

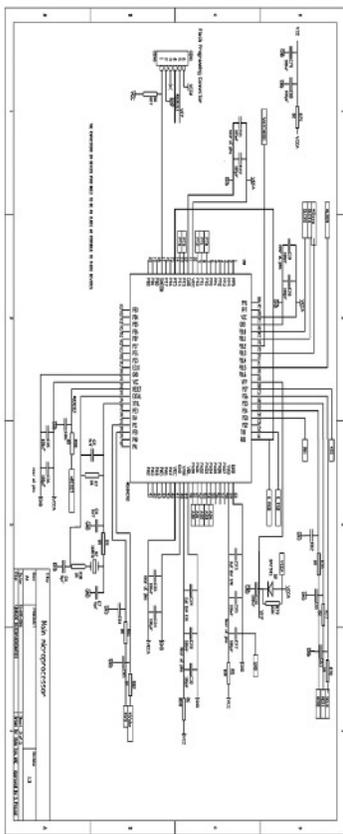
AutoPak

The Universal Electronic Control Unit

by the Dearborn Group, Inc.



version 1.35



Key Benefits

- * Universal Validated Electronic Control Unit: ECU.
- * Hardware is validated to automotive electrical and environmental standards. Very fast time to market.
- * Is currently being installed on production vehicles.
- * Small, light and rugged. Self contained. 7x7x2.54 cm
- * Program, Plug and Play. Freescale HC12 family.
- * Available off-the-shelf from one unit to thousands.
- * Supports J1850 VPWM, KWP2000 (ISO 14230) with a ISO 9141 K line and optional CAN support. Other protocols are available by custom order.
- * Basic unit has 6 o/p and 5 i/p lines - A/D and digital.
- * Easily and quickly customizable for your design.
- * FLASH memory is field programmable with the BDM connector. (Background Debug Mode)
- * Is also the evaluation and development platform.

Typical Applications

- * Gateway from one protocol to another.
- * Automotive or industrial device controller.
- * Intelligent data acquisition for design or diagnostics.

Introduction

The AutoPak is designed and manufactured by the Dearborn Group as a general purpose automotive and industrial module. It is capable of communication over several types of serial busses and moves data over several discrete I/O channels including A/D converters.

A main application will be as a gateway - translating from one protocol to another with the addition of useful I/O lines which can be used for any purpose.

Since the AutoPak comes without a software application, a custom one will be provided by the customer or Dearborn Group. DG can supply C code algorithms and functions to facilitate in-house development.

AutoPak is programmed with a standard economical BDM emulator. AutoPak and the BDM are also used for the development, debugging and testing processes.

The AutoPak ECU - General Description

AutoPak is a single circuit board mounted in an aluminum extruded case. There is one 16 pin connector plus an internal BDM debugging and FLASH programming connector. AutoPak is powered by the vehicle.

The HC12 microcontroller is operated in single-chip mode at 8 MHz bus speed. Other HC12 family members including the faster MCS12 DP256 family can be custom designed for more capabilities.

The application code is programmed to the FLASH memory and will instantly start upon RESET. AutoPak has automatic Sleep and Wakeup modes for minimal power consumption as well as a COP watchdog.

The AutoPak is fully tested and validated for temperature (-40 to 85 C), moisture, vibration, crash, emissions, power and many other tests listed on the other side. →

Dearborn Group Consulting Services

The Dearborn Group can develop the AutoPak's application program (firmware) or this can be done in-house by the customer. DG can design a product using the AutoPak or with a new proprietary design.

The Software or Firmware

This program is normally written in C and then must be thoroughly tested and validated. DG has many years of software development for the automotive industry and can save time and money for any application.

There is no need to "re-invent the wheel" and all software is tested and validated to contemporary standards. DG develops and tests software using state of the art techniques and best practices and uses quality tools such as leading compilers and emulators.

The AutoPak Hardware

The hardware is already validated and this takes any project using AutoPak to the market quickly and economically with a minimum of testing and validating. DG will supply the appropriate test documentation.

The AutoPak uses practical hardware design techniques so no time is wasted deciphering obscure and overly complex designs which can contribute to bugs.



Part Numbers: DG-AP1-J1850
DG-AP1-CAN

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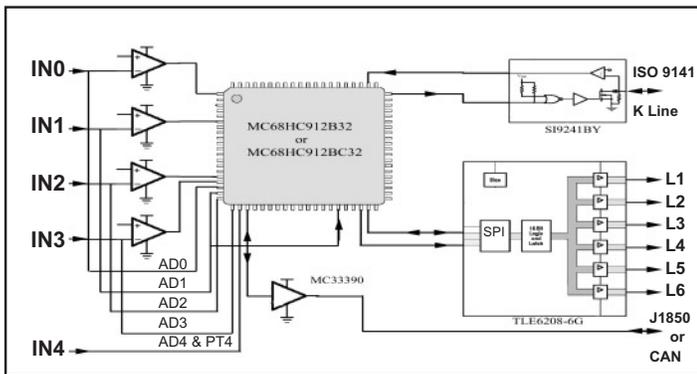
The Freescale 68HC912B32 Microcontroller

AutoPak uses the Freescale MC68HC912B32 controller. CAN capability is optionally available (instead of J1850) by using a MC68HC912BC32.

The HC12B32 and HC12BC32 include these features:

- * 32 Kbyte FLASH programmable memory.
- * 768 bytes of non-volatile EEPROM.
- * 1 Kbyte static RAM.
- * 8 channel 10 bit A/D converter.
- * 8 channel Timer Unit (TIM).
- * Various general purpose I/O pins.
- * Watchdog timer.
- * BDM port for debugging and FLASH programming.
- * Asynchronous and synchronous ports (SCI and SPI).
- * J1850 VPWM BDLC module (B32 only).
- * CAN module (BC32 only) (special order).

The program residing in the FLASH has unrestricted access to all HC12 functions and pins. No resources are used by AutoPak for any house-keeping functions. The SPI and SCI ports are used for ISO 9141 and O/P lines. Other microcontrollers can be used with custom development.



AutoPak Block Diagram

AutoPak Power Supply

The AutoPak operates from 9 to 30 volts (or 40) @ < 1 amp. The low power mode consumes < 500uA. The AutoPak internal supply is 5 volts regulated. All circuitry is protected against reverse voltages and spikes.

AutoPak Output Lines

High Current Output Drivers

There are 6 output lines L1 through L6. These are provided by an Infineon TLE6208-6G driver IC which provides six high and six low side drivers. The AutoPak uses the low side outputs. The TLE6208 can sink up to 0.6 amps per driver and has a RDSon of 0.8 ohms.

The TLE6208 is programmed via the HC12 synchronous serial SPI port. Diagnostic information can also be read from the TLE6208.

AutoPak Network Lines

ISO 9141 K Line

The HC12 reads and writes to a SI9241BY to provide a bidirectional ISO 9141 K line. The CPU SCI UART is used for the ISO 9141 K line.

J1850 VPWM Class 2

The HC12B32 has a BDLC module that is J1850 VPWM compliant. This is the GM Class 2 protocol. A MC33390 interface chip is used to provide the single wire bidirectional network. Daimler-Chrysler SCI can also be supported with the HC12 BDLC module.

CAN (ISO 11898)

The HC12BC32 has a CAN module instead of the BDLC of the B32. The standard version of the AutoPak module contains the B32 therefore supports only the J850. J1850 and CAN are mutually exclusive in the AutoPak. One or the other, but not both. The CAN version of the AutoPak is available by special order at this time.

AutoPak Input Lines

A/D Converter Input - Analog to Digital

The AutoPak uses five of the eight HC12 A/D channels. The HC12 Port AD pins can be programmed individually as general purpose I/O or A/D. Discrete filtering and protection is used on these pins. The use of these pins can be customized for specific applications. AD4 feeds port PT4.

Buffered Digital Inputs

The AutoPak has four op-amp buffered inputs that feed Port PT of the HC12. They accept a voltage up to 5 volts and are provided with spike and overvoltage protection. All other HC12 I/O lines are unused and can be implemented in custom versions of the AutoPak. No lines are used as address/data busses as the HC12 is operated in single-chip mode.

Validated Environmental and Electrical Specifications

The AutoPak has been thoroughly tested by Dearborn Group engineers at their site in Michigan. DG uses the Underwriter's Laboratory (UL) extensively for many of these tests. Complete test specifications and verification are available from DG.

These tests are extensive and having the AutoPak pre-qualified is a tremendous advantage for your project including time and budget. A listing of the tests follows and represents only a portion of the AutoPak specification.

- Conformal Coating
- Mechanical Shock
- Crash Endurance
- Drop Endurance
- Random Vibration
- Temperature Endurance
- Thermal Shock Endurance
- Altitude Test
- Humidity Endurance
- Short Circuit
- Salt Spray
- Fluid Compatibility
- Dust Endurance
- Flammability
- Power and temperature Cycling
- Radiated Emissions
- Radiated Immunity
- Conducted Transient Emissions and Immunity
- Electrostatic Discharge (ESD) Requirement
- Connector Reliability
- EMC Requirement
- Voltage and Current Operating Range, Power Consumption.

For more information:

For more information regarding AutoPak, DG Consulting and Design, other DG products and services, to find technical specifications, pricing, information on unlisted protocols or to locate your local representative, contact the Dearborn Group at sales@dgtech.com, visit www.dgtech.com or call our offices in Michigan at (248) 488-2080.

AutoPak is Made in the USA and supported everywhere.