STEERING—ELECTRONIC POWER ASSISTED

SG2010/D, REV 0
12/2002

KEY BENEFITS

- Reduces system mass compared to hydraulic power-assisted steering
- Reduces fuel consumption because power is not taken from the engine to operate the hydraulic pump
- Offers a lower cost solution than hydraulic power steering
- Increases the flexibility of component placement by removing the hydraulic system

OVERVIEW

Electric power assisted steering (EPAS) is designed to use an electric motor to provide directional control to the driver of a vehicle. Most EPAS systems have variable assist, which allows for more assistance as the speed of a vehicle decreases and less assistance from the system during high-speed situations. This functionality requires a delicate balance of power and control that has only been available to manufacturers in recent years. The EPAS system is replacing the hydraulic steering system and is destined to soon become mainstream among automotive manufacturers.

Electric power assisted steering systems do not require engine power to operate. Thus, a vehicle equipped with an EPAS system may achieve an estimated three percent greater fuel economy than the same vehicle with conventional hydraulic power steering. As an added benefit, more of the engine's power is transmitted to its intended location—the wheels.

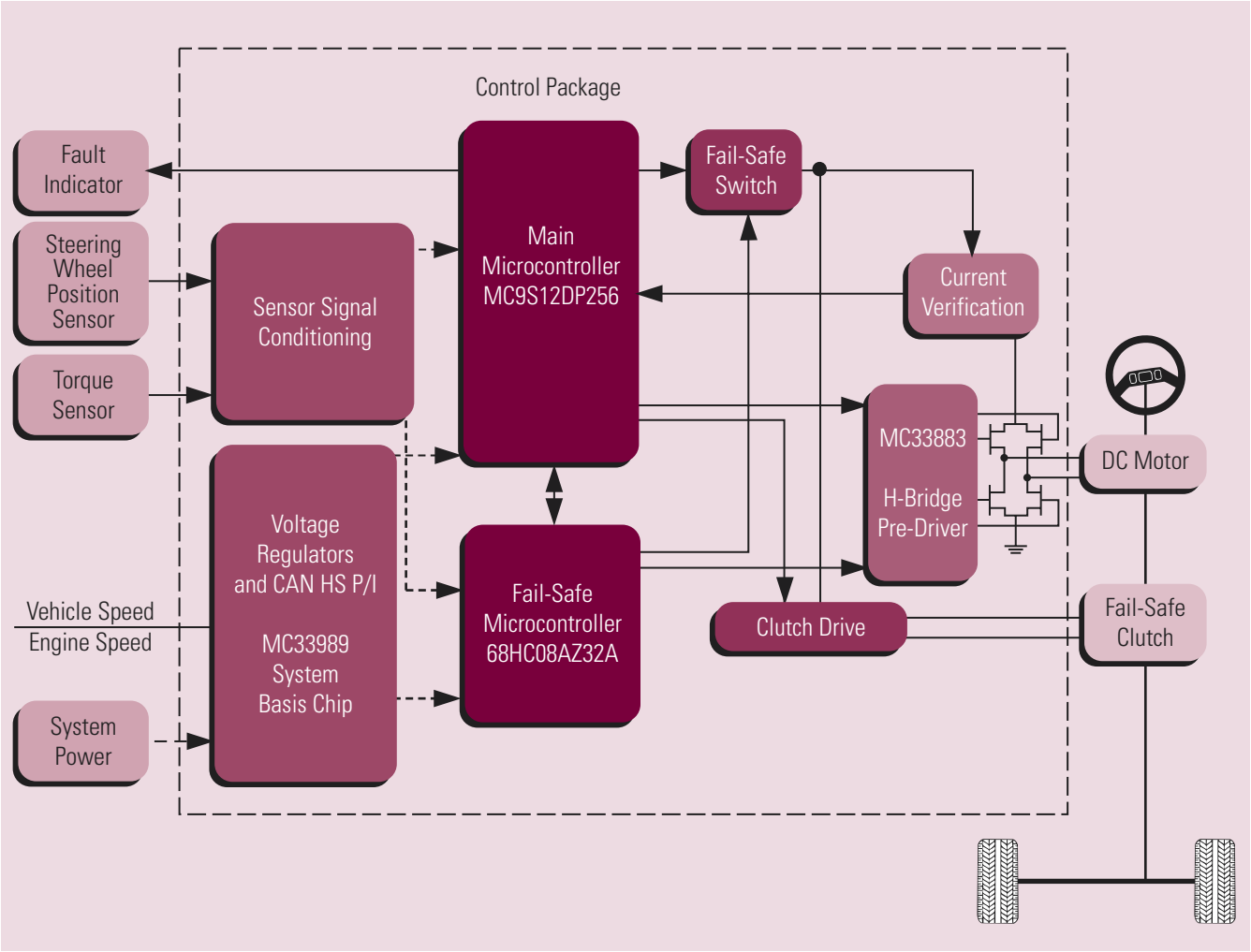

Figure 1. Steering—Electronic Power Assisted

MOTOROLA ORDERING INFORMATION

Contact your Motorola sales representative for complete information on existing products and custom solutions.

Part Number	Product Highlights	Additional Information
68HC08AZ32A	Fail-safe microcontroller	www.motorola.com/semiconductors[NOTE]
MC33883	H-bridge pre-driver	
MC33989	System Basis Chip	
MC9S12DP256	Microcontroller	

NOTE: Search on the listed part number.

DESIGN CHALLENGES

Power steering applications require that the assist device mimic the driver's inputs at the steering wheel. The inputs are typically precise course corrections followed by periods of inactivity. This condition presents an interesting challenge to any motor design. The motors must also operate for extended periods in an under-hood environment that can sometimes reach temperatures of up to 150 degrees Celsius with little or no maintenance.

An acceptable motor design, with a high efficiency and temperature tolerance, is one that can be precisely manipulated. Today's multiple-poled "brushless" DC motors have been designed with tasks like these in mind. Their brushless design moves the electrical windings to the stator, the outer housing, which eliminates the need for motor brushes and can help to improve overall efficiency. This combination enables the motors to be used in the harshest of conditions with a very long service life.

MOTOROLA SOLUTION

Motorola's established HC12 architecture family contains ideal on-chip Flash solutions for EPAS applications, which are currently available. They include four to eight pulse width modulation (PWM) channels, timer channels, and A/D channels to help control the motor in the EPAS system. Packages include 112 LQFP and 80 QFP. A wide variety of tools are also available.

DEVELOPMENT TOOLS

Vendor	MPC555	MPC561	MPC562	MPC563	MPC564	MPC565	MPC566	TPU
Metrowerks								
CodeWarrior™ for Embedded PowerPC ISA	●	●	●	●	●	●	●	
CodeWarrior for OSEK RTOS	●	●	●	●	●	●	●	
CodeWarrior Development Systems	●					●		
OSEKturbo (RTOS)	●	●		●		●		
TPU Low-Level Driver Library								●
Flash Programming — CodeWarrior for Embedded PowerPC ISA	●			●	●	●	●	
Flash Programming — CodeWarrior for OSEK RTOS	●			●	●	●	●	
Wind River Systems								
BDM Debugger — SingleStep	●	●		●		●		
BDM Debugger — SingleStep with Vision	●	●		●		●		
Flash Programming — SingleStep	●			●		●		
BDM Debugger — VisionCLICK	●	●		●		●		
Nexus Debugger — VisionCLICK		●		●		●		
Nexus Debugger — SingleStep with Vision		●		●		●		
Flash Programming — VisionCLICK	●			●		●		
Compiler — DiabData	●	●	●	●	●	●	●	
MATRIXX	●	●		●		●		
Simulator — SingleStep	●	●	●	●	●	●	●	
Lauterbach								
BDM Debugger Trace32	●	●	●	●	●	●	●	●
Nexus Debugger Trace32		●	●	●	●	●	●	●
Code Trace (with Bus access)	●	●	●	●	●	●	●	
Code Trace (Nexus)	●	●	●	●	●	●	●	
Axiom Manufacturing								
Low-Cost Evaluation Board	●	●						
Mid-Range Evaluation Board	●	●						
Full-Feature Evaluation Board	●	●	●	●	●	●	●	

DEVELOPMENT TOOLS (continued)

Vendor	MPC555	MPC561	MPC562	MPC563	MPC564	MPC565	MPC566	TPU
Ashling Microsystems								
BDM Debugger — Opella, Genia, and Vitra	●	●	●	●	●	●	●	
Nexus Debugger — Vitra (w/trace)		●		●		●		●
Nexus Debugger — Opella, Genia		●		●		●		
Green Hills Software								
IDE, Debugger — Multi	●	●		●		●		
Compiler — C/C++/EC++	●	●		●		●		
P&E Microcomputer Systems								
Low-Cost Debugger	●	●		●		●		
Flash Programming Tools	●			●		●		
GNU								
Compiler/Debugger	●	●		●		●		
ASH WARE								
TPU Simulator								●
ETAS								
ErCOSEK	●	●		●		●		
Calibration Tools (ETK)	●	●		●		●		
Calibration Tools (ETK) Nexus	●	●		●		●		
dSPACE								
TargetLink	●	●		●		●		
dli								
Logic Analyzer	●	●		●		●		
Agilent Technologies								
Logic Analyzer	●	●		●		●		
Inverse Assembler, Source Correlation	●	●		●		●		
Emulation Probe (BDV)	●	●		●		●		
Tektronix								
Logic Analyzer	●	●		●		●		
Abatron AG								
BDM Support	●	●		●		●		
Accelerated Technology								
Nucleus (RTOS)	●	●		●		●		

THIRD PARTY SUPPORT

Vendor	Contact Information
Metrowerks	800-377-5416 (www.metrowerks.com)
Axiom Manufacturing	972-926-9303 (www.axman.com)
Wind River Systems	800-872-4977 (www.windriver.com)
Green Hills Software	805-965-6044 (www.ghs.com)
Lauterbach	508-303-6812 (www.lauterbach.com)
Accelerated Technology	800-468-6853 (www.acceleratedtechnology.com)
Ashling Microsystems	408-732-6490 (www.ashling.com)
ASH WARE	503-533-0271 (www.ashware.com)
GNU	617-542-5942 (www.gnu.org)
ETAS	888-382-7462 (www.etasinc.com)
dSPACE	248-567-1300 (www.dspace.com)
P&E Microcomputer Systems	617-353-9206 (www.pemicro.com)

RELATED INFORMATION

For inquiries about Motorola products, contact the Technical Information Center at 800-521-6247, or visit us online at www.motorola.com/semiconductors.

Online Topics
M68HC08
M68HC12
Analog and Mixed Signal

Related Products

Product Number	Product Name	Contact Information
MC33253	Full bridge pre-driver with AOP for body electronic application	www.motorola.com/semiconductors[NOTE]

NOTE: Search on the product number listed.

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SG2010/D, REV 0

December2002