



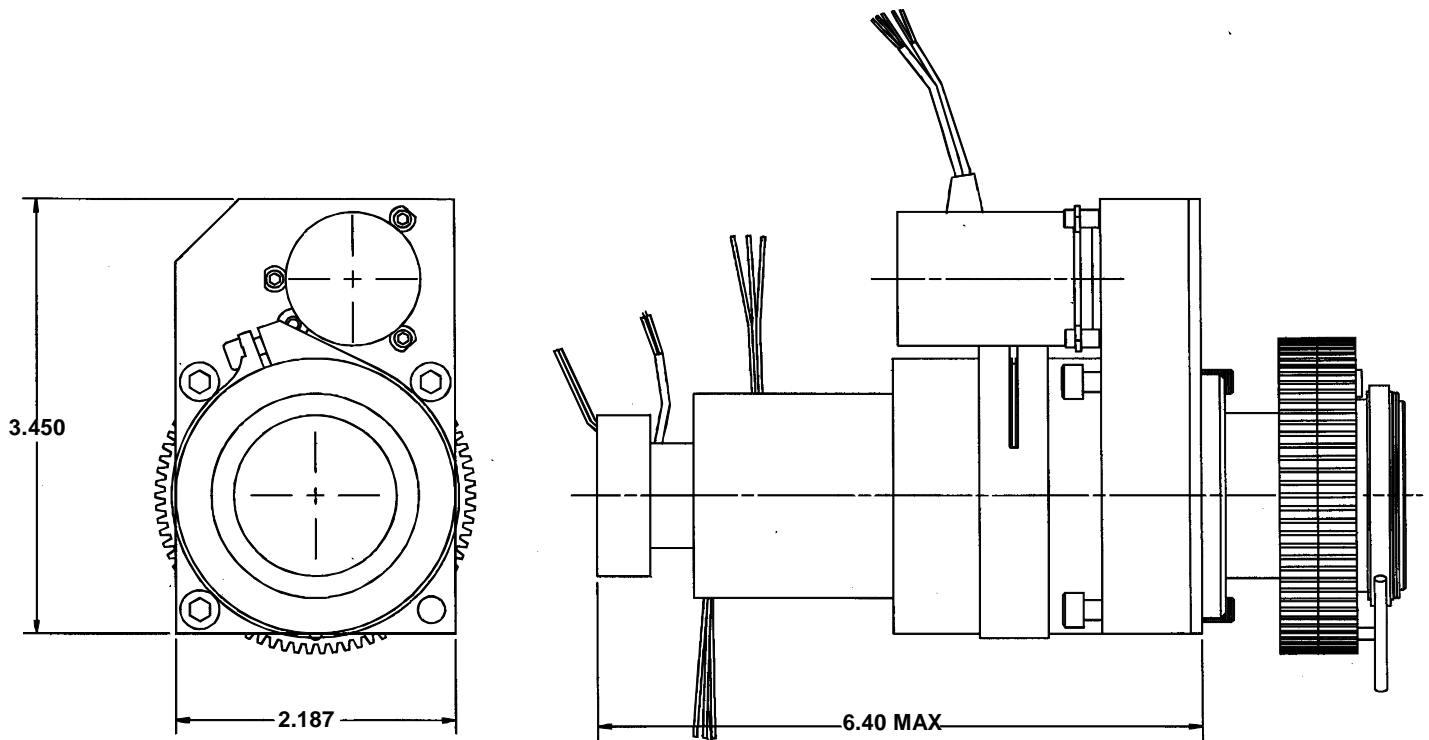
## BRUSHLESS DC MOTOR CONTROLLER AND ROTARY ACTUATOR

The Kearfott Brushless DC Motor Controller (C703532013) is designed to drive the Kearfott Rotary Actuator (CU09660006-0). The motor controller I.C. (Motorola 33035) is implemented using a pulse width modulation control in conjunction with the three phase commutation logic. The controller uses pulse width modulation which provides efficient operation even at high power levels. Loop feedback is supplied locally by the use of current sense resistors in the motor supply return path. The controller supplies a linear current for a linear change in command voltage by the use of standard summing junction practices. The design incorporates an optically isolated enable circuit to control the motor output section independent of the motor controller I.C. A second circuit which mounts on a daughter board provides the tachometer demodulation and conditioning. The creepage and clearance tolerances required for the 70 V dc operation at the 10,000 feet altitude have been compiled with throughout this design. There are no spark producing devices used in this design. All electronics components are derated such that no surface temperature exceeds 100°C.

DIFFERENTIAL INPUT IMPEDANCE	10,000 OHMS
INPUT SCALE FACTOR	0.56 AMPS/VOLT ( $\pm 10\%$ )
CURRENT MONITOR SCALE FACTOR	0.74 VOLTS PER AMP
CURRENT MONITOR RANGE	$\pm 5$ VOLTS DC
SIGNAL GROUND TO POWER GROUND IMPEDANCE	110K OHMS
STORAGE TEMPERATURE	-55°C TO +85°C
PWM FREQUENCY	20 KILOHERTZ MIN
TACHOMETER CIRCUIT OUTPUT GAIN WITH 2 VRMS $\pm 5\%$ • 1.6 KHz $\pm 50$ Hz INPUT AND REFERENCE SIGNAL	1.9 VOLTS DC
TACHOMETER OUTPUT RIPPLE VOLTAGE	17.68 MILLIVOLTS RMS MAX
TACHOMETER OUTPUT DC OFFSET	50 MILLIVOLTS DC MAX
OUTPUT POLARITY WITH IN-PHASE INPUT AND REFERENCE SIGNAL	NEGATIVE
WEIGHT	1.4 LBS MAX

ACTUATOR DATA - TYPICAL			
CHARACTERISTICS	UNITS	SYMBOL	VALUE
WEIGHT	LBS	W	4.6
RATED TORQUE	IN-LBS	$T_R$	185
RATED SPEED	RPM	$W_R$	102
NO LOAD SPEED	RPM	$W_{RL}$	128
GEAR RATIO - MOTOR TO OUTPUT	-	-	133.33:1
GEAR RATIO - BULL GEAR TO RESOLVER	-	-	5.3333:1
GEAR RATIO - BULL GEAR TO RESOLVER	-	-	1:1 EXACT
OUTPUT SHAFT PRELOAD	IN-LBS	-	113

CONTROLLER OPERATION WITH MOTOR AT 70 V dc				
INPUT COMMAND (VOLTS DC)	MOTOR LOAD TORQUE (OZ-INCHES)	MOTOR SPEED (RPM) MINIMUM	CURRENT MONITOR (VOLTS DC) NOMINAL	AVG POWER SUPPLY CURRENT (AMPS DC) NOMINAL
+8.0	27.4	12,000	3.36 - 5.04	4-6
+4.0	23.7	8,400	1.92 - 2.88	2.32 - 3.48
+2.0	17.78	4,800	1.04 - 1.56	1.12 - 1.68
+0.0	17.78	0	0	0
-2.0	17.78	4,800	1.04 - 1.56	1.12 - 1.68
-4.0	23.7	8,400	1.92 - 2.88	2.32 - 3.48
-8.0	27.4	12,000	3.36 - 5.04	4 - 6



## **ASHEVILLE PRODUCT LIST**

### **SENSORS**

LVDT  
RVDT  
Synchros  
Resolvers

### **ELECTRONICS**

PWM Amps  
Servo Amps  
Converters  
Power Supplies

### **MOTORS**

AC  
DC  
Brush/Brushless  
Induction/Synchronous

### **ACTUATORS**

Linear  
Rotary

### **OTHER**

Motor Gearheads  
Servo Systems  
Dampers  
Angle Sensors  
Torquers  
Tachometers  
Generators  
Alternators  
PC Boards  
Harnesses

For additional information on this product or any other product listed above please contact Kearfott's Marketing Department at:  
**Kearfott Guidance & Navigation Corporation • Asheville Operations**  
 2858 Route 70 W, Black Mountain, North Carolina 28711-9111 USA • Telephone (828) 350-5300 • Fax (828) 686-5764  
 Website: [www.kearfott.com](http://www.kearfott.com)