

# Automotive Networking Tools

Media converters, data logger, CAN-FD interface

## Testing Automotive In-Vehicle Networks

There are many kinds of communication buses in a car today – interfaces that have been around for a long time such as CAN and LIN alongside more modern interfaces such as automotive Ethernet. Monitoring the traffic on those buses, actively logging it and testing to be sure it works the way it is intended, is critical. The products below offer some simple tools and hardware to help.



# Multi-Protocol Vehicle Network Interface

The Keysight AP1200A provides Ethernet, eight channels of CAN (including CAN FD), and four channels of LIN in one tool. All channels run simultaneously and are time-stamped in hardware. A fully isolated high-speed USB interface allows messages to be sent and received without risk of damage to the PC.

## Features

- 8x CAN FD
- 4x LIN
- Ethernet: DoIP/XCP
- All channels run simultaneously and are timestamped in hardware
- Fully isolated high-speed USB interface allows PC to safely send and receive messages



## Stand-alone logging, scripting, and simulation

In addition to working as a PC interface, the AP1200A can operate in standalone mode. The AP00000A Intrepid Controls Systems Vehicle software is required to configure standalone mode. It can run real-time scripts, log data to a removable microSD card, and simulate ECUs and gateways. With these features, it is possible to run a script to reflash ECUs using data from the microSD card.

## Vehicle spy application software

With AP00000A Intrepid Controls Systems Vehicle Spy software, users can monitor and transmit on all channels simultaneously. Users can take advantage of the powerful interface to load databases and to write and debug scripts before downloading them to the device. For users that prefer to write their own software, AP1200A supports three APIs: neoVI DLL API, SAE J2534 API, and the TMC RP1210 A/B API.

## Hardware-in-the-loop real-time performance

The AP1200A includes a real-time scripting engine that can be used to perform real-time messaging. For example, an engineer creating an application can load a script into the hardware and interface with the script variables, allowing microsecond-level measurement and control.

# Automotive Ethernet Media Converters



## Media converter types

Model	Function	Description
<p>APM1000E-STD</p> 	100/1000BASE-T1 Media Converter	<ul style="list-style-type: none"> <li>Converts standard 10/100/1000 Ethernet to 100/1000BASE-T1 Automotive Ethernet</li> </ul>
<p>APM1000E-CLK</p> 	100/1000BASE-T1 Media Converter	<ul style="list-style-type: none"> <li>Converts standard 10/100/1000 Ethernet to 100/1000BASE-T1 Automotive Ethernet</li> <li>Same as above with CLK output accessible</li> </ul>
<p>APM0100A</p> 	100BASE-T1/Ethernet Media Converter	<ul style="list-style-type: none"> <li>Converts standard 10/100/1000 Ethernet to 100BASE-T1 Automotive Ethernet</li> </ul>

## 100/1000BASE-T1 media converter

Keysight's APM1000E-STD and APM1000E-CLK are advanced Ethernet media converters. The APM1000E-STD and APM1000E-CLK convert from 100BASE-T1 Ethernet to 100BASE-TX or 1000BASE-T1 to 1000BASE-TX. This is useful for connecting a PC to a 100/1000BASE-T1 host or switch.

### Features

- 100/1000BASE-T1 via Marvell 88Q2112 PHY
- Membrane switches on the front panel of the unit enable easy selection of the data rate (100BASE-T1 or 1000BASE-T1) as well as the PHY clock mode
- Physical Layer Testing and Debugging including packet generator, cable tester, CRC Error counter, Link and Signal quality measurement
- Uses a MATEnet connector



## 100BASE-T1 media converter

Use Keysight's APM0100E to connect one port of 100BASE-T1 (BroadR-Reach) to one port of a 4-wire 10/100 Ethernet (100BASE-TX).

### Features

- 1 port BroadR-Reach PHY (BCM89810)
- Powered via USB
- Activity Link LEDs for both PHYs
- Molex/Mini50 connector for BroadR-Reach PHY
- Compact and rugged



# CAN-FD Interface

## Low-cost high-performance CAN FD – USB interface



The AP0200A comes with software-controlled CAN termination, increased buffer size, improved USB latency performance, and standalone operating capability using a USB charger.

The AP0200A supports 2x CAN or CAN FD channels, has USB Type A and Type C options available, and certified drivers for Windows 7, 8, 8.1, and 10.

The AP0200A is fully isolated from the PC, and its isolation layer is self-powered from USB, which eliminates the need for external power for the

CAN transceiver. The AP0200A isolation, a feature not common on low-cost interfaces, eliminates issues with grounding or noise affecting your PC and its communications. The AP0200A is also electrically hardened to survive an abusive environment, including reverse battery voltage and electrical transients. To make wiring easy, the device pinout is printed clearly on the housing.

## Features

- High-bandwidth 1 Mb/s baud rate for CAN and up to 8 Mb/s for CAN FD on each channel
- USB-powered
- Fully isolated from the PC to avoid grounding or noise issues
- Electrically hardened to survive abusive environments, including reverse battery voltage and electrical transients
- Supports J1939, OBD2 on CAN, Keyword Protocol over CAN, UDS diagnostics, CCP/XCP, DeviceNET, and CANOpen
- ISO15765 for CAN FD implemented in hardware for super-fast ECU flashing
- Use with AP00000A Intrepid Controls Systems Vehicle Spy software or program directly with neoVI DLL open API, J2534, Linux, or RP1210
- 64-bit timestamping to an accuracy of 25 nanoseconds
- RJ-45 connector for 10/100 Mb PHY
- Compact and rugged

# Multi-Purpose Vehicle Network Software

The AP00000A Vehicle Spy software is a single tool for diagnostics, node and ECU simulation, data acquisition, automated testing, and vehicle network bus monitoring. The AP00000A has been designed with a focus on ease-of-use and user productivity.

## Key applications:

- Monitoring networks
- Diagnostics
- Data acquisition and logging
- Node simulation
- Automated testing

## Supported networks and protocols

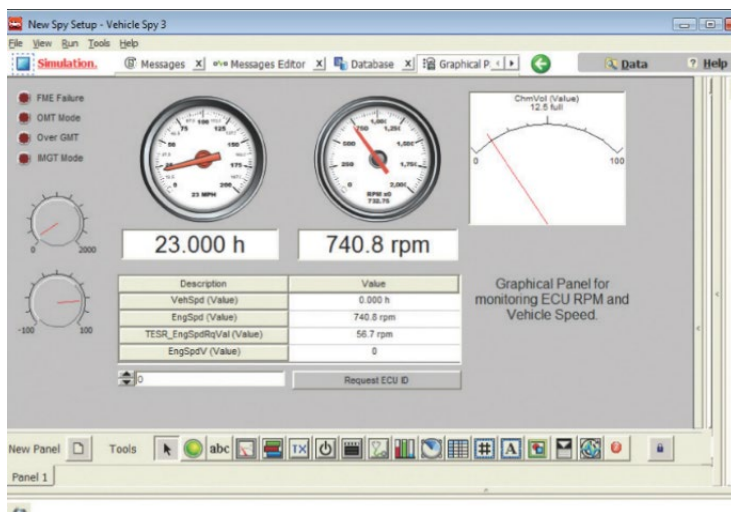
CAN, CAN FD, automotive Ethernet, LIN, FlexRay, K-Line, J1939, J1708, GMLAN, Keyword, UART, CCP/XCP, ISO9141, and ISO14229

## Quick and easy

The AP00000A software enables multiple users of a single computer to easily keep track of their own projects, logged data, scripts, and function block setups. Easy to follow tutorials and online help enable a new user to become familiar with the software quickly.

## Screens and functional blocks

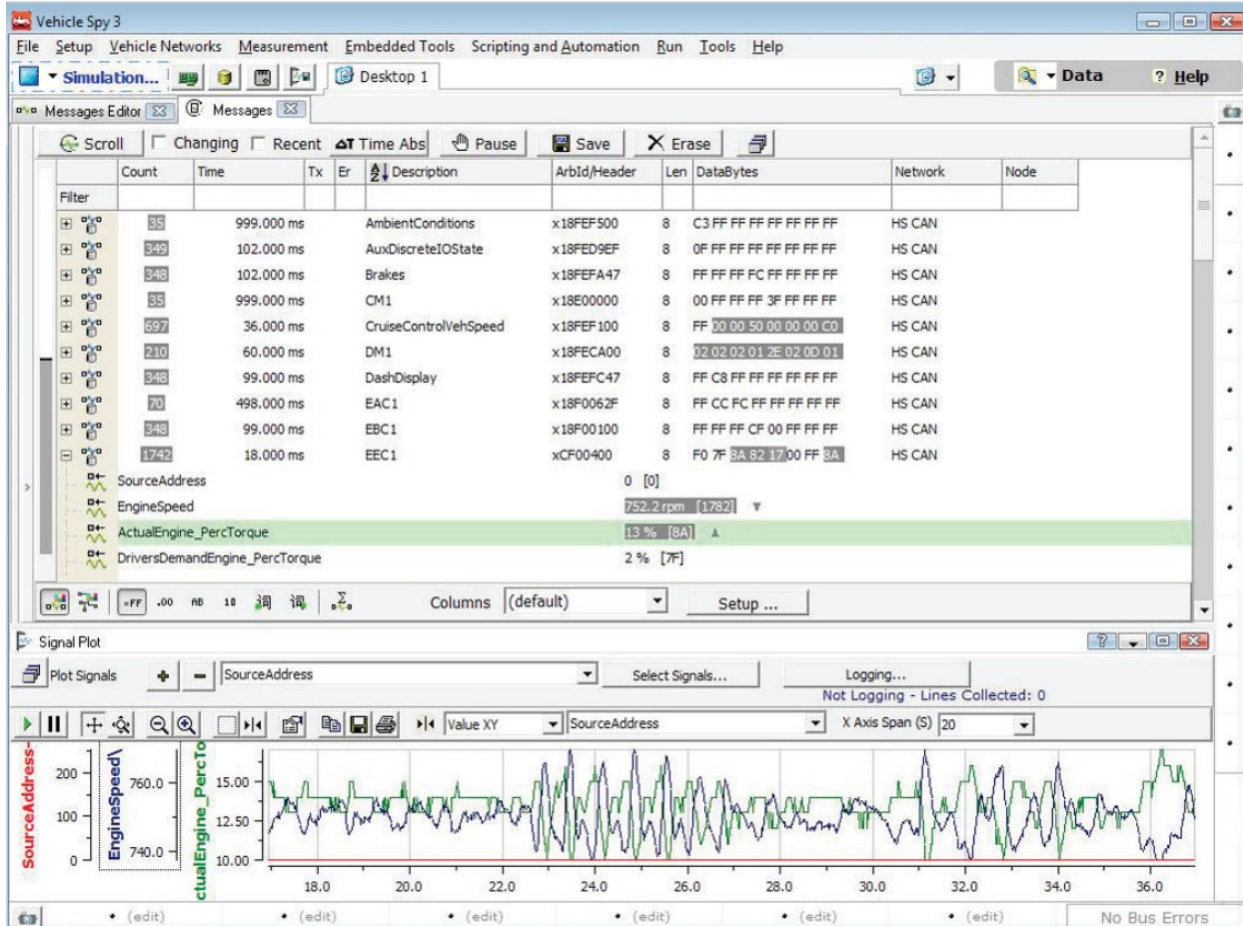
The Networks View enables users to monitor the statistics, properties and utilization of multiple networks simultaneously. The messages screen allows users to view, filter, sort, customize, and log multiple vehicle bus signals and messages. Automatic message highlighting shows exactly what data is changing on each vehicle network. The messages Editor screen makes it simple for users to quickly set up transmit and receive messages and signals for real-time communication on the vehicle network. Post-analysis functions include multi-Y-axis, multi-X-axis, legends, copy to clipboard, multiple cursors, and much more.



Create graphical panels to customize data display. Choose from: gauges, message panels, knobs, text boxes, buttons, and more. Users can also import custom pictures and animated components.






## Scripting and automation

There are Function Blocks that enable users to easily set up automated tasks and simulate nodes and ECUs without learning a complicated, text-based computer language. If more control is required, the C Code Interface guides you through building a project in Microsoft Visual C, giving you access to anything accessible through Visual C. Access security DLL files, external hardware, or the Win32API, and interface that information with your networks.



# Ordering Information

The following ordering information includes optional cables associated with each unit.

Model	Description		Option
AP1200A	Multi-Protocol Vehicle Interface and Data Logger, 8x CAN FD, 4x LIN/K-Line, DoIP-100BASETX <sup>1</sup>		
Comes standard with each order of the main unit AP1200A	Ethernet adapter cable, DB-26F- DB-25M, DB9(M)-RJ-45  Used for connecting the AP1200A to vehicle networks. Converts the HD-26F connector on the AP1200A to DB-25M, DB-9 and RJ-45 (Ethernet) connectors. The HD-26 connector mates to the HD-26 on the AP1200A.		AP1200A-J45
	DB-26HD cable F to 12x DB-9M + 1x RJ-45 + 2x Banana Plugs (for benchtop use).  This cable breaks out the DB-26HD Female connector on the AP1200A to individual DB-9M connectors for multiple 8 x CAN and 4 x LIN channels, plus an additional RJ-45 connector for DoIP and two banana plugs for power. This cable also has a switchable 2x SWCAN channel and 1x Individual MSCAN cable.		AP1200A-DB9
Optional cables	DB-25F to OBD-II.  The DB-25F mates to the DB-25M connector on the AP1200A-J45 cable, converting DB-25 to a standard OBD-II connector, with a pinout to meet the needs of most newer vehicles using multiple DW CAN channels.		AP1200A-MUL
	OBD Cable with DoIP support, HD26F to DB25M, DB9M to OBDII  Breaks out the HD-26F connector on the AP1200A into DB-25M, DB-9M and OBD-II (J1962) connectors. Suitable for gatewaying all traffic over pins 6 and 14 exclusively, or for use with Diagnostics over IP (DoIP).		AP1200A-DIP
	DB-26HD to OBD x2  This cable adapts the AP1200A to two SAE J1962 connectors: One for the DLC on Global B vehicles, and the other for a proprietary harness		AP1200A-GMB
	Vehicle Spy 3 Enterprise (Full Version)		AP00000A-SPY

<sup>1</sup> AP1200A comes with 2 connection cables, DB9 and J45 as standard. Either replacement/additional standard cables or any optional cables can be purchased with the same option numbers.  
The AP1200A also comes with a USB 2.0 (A/B) cable, 32 GB Micro SD card and a µDB-9F to DB-9M cable adapter





## Media converters

Model	Description	Option
APM0100E	100 BASE-T1 to 100BASE-TX Media converter Vehicle Spy 3 Enterprise (Full Version)	AP00000A-SPY
APM1000E-STD	1000/100 BASE-T1 to 1000BASE-T Media converter Vehicle Spy 3 Enterprise (Full Version)	AP00000A-SPY
APM1000E-CLK	1000/100 BASE-T1 to 1000BASE-T Media converter with clock access Vehicle Spy 3 Enterprise (Full Version)	AP00000A-SPY

For all the media converters, software is tied to the hardware and must be ordered at time of original sale. Each of these products comes with a 1-meter CAT5e Ethernet cable, USB3.0 type A to USB-C cable and MATEnet cable.

## CAN FD interface

Model	Description		Option
AP0200A	Vehicle network Interface, 2x CAN FD		
	DB9 to OBD-II Cable (2 meters)  This cable allows an AP0200A to connect and communicate over dual CAN channels on a vehicle network using a standard OBD-II port.		AP0200A-OBDD
	DB9 to J1939 Deutsch 9-pin (1.83 meters)  This cable allows connection to a Deutsch 9-pin (J1939) connector on commercial vehicles. It uses the standard J1939 pinout, including dual CAN channels.		AP0200A-DB9
	Vehicle Spy 3 Enterprise (Full Version)		AP00000A-SPY

Cables are optional.

# Conclusion

These products are easy-to-use and connect. They will help you log data, convert formats, and tap the vital networks that connect the modules, cars, and systems together.

From vehicle network adapters to automotive Ethernet tools, data loggers, and software that will control them these products are easy to use and an important part of a complete test solution of your in-vehicle systems.



**For more information**

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