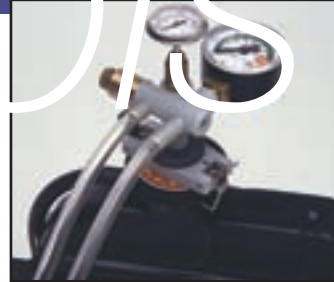


# Diagnostic

# Tools



*Import Service is venturing into new terrain with this, the first issue for 1998. As you will see as you leaf through the magazine, we've gathered a large sampling of information on many new pieces of diagnostic equipment, general tools, shop equipment, information sources, and vehicle parts. While we have always provided you with these kinds of information in smaller doses in the "Information Station" and "Odds 'N Trends" departments in the magazine, this is the first time we have devoted an entire issue to informing you of what's new and exciting out there.*

Before we go any further, we would like to thank the many manufacturers and suppliers who responded to our requests for information about their products and services. After perusing this issue, if you have a further interest in any of the items you will find displayed, you are encouraged to use the Reader Response Cards that may be found between pages 42 and 43 of the magazine. Any of the companies that are listed on these pages would be glad to hear from you, and may be able to provide you with additional information.

We'll begin our new product coverage with a description of several pieces of diagnostic equipment. It's a rather varied lot, with everything from exhaust emission analyzers to cooling system testers. The group includes the ADL 7100 Lab Scope from **UEI (Circle No. 324)**, the Model 70600 Cooling

System Analyzer from **ABW (Circle No. 325)**, the ScopeMeter Series II from **Fluke (Circle No. 326)**, the Personal Automotive Computer (PAC) from **Snap-on and Edge Diagnostics (Circle No. 327)**, the Vantage MT2400 Power Graphing Meter from **Snap-on (Circle No. 328)**, and the Engine Analysis System from **CODA (Circle No. 329)**.

We'll give you a general idea of each tool's capabilities, but we promise a more in-depth discussion in coming months. Next month, we plan to introduce a new feature called "Test Bench," which will feature a thorough analysis and use of a single piece of diagnostic equipment. We'll give you the information you will need to make your equipment buying decisions a little easier.

—Import Service



*If you are familiar with the Snap-on LS-2000, the **ADL 7100 Lab Scope** from UEI should look pretty familiar to you. UEI originally developed the LS-2000 for Snap-on, and is now marketing their own version of the tool under their own name. The basic scope comes with a memory card that provides a database of 23 known-good automotive and training waveforms. The ADL 7100 is equipped with DMM-style test leads, and a variety of specialized probes can be added for advanced system testing.*



*In addition to the standard memory card that covers secondary ignition systems, fuel injectors, mass air flow sensors, and wheel speed sensors, six additional memory cards are also available. These cards contain more specific waveform information on Ford, GM, and Chrysler as well as general domestic, Asian, and European models. UEI plans to introduce additional waveform cards to keep pace with changes in underhood systems. This should ensure a long service life for the tool.*



*After selecting a sample waveform, the ADL 7100 configures itself so you are ready to start testing the component or system as quickly as possible. The unit has a minimum digital sample rate of five megasamples per second on both channels simultaneously. The specialized leads for secondary ignition analysis shown here are included with the standard ADL 7100 package. An inductive pickup for amp testing and a cigarette lighter power supply cable are also available at an additional cost.*



*The ADL 7100 has the ability to store up to eight additional waveforms and setups in memory. If you have used all of memory in the scope, and you've got something you want save for posterity, saved waveforms can be downloaded to a PC. The cable shown plugs into the scope, then attaches to the PC via its serial port. UEI supplies a version of Waveform Manager with its scope to PC kit. Other types of waveform storage and database software can also be used with the ADL 7100.*

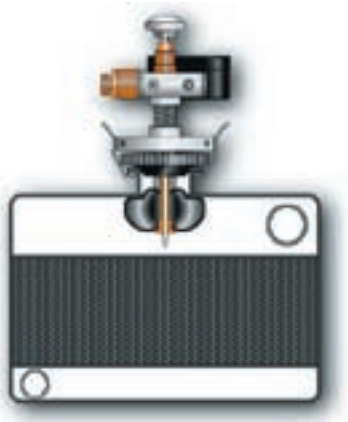
## ABW Cooling System Analyser

ABW promotes its **70600 Cooling System Analyser** (not “Analyser”—ABW is an Australian company) as being “The world’s first radiator pressure tester that doesn’t use adapters.” Just to be mean, the first vehicle we tried it on was a Volkswagen Quantum. The Analyser didn’t work—it needed an adapter. But to be fair, it would be easy to make an adapter for the VW. Drill a 3/4” hole through the center of an old coolant tank cap, and *voila*, there’s your adapter. The Analyser seals the radiator opening by means of an inflatable rubber bladder. Hook the Analyser over the radiator neck, pump twice to inflate the bladder, slide the switching valve on the Analyser to the left, and pump to pressurize the cooling system. Once the cooling system has been pressure tested, you can adjust the Analyser to automatically maintain the cooling system’s rated pressure as the vehicle warms up, which enables you to continuously monitor the temperature and system pressure. Trapped air is vented through a second clear vinyl hose that can be routed back to the coolant reservoir, or into a jar containing indicator dye if you suspect a blown head gasket. The vent hose has a second benefit: when you release pressure, excess coolant drains into the hose instead of burping all over the radiator.

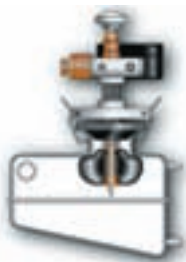
The Quantum wasn’t a fair test—the opening in the coolant tank is just too large for the bladder to seal—but on every other vehicle tested, the Analyser performed flawlessly.

One other feature in the Analyser’s favor is the ability to store it in its blow-molded case without having to remove the thermometer—thereby saving wear and tear on the o-rings. The only feature to dislike about the

Analyser is the material that it’s made from: plastic. The cost is reasonable as a result (you can buy an Analyser for just about what it costs to buy two standard cooling system tester adapters), but we’d be willing to pay more for an all-metal model.



*Analyser On Radiator*



*Analyser Detail*



*Analyser In Use*



If you've been reading *Import Service* for any length of time, you've seen several mentions of the successive incarnations of the **Fluke Automotive ScopeMeter**. We can trace our interest in the ScopeMeter back to the original 97. So what's new with the **ScopeMeter Series II**, you ask? The biggest news is a new type of display that produces a much brighter image than the original 98. The new display is easier to see in all kinds of light. Like Rudolph's nose, you could even say it glows.

Another feature of the ScopeMeter 98 has been improved on the Series II. The size of the on-screen menu text that guides you through the scope setup process has been increased. The scope starts out by asking some basic information about the vehicle you are working on, then takes you directly to a menu that further defines your intended scope usage. Once you finish, the scope is pre-configured and ready to test. If you're a traditionalist, full manual control of basic scope functions is still possible.



The ScopeMeter 98 Series II has several advanced record functions. The unit features Plot Readings, Min/Max Trend Plot, Intermittent Record, and Flight Record. Once you've recorded a series of signals or a single waveform, they can be saved and recalled for later viewing. A scroll feature allows you to scan through the recorded information, much like viewing a movie. The unit includes an internal memory for stored waveforms, and waveforms can also be downloaded to a PC using *FlukeView* software.

The standard ScopeMeter 98 Series II package includes the necessary inductive trigger pickups for secondary ignition analysis. Fluke also manufactures several specialized automotive probes for measuring such things as vacuum, pressure, and amperage. The Series II can be easily configured to take advantage of these specialized probes. For example, the input sensitivity when working with an inductive amp probe can be adjusted using the unit's setup menu.



The **Personal Automotive Computer (PAC)** from **Snap-on** is a truly modular tool. The combination of a PAC base unit and the PACPro 5 in 1 module shown here transforms the PAC into a four channel diagnostic oscilloscope. The PAC base unit uses a touchscreen interface, so the number of buttons and switches on the face of the unit are kept to a minimum. Snap-on plan several additional diagnostic modules for the PAC, two of which we will be discussing here. This modular plan should assure a long tool life.

Like two of the other pieces of equipment in this article, the PAC can receive additional information via plug-in memory cards. Individual memory cards for the PAC provide detailed information about Domestic, Asian, and European engine management systems, ABS systems, and electronically controlled transmission systems. Additionally, software updates to the PAC's operating software can be accomplished via a PC and serial cable. Info can also be downloaded from the PAC to a PC.



The PACBoost module gives the PAC operator the additional capability of injecting simulated signals into a vehicle system. The PACBoost piggybacks on the PACPro module, and allows you to trigger larger current draw components, such as fuel injectors. This is an unrestricted signal generator, so you'll want to have a thorough understanding of the circuits involved before you start sending large amounts of current through them. In other words, don't call Snap-on if you accidentally fry a control unit.

The last module we were able to test is the PACGas module. This converts the PAC unit into a hand-held five gas exhaust analyzer. Those of you who are working in enhanced I/M areas may find the PACGas module handy, as it will allow you to do a road test to simulate the conditions present during a loaded mode I/M 240 test. If you're lucky enough to have a dyno, the PACGas can still go along for the ride. A PAC module for ignition analysis, a scan module, and a breakout box module are also planned.



The **Vantage MT 2400 Power Graphing Meter** from Snap-on is another tool that has been around for a while now. But some recent changes have given it some additional capabilities that the original version just didn't have. These changes are made possible by a new Version 2.0 software card that replaces the original card under one of the unit's side covers. The first time you turn the unit on after the card change, the Vantage automatically reconfigures itself to take advantage of the new software.

We don't have the room here to explore all of the Vantage's new capabilities. To summarize, Version 2.0 software includes a new European database, domestic coverage including OBD II, 20 screen review capability with cursor, and a long-term memory that can save up to five screens. The unit also supports three new pressure and vacuum transducers as well as improved screen navigation and faster access. All of these new features can be exploited by scrolling through the Vantage menus.



Like some of the other equipment we've describe here, the Vantage will configure automatically for a specific test, based on the information you provide and the choices you make while working through the various menus. As an example, we wanted to capture an injector waveform for this photo. Audi isn't included in the Vantage database, but the basic selections in the Waveform Viewer helped us produce the waveform you see here. No need to waste time configuring time and amplitude for a particular signal.

The Vantage can store up to five screens in its long term, non-volatile memory. Turning the unit off or changing the batteries will not erase stored screens. Additionally, screens can be printed or downloaded to a PC using Snap-on's PC Link software. Other waveform database programs may also be adapted for use with the Vantage. If you're a new user or need a refresher, the Vantage also includes a 10 Minute Electronics Class that can be read directly from the screen of the unit.

## CODA Engine Analysis System

The heart of the **CODA Engine Analysis System (EAS)** is a five-gas analyzer, but to call it a gas analyzer is to do it an injustice. The EAS lets you see combustion events the way an oscilloscope lets you see ignition events. But, unlike a scope, the pattern doesn't blur when you snap the throttle. The exhaust is the written record of the combustion process, the EAS lets you decipher it.

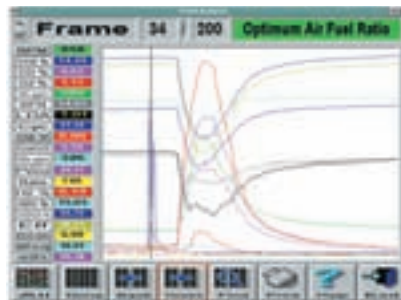
The EAS sensors include O<sub>2</sub> input, injector pulsewidth, engine vacuum, rpm, and ground. The brains of the EAS are contained in its Windows 95-based software, which stores the five-gas and sensor readings while it simultaneously calculates and stores about a dozen other values, including air/fuel ratio, Lambda, and volumetric efficiency. It does this under all engine operating conditions: starting, idle, snap throttle, cruise, and deceleration. Once the values are stored, they can be played back frame by frame.

The EAS uses a specially-modified gas bench that enables it to take approximately 200 samples per minute. The EAS can detect the misfire of a single spark plug during snap throttle acceleration. The sample pattern shown in **Figure 1** at the top of this page was taken from a 1996 BMW 5-series. An erratic misfire would develop as soon as the CTS registered 11 degrees Celsius, and would go away once the engine was fully warmed up. The left hand part of the screen shows a pulsewidth irregularity just before the raw air/fuel readings start to climb and the by-products of ideal combustion start to plunge.

The basic hardware for the EAS is shown in **Figure 2**. A retrofit kit (**Figure 3**) is also available to convert any Andros-based exhaust analyzer (e.g.:

OTC, Bear) to an EAS.

The EAS software is updatable by using the CODA web site at: <[www.coda.com.au](http://www.coda.com.au)>.



Screen Capture  
Figure 1



EAS  
Figure 2



EAS Retrofit Kit  
Figure 3