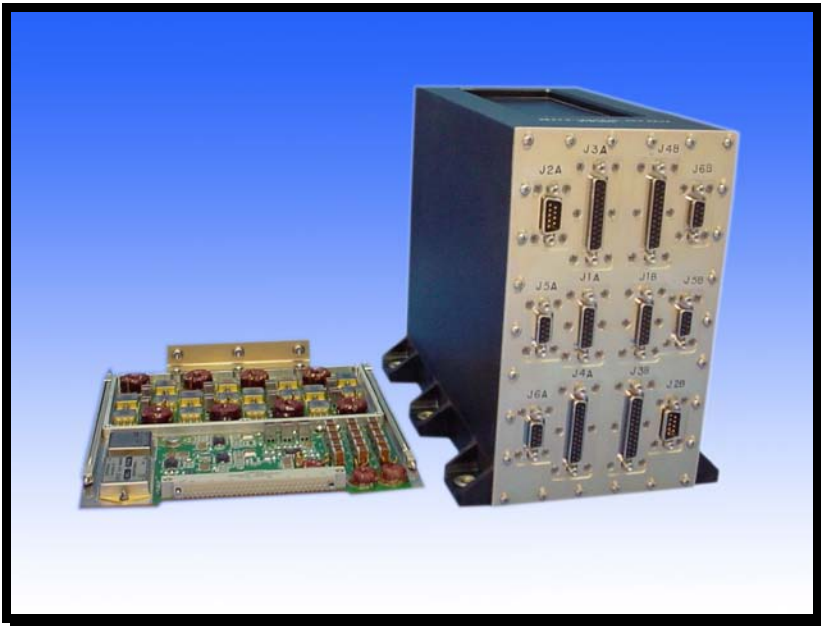


4-Channel Electronic Control Unit



Overview

This Electronic Control Unit (ECU) is capable of driving 4 independent brushless DC motor windings. It is designed for high-reliability space flight applications and is radiation hardened.

The heart of the unit is an FPGA based controller board. Three FPGA's provide the control logic as well as perform functions such as servo control, process input commands and generation of Pulse Width Modulated outputs.

The unit is capable of interfacing with a resolver for position feedback and motor commutation.

The ECU contains two electrically isolated sections. The motor drive circuitry is connected directly to the 28 VDC power bus, which is isolated from chassis ground. The low-level logic circuits, including the FPGA's and telemetry, are tied to chassis ground, and are connected to the motor drivers by high-speed optocouplers.

Applications

Disturbance torque is a key factor in many space applications. By using this ECU joined with Aeroflex's zero-cogging motor technology a designer can significantly limit disturbance torques.

The ECU is particularly well suited for spacecraft applications such as Solar Array Drives and Antenna Pointing Mechanisms.

Applications such as Imaging Platforms, Instrument Gimbals for Earth and Planetary Observations are also excellent uses for this ECU.

Heritage

ATMS - Advanced Technology Microwave Sounder. The ECU drives the Scan Drive Mechanism (SDM), which accurately positions two microwave antennas used for gathering meteorological data.

MRO - Mars Reconnaissance Orbiter. The ECU is used in two separate applications: Solar Array Drive and the Antenna Pointing Mechanism.

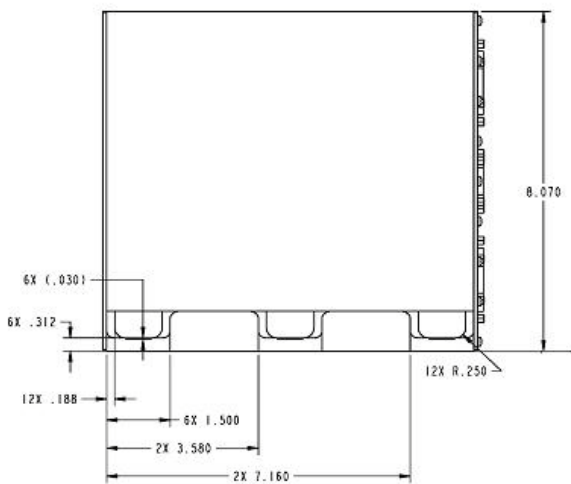
4-Channel Electronic Control Unit



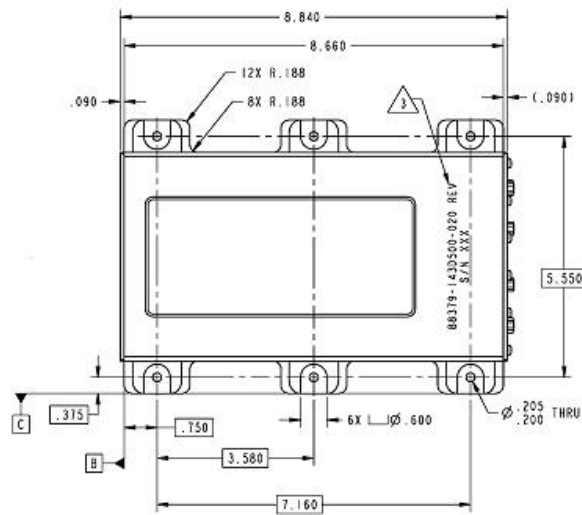
Specifications

	Value	Units	Basis
Inputs			
Voltage	22 - 36	VDC	Nominal
Resolver	1X - 64X	multi-speed	
A/D	12	bit	
Interface			
	Mil-1553		
Outputs			
Motor Drive	0 - 8	Amps	Total range
Characteristics			
Weight	9	lbs	Maximum
Power	22	Watts	Maximum
Radiation Tolerance	30	krad	total dose
Single Event	37	mev-cm ²	per mg
Environments			
Operating Temp	-45 to +85	Degree C	In Vacuum
Non-Operating Temp	-45 to +110	Degree C	In Vacuum

CONTROLLER DIMENSIONS



Side View

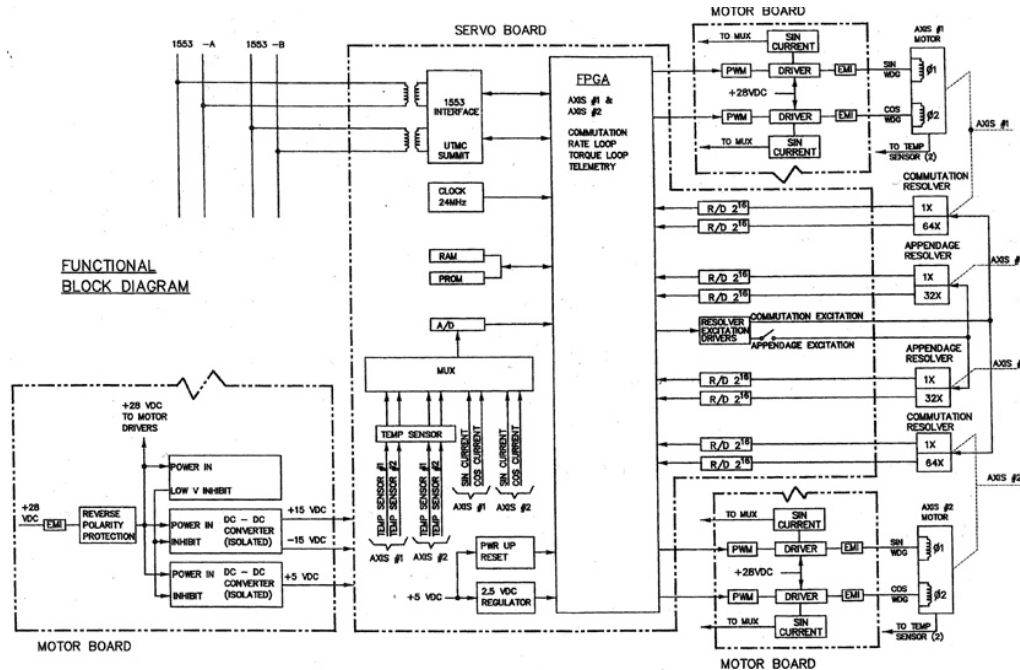


Top View

Functional Block Diagram



- 2 redundant motors (4 independent motors)
- 2 redundant dual speed commutation resolvers
- 2 redundant dual speed appendage resolvers
- Closed loop rate control
- Closed loop torque control
- 1553 interface



Highlights

- FPGA based digital control
- Efficient all digital PWM motor drive
- Aeroflex 1553 ASIC
- Aeroflex Resolver to Digital Converter
- EMI filtered power input
- EMI filtered motor drive outputs
- Separate I/O connectors for each redundant controller
- Internal DC to DC converters (+5v, ± 15v)
- Analog multiplexer for telemetry and motor current feedback
- 24 MHz system clock oscillator
- Rad-Hard power-up reset supervisor IC