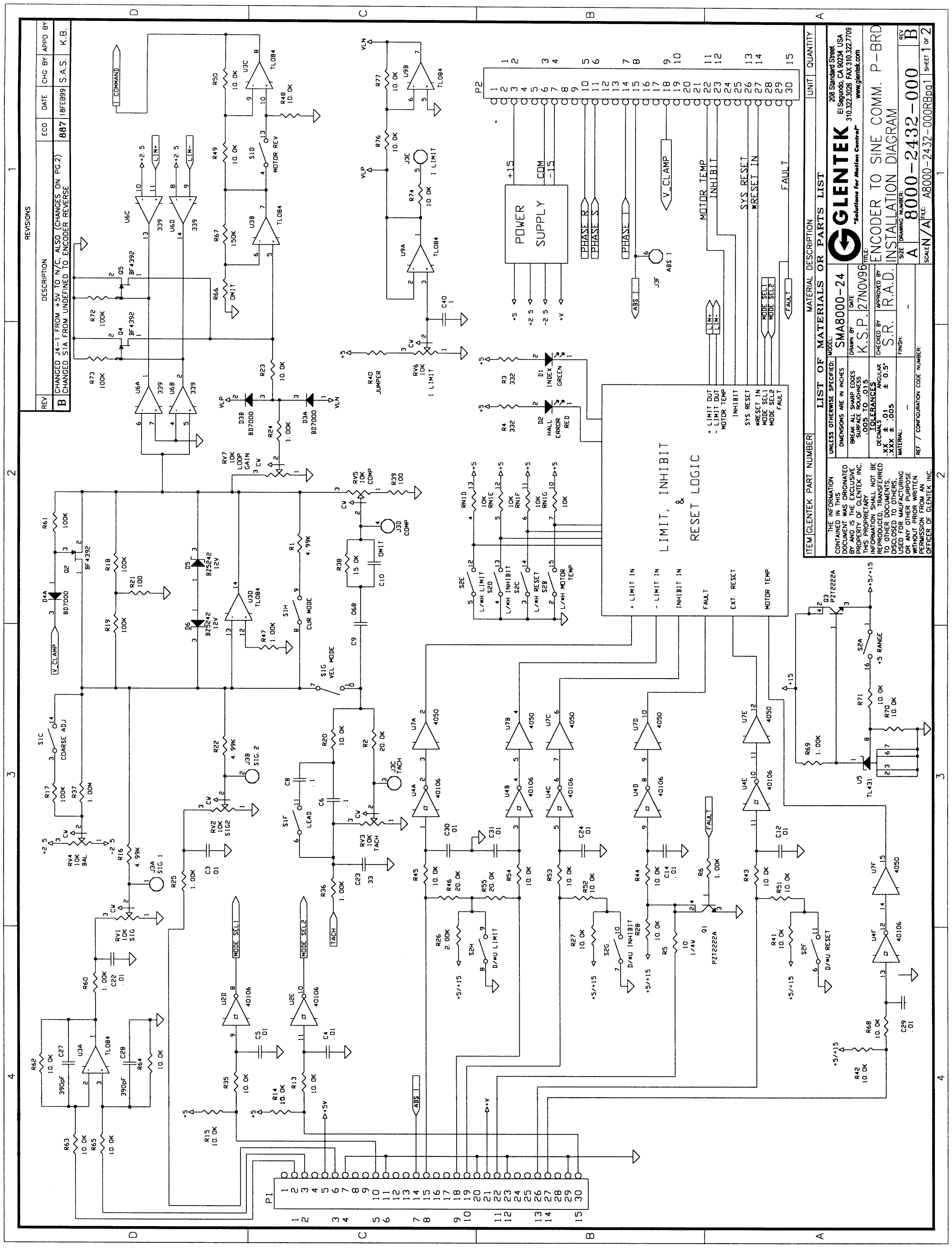

PULSE WIDTH MODULATOR AND 3Ø DRIVE CIRCUITS
3Ø CURRENT MONITOR
FAULT MONITORS AND CONTROL CIRCUITS
ON-BOARD POWER SUPPLY
REGEN CLAMP
POWER-ON RESET
PERSONALITY MODULES:
TRAP DRIVE 8000-11
RESOLVER 8000-14 OR 8000-22
2Ø/3Ø CURRENT 8000-13
ENCODER TO SINE DRIVE 8000-24
ABS I 10A/V
NOTES: UNLESS SPECIFIED OTHERWISE
1. RESISTANCE IS IN OHMS.
2. CAPACITANCE IS IN MICROFARADS.
3. TEST POINTS ARE LOCATED ALONG J1.
FOR 120VAC OPERATION JUMPER FROM P1-P3 & P2-P4.
FOR 240VAC OPERATION JUMPER FROM P2-P3.
AC INPUT 1
AC INPUT 2
AC INPUT 3
GLENTEK
SMA8X30 INSTALLATION SCHEMATIC
8030-1037-000

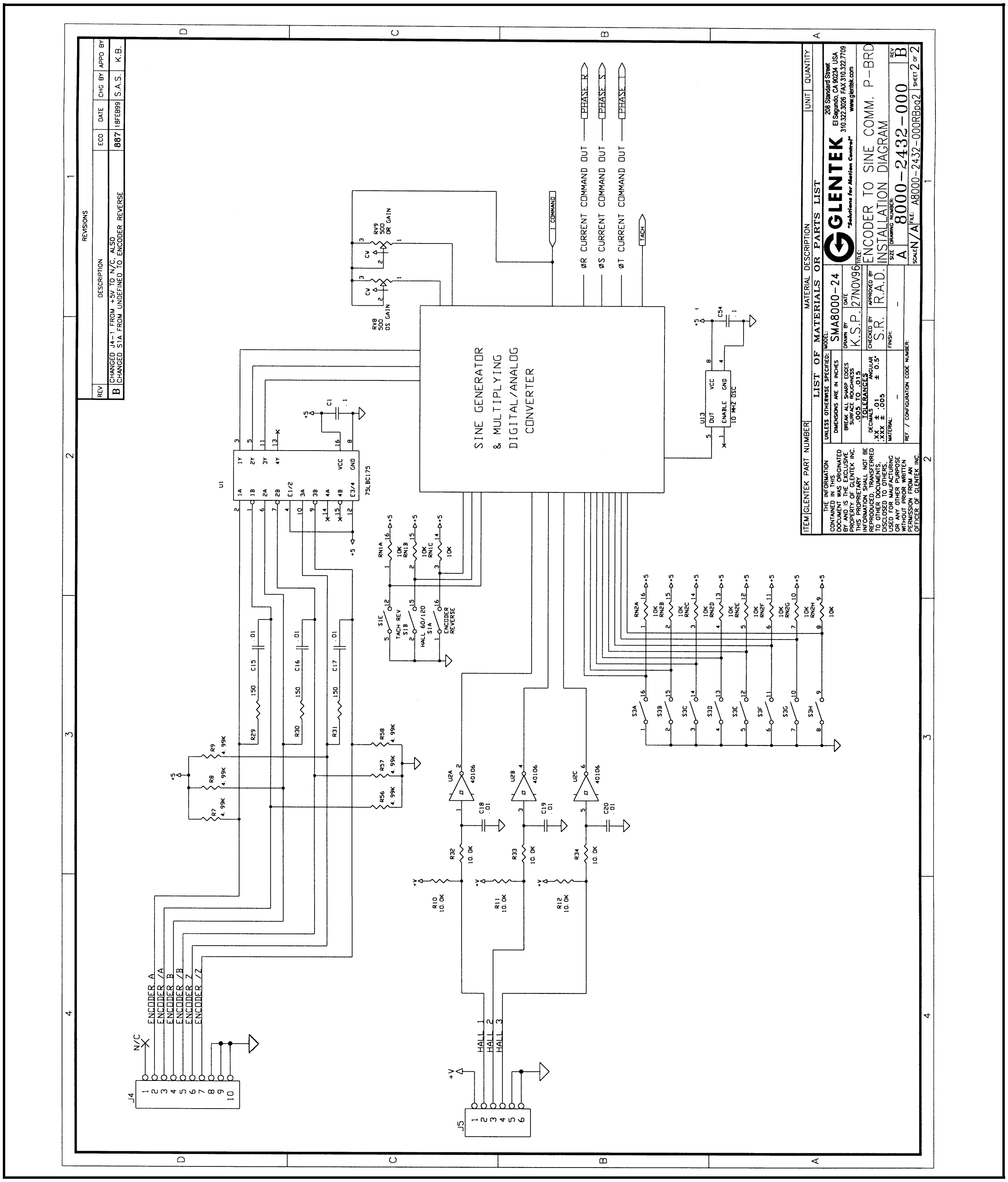

TOP VIEW
AC1
AC2
AC3
1Ø
3Ø
CASE GND
N/C
PHASE R
PHASE S
PHASE T
REGEN
FAULT
RUN
RESET
COMMAND ØR
COMMAND ØS
COMMAND ØT
LS/ECB
COMMON
ØR BAL
ØS BAL
ØT BAL
LS/ECB
REGEN
J1 SETTINGS
SMA8130
1 SIGNAL 1+
2 SIGNAL 1-
3 SIGNAL 2+
4 COMMON
5 TACH OUT
6 COMMON
7 ABS I
8 LIMIT +
9 LIMIT -
10 INHIBIT
11 FAULT
12 COMMON
13 RESET IN
14 MTR TEMP
15 DIG. TACH
SMA8230
1 SIGNAL 1+
2 SIGNAL 1-
3 SIGNAL 2+
4 COMMON
5 TACH OUT
6 COMMON
7 ABS I
8 LIMIT +
9 LIMIT -
10 INHIBIT
11 FAULT
12 COMMON
13 RESET IN
14 MTR TEMP
15 N/C
SMA8330
1 PHASE R+
2 PHASE R-
3 PHASE S+
4 PHASE S-
5 PHASE T+
6 COMMON
7 ABS I
8 N/C
9 N/C
10 INHIBIT
11 FAULT
12 COMMON
13 RESET IN
14 MTR TEMP
15 N/C
SMA8730
1 SIGNAL 1+
2 SIGNAL 1-
3 SIGNAL 2+
4 COMMON
5 N/C
6 COMMON
7 ABS I
8 LIMIT +
9 LIMIT -
10 INHIBIT
11 FAULT
12 COMMON
13 RESET IN
14 MTR TEMP
15 N/C
REVISIONS
REV ECO DESCRIPTION DATE CHG BY APPD BY
A 1059 INITIAL RELEASE SMA8X30 INSTALLATION ASSEMBLY DRAWING 13DEC99 S.A.S. K.P.
LIST OF MATERIALS OR PARTS LIST
GLENTEK
208 Standard Street El Segundo, CA 90245 USA
SMA8X30 INSTALLATION ASSEMBLY DRAWING
8030-1032-000
A8030-1032-000RA.DWG
SCALE: 1:1
SHEET 1 OF 1

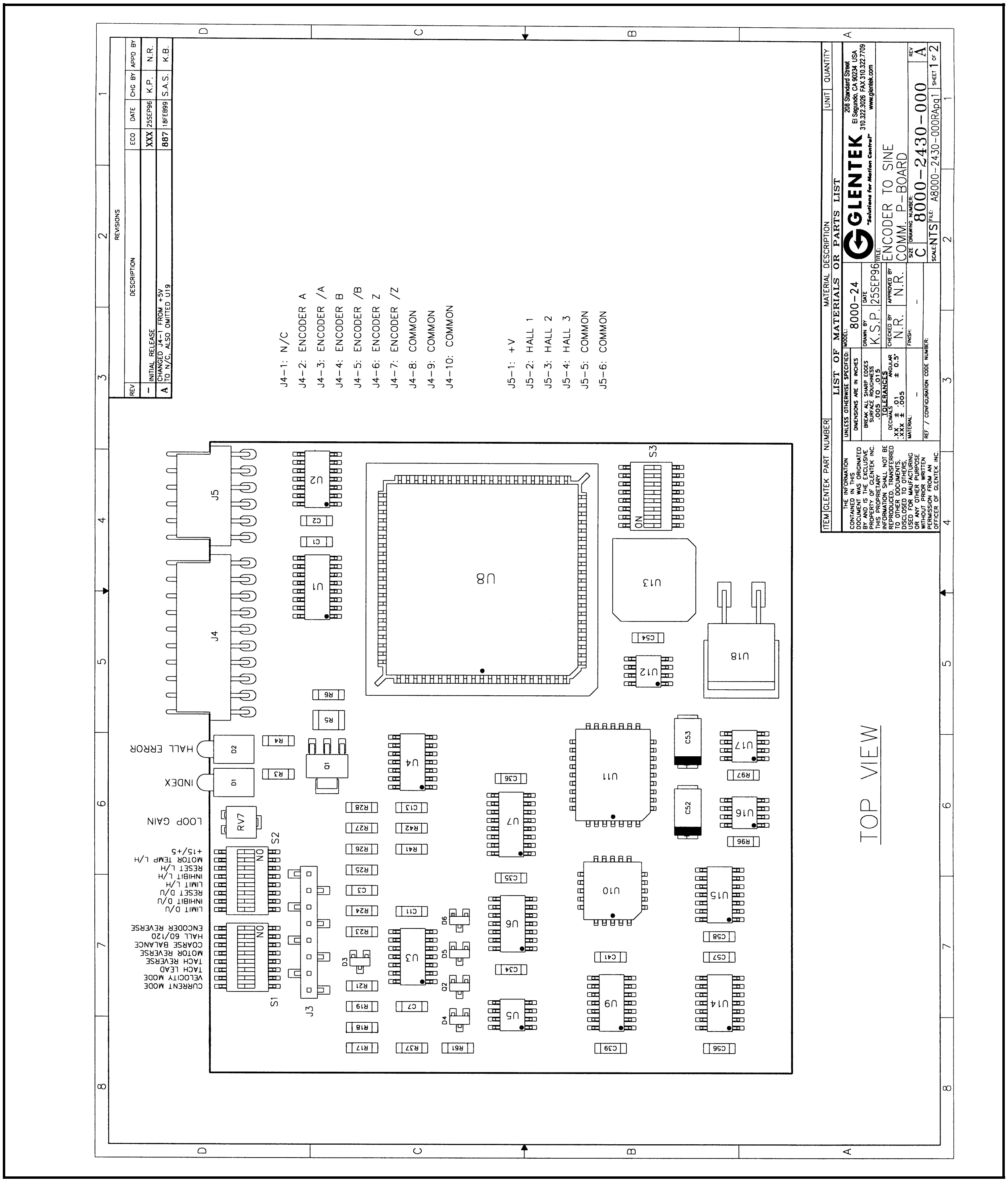

AIR FLOW
SMA8730-1A-1
DIGITAL
BRUSHLESS AMPLIFIER
FOR SLOT DIMENSIONS
SEE DETAIL "B".
FOR SLOT DIMENSIONS
SEE DETAIL "A".
DETAIL "A"
DETAIL "B"
ø.201 DRILL THRU
.59 SLOT, 3 PLS AS SHOWN.
PHASE T
PHASE S
PHASE R
N/C
CASE GND
AC3
AC2
AC1
TB1
REGEN
FAULT
RUN
RESET
12.50 [317.50]
14.50 [368.30]
8.81 [223.85]
9.21 [234.01]
4.25 [107.95]
GLENTEK
SMA8730
INSTALLATION DRAWING
8030-1036-000

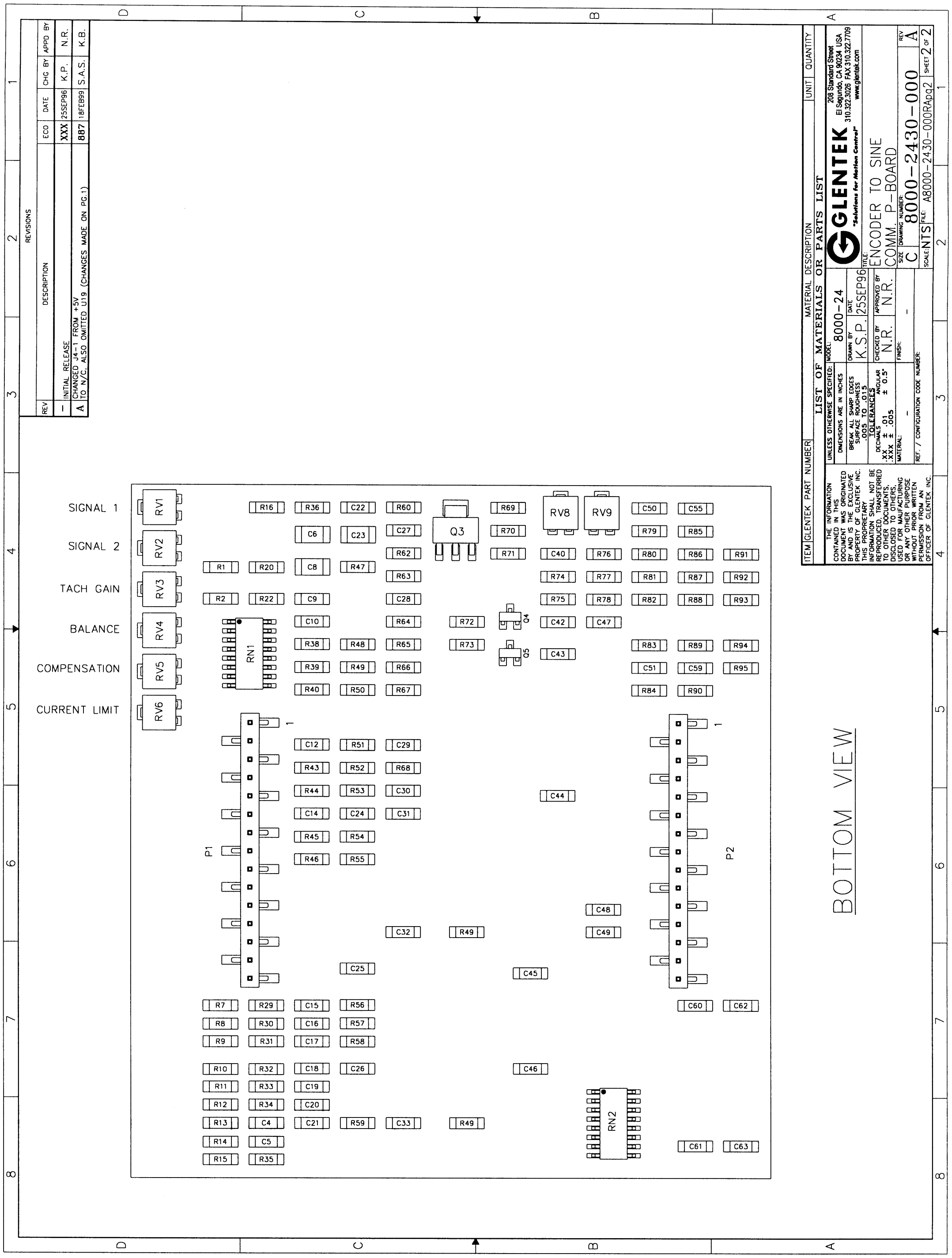
Appendix B

Personality Module


POWER SUPPLY
LIMIT, INHIBIT & RESET LOGIC
GLENTEK
ENCODER TO SINE COMM. P-BRD
INSTALLATION DIAGRAM
8000-2432-000
LIST OF MATERIALS OR PARTS LIST
REVISIONS


SINE GENERATOR
& MULTIPLYING
DIGITAL/ANALOG
CONVERTER
ØR CURRENT COMMAND OUT
ØS CURRENT COMMAND OUT
ØT CURRENT COMMAND OUT
PHASE R
PHASE S
PHASE T
ENCODER A
ENCODER /A
ENCODER B
ENCODER /B
ENCODER Z
ENCODER /Z
HALL 1
HALL 2
HALL 3
GLENTEK
ENCODER TO SINE COMM. P-BRD
INSTALLATION DIAGRAM
8000-2432-000
LIST OF MATERIALS OR PARTS LIST
SMA8000-24
K.S.P.
27NOV96
S.R.
R.A.D.


J4-1: N/C
J4-2: ENCODER A
J4-3: ENCODER /A
J4-4: ENCODER B
J4-5: ENCODER /B
J4-6: ENCODER Z
J4-7: ENCODER /Z
J4-8: COMMON
J4-9: COMMON
J4-10: COMMON
J5-1: +V
J5-2: HALL 1
J5-3: HALL 2
J5-4: HALL 3
J5-5: COMMON
J5-6: COMMON
TOP VIEW
HALL ERROR
INDEX
LOOP GAIN
+15/+5
MOTOR TEMP L/H
RESET L/H
INHIBIT L/H
LIMIT L/H
RESET D/U
INHIBIT D/U
LIMIT D/U
ENCODER REVERSE
HALL 60/120
COARSE BALANCE
MOTOR REVERSE
TACH REVERSE
TACH LEAD
VELOCITY MODE
CURRENT MODE
GLENTEK
ENCODER TO SINE COMM. P-BOARD
8000-2430-000
A8000-2430-000RApg1


SIGNAL 1
SIGNAL 2
TACH GAIN
BALANCE
COMPENSATION
CURRENT LIMIT
RV1
RV2
RV3
RV4
RV5
RV6
RV8
RV9
Q3
RN1
RN2
P1
P2
BOTTOM VIEW
GLENTEK
ENCODER TO SINE
COMM. P-BOARD
8000-2430-000
LIST OF MATERIALS OR PARTS LIST
8000-24
K.S.P.
25SEP96
N.R.
REVISIONS
INITIAL RELEASE
CHANGED J4-1 FROM +5V TO N/C, ALSO OMITTED U19 (CHANGES MADE ON PG.1)
25SEP96
18FEB99
K.P.
S.A.S.
N.R.
K.B.

High Bandwidth Brush Type Servo Amplifiers

- Linear Brush type servo amplifiers to 2.25KW
- PWM (Pulse-width-modulated) Brush type servo amplifiers to 70KW

High Bandwidth Brushless Servo Amplifiers

- Linear Brushless servo amplifiers to 2.25KW
- PWM (Pulse-width-modulated) Brushless servo amplifiers to 65KW

Permanent Magnet DC Brush Type Servo Motors

- Continuous Torques to 335 in. lb.
- Peak Torques to 2100 in. lb.

Permanent Magnet DC Brushless Servo Motors

- Continuous Torques to 1100 in. lb.
- Peak Torques to 2200 in. lb.

GLENTEK
"Solutions for Motion Control"

MANUAL #: 8030-1041 (A)
DATE: 11 May 2000

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www.glentek.com