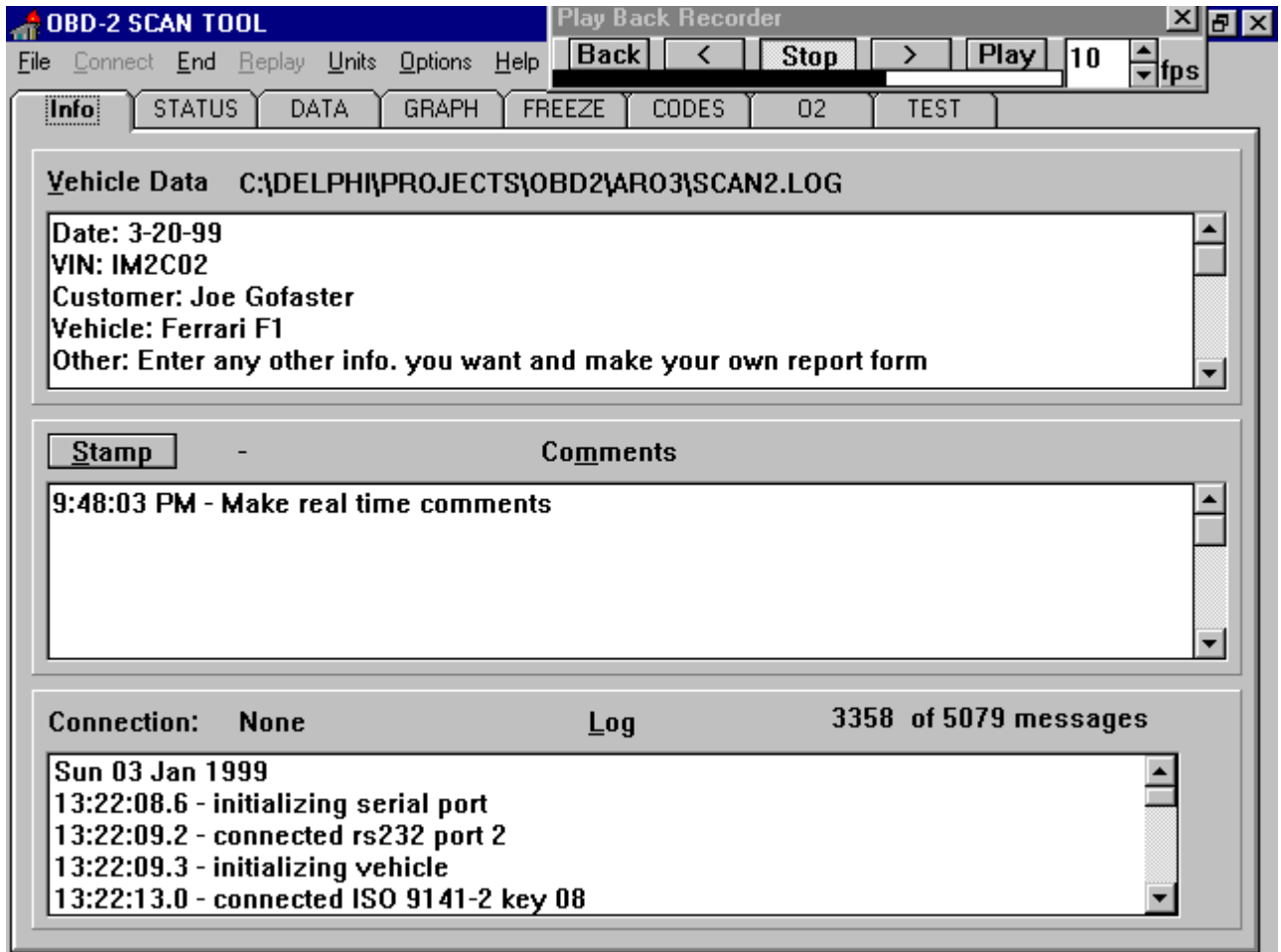


home page screen shot



The Vehicle Data memo provides any information needed to categorize your scans in a folder. You can make a specific template. The file is saved after each scan. Comments, log and message data are saved based on your scan session file name. The log file will report the protocols and keywords used to establish a connection and log-on information. The browser will continue to try to connect until terminated by user or connection established. Transcription errors and invalid vehicle domain requests are reported. A status light will report connection timeouts and vehicle server problems. The data memo, comment and log files are stored as text files. SAE protocol data bytes are stored in a binary VP2 (vehicle player level-2) format. Data can be exported as spreadsheet, database, html table.

Mode 09 Request Vehicle Information provides for Vehicle Identification Number(VIN) Calibration Identification Number(CIN) and Calibration Verification Number(CVN) The calibration numbers and verification are used for anti-tampering of vehicle emission software code. Some cars year 2000+ will support the mode 09 address request, and all cars in 2002. Verification can take several seconds depending on vehicle server encryption used and if engine is running. For GM vehicles selecting enhanced mode in

menu can be used to read and write the VIN to the selected server address number. A listing of server domain names can be found in menu-options-gateways-filters. Changing VIN can be helpful when installing or replacing equipment on the network. Note many VIN numbers will revert to original on a power loss.

vehicle status screen shot

The screenshot shows the 'STATUS' tab of the OBD-2 SCAN TOOL. The window title is 'OBD-2 SCAN TOOL' and it includes a 'Play Back Recorder' section with buttons for 'Back', '<', 'Stop', '>', 'Play', and a frame rate of '10 fps'. The main menu includes 'File', 'Connect', 'End', 'Replay', 'Units', 'Options', and 'Help'. The 'STATUS' tab is active, showing the 'Readiness status of supported diagnostic test evaluations as of: 12:06:03 A' and 'Mode \$01 PID \$01'. A green checkmark and 'Update' button are present. The 'MIL commanded on' is 'YES' and the '# of Codes' is '1'. The 'Continuous monitoring complete?' section shows 'Misfire : YES', 'Fuel system : YES', and 'Comprehensive component : YES'. The 'non-continuous monitors complete ?' section shows 'Catalyst : NO', 'Evaporative system : NO', 'Oxygen sensor : NO', and 'Oxygen sensor heater : NO'. There are checkboxes for 'update period' (set to 10 sec) and 'result alarm'. The text 'Recieved from Engine Controller address \$10' is displayed. At the bottom, there is a 'Clear' button with a green arrow icon, 'Mode \$04 Clear/Reset Emission-Related Diagnostic Information', and a 'Last Clear' time of '00:00:00.0 ET' with a '0.0 sec' timer.

OBD-2 SCAN TOOL Play Back Recorder

File Connect End Replay Units Options Help Back < Stop > Play 10 fps

Info **STATUS** DATA GRAPH FREEZE CODES O2 TEST

Update Readiness status of supported diagnostic test evaluations as of: 12:06:03 A Mode \$01 PID \$01 **History**

MIL commanded on : **YES**

of Codes : **1**

Continuous monitoring complete?

Misfire : YES
Fuel system : YES
Comprehensive component : YES

non-continuous monitors complete ?

Catalyst : NO
Evaporative system : NO
Oxygen sensor : NO
Oxygen sensor heater : NO

☐ update period 10 sec ☐ result alarm
(idle 5 sec)

Recieved from Engine Controller address \$10

Clear Mode \$04 Clear/Reset Emission-Related Diagnostic Information

Last Clear : 00:00:00.0 ET 0.0 sec

?

Mode 01 Parameter IDentification 01 message request reports if your Malfunction Indicator (check engine) Light (MIL) is turned on, the number of Diagnostic Trouble Codes and the completion of vehicle component testing. The listed parts and systems can be either continuously or non-continuously (only during specific vehicle operation) monitored to finalize a test grade. The monitoring of a test can take from 1 ms to several days depending on the test and your driving. To pass state inspection your MIL must be off and for most cars all monitoring of tests completed and ready to determine MIL status and trouble codes. Any changes in status are recorded and time stamped in the history list. If the result alarm is on, this page will be automatically opened for your viewing pleasure. You can also select an automatic download request based on an update period. With a ISO-9141-2 connection this browser uses Mode 01 PID 01 as a default request to prevent disconnection by the vehicle server if you are idle over 5 seconds. When a message is received you will be notified of the assigned domain name and SAE address. You will also get separate notification and data listings if multiple sites respond to your request.

Mode 04 will allow you to connect to your vehicle's main server and erase all diagnostic files. No password is required but you will be prompted to make sure you want to do this. If on, the check engine MIL light will be extinguished, trouble codes will disappear, all testing can be aborted and declared incomplete, with monitoring restarted. Note it can take several days to monitor and complete a final exam depending on the way you drive. Do not press this button if you have an appointment with an enhanced inspection station within 48 hrs.

For Volvo you can reset and turn off maintenance interval lights. After performing recommended service, press enhanced in main menu, when not normally connected, to establish a private secession.

Real time data selection grid screen shot

OBD-2 SCAN TOOL Play Back Recorder

File Connect End Replay Units Options Help Back < Stop > Play 10 fps

Info STATUS **DATA** GRAPH FREEZE CODES O2 TEST

SEND Stop MOVE **Mode \$01 – Current Powertrain Diagnostic Data**

PID	Data	Unit	Time
\$00 PID SUP(\$01-\$20)	SUP		12:06:03 A
\$01 OBD STAT	Status		12:06:03 A
\$03 SYS STAT	N/A CL O	-	12:14:30 A
\$04 LOAD	32.5	%	12:14:30 A
\$05 ECT	207	F	12:14:30 A
\$06 SHRT FT 1	-1.56	%	12:14:30 A
\$07 LONG FT 1	3.13	%	12:14:29 A
\$0C RPM	1469.50	r/min	12:14:29 A
\$0D MPH	52	mph	12:14:29 A
\$0E SPARK ADV	26.0	deg	12:14:29 A
\$0F IAT	113	F	12:14:29 A

\$07 Long term fuel trim-Bank 1 was 3.13 percent = rich

Recieved from Engine Controller address \$10

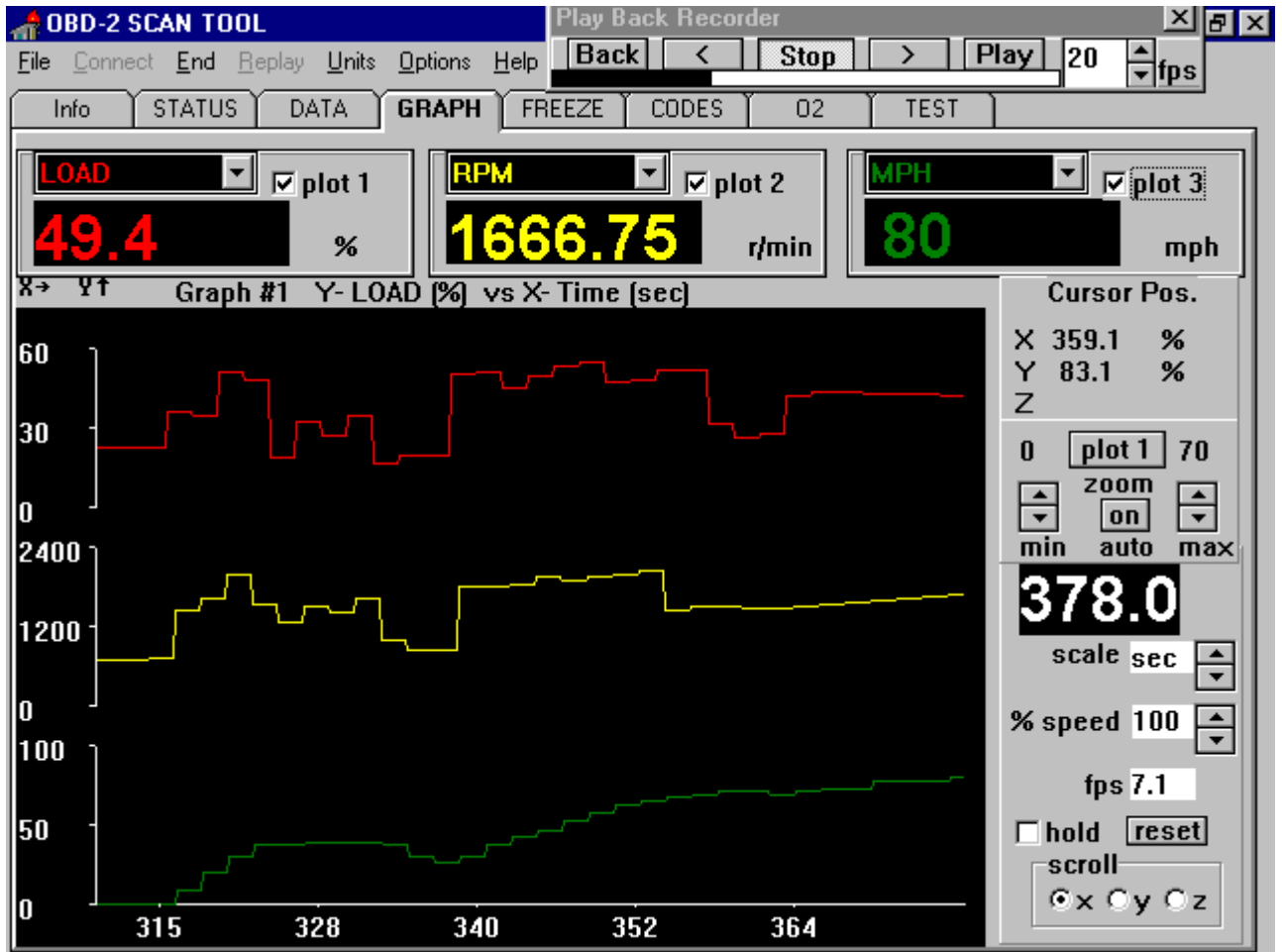
Freq. (Hz)
0.0

This is Mode 01 for continuous real time data. You can make a request to send all data sequentially or any combination of individual content, by selecting(highlighting) a item and pressing send. A listing of supported vehicle data to view can be found by requesting PID 00. You can also view all 255 mode 01 allocated data names, that could have vehicle support. A full description is shown for the current selected item, below the data grid. All data is time-stamped and stored. The frequency meter indicates the data acquisition speed in Hz (data points per second). For SAE J1979 data the O2 sensor and corresponding short term fuel trim is sent in packets, thus arriving at the same time. The maximum legal SAE acquisition speed is 10 Hz. per request. Speed is adjustable in menu-options-gateway-protocol in units of milliseconds delay for a response between requests. Some networks will respond within 25 ms allowing acquisition rates to 40 Hz depending on speed of the browser computer. Note: acquisition time is also dependent on other vehicle computers using the network, if your vehicle has a large number of computers on line, acquisition times will be reduced(under 10 Hz) and sporadic. Note: ISO protocol is slower(under 10 Hz), and indo-3 router is limited to 10 Hz.

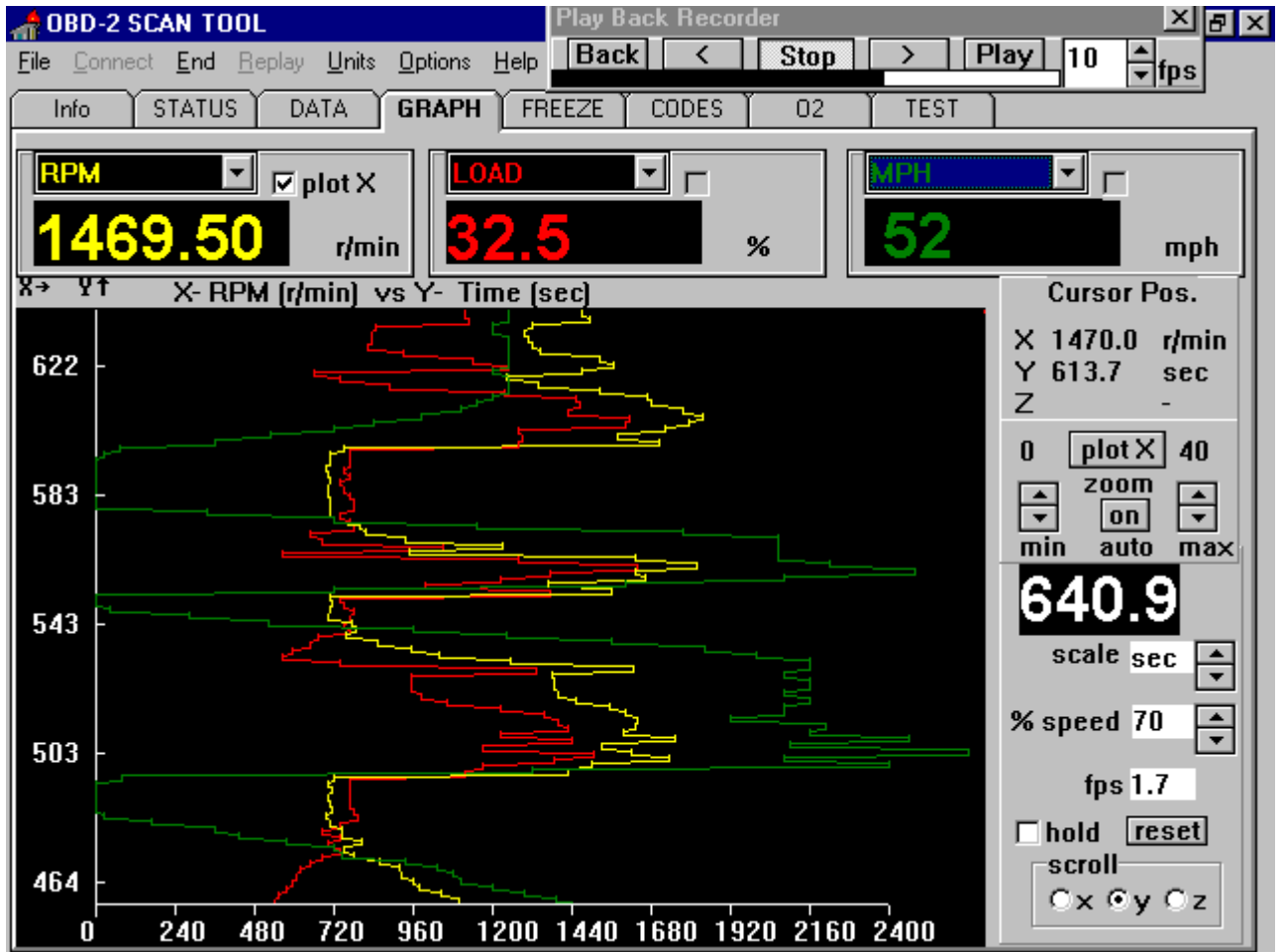
Units can be changed in real time for all data SI metric or English with time stamp as data pt, seconds minutes, hours or hh:mm:ss in menu-units. If enhanced real-time data is available for your car, pressing menu-enhanced will open a similar data grid display. Selecting audio will produce a low to high frequency sound representation of the data value, using the PC speaker(not available for win 2000 or NT).

The statistical analysis (stat) panel provides average, minimum, maximum and absolute range difference between the maximum and minimum of the selected data item with time stamp. The rate will give current increase or decrease of data per second. Rate maximum will show fastest rise, rate minimum fastest drop. Frequency, and period (T) in seconds or calculated on repetitive cycling time varying signals. Peak to Peak(P-P) is the absolute difference between maximum and minimum of the repetitive signal. The elapsed time (ET) stop watch panel has dual triggers for positive (increasing) and negative (decreasing) set points. The selected data timer will start when the start data value is obtained, stop when stop value is obtained then list lap time between the points and a split time stamp reading.

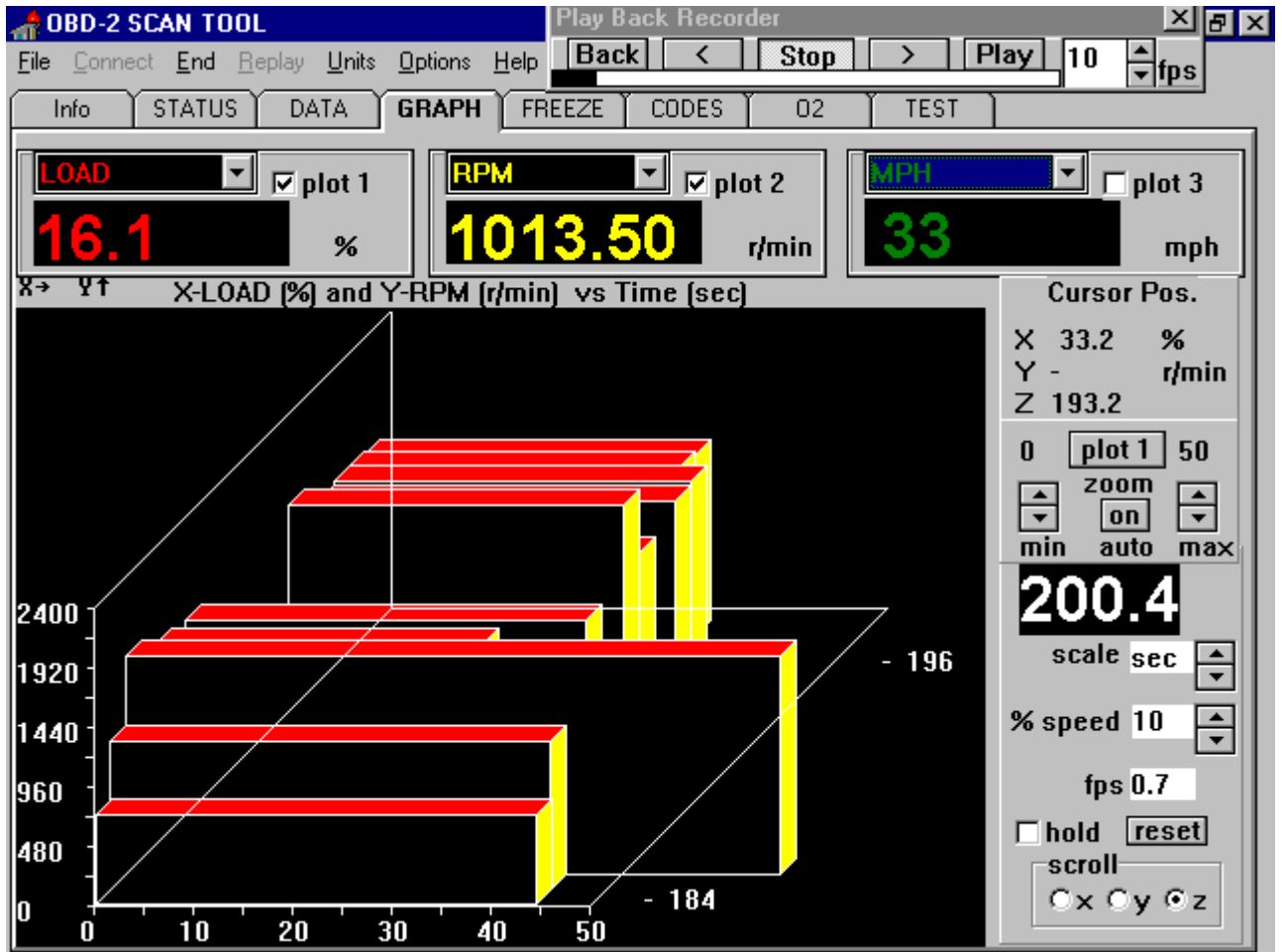
X-axis scrolling graphs screen shot



Y-axis 32 pin strip chart screen shot



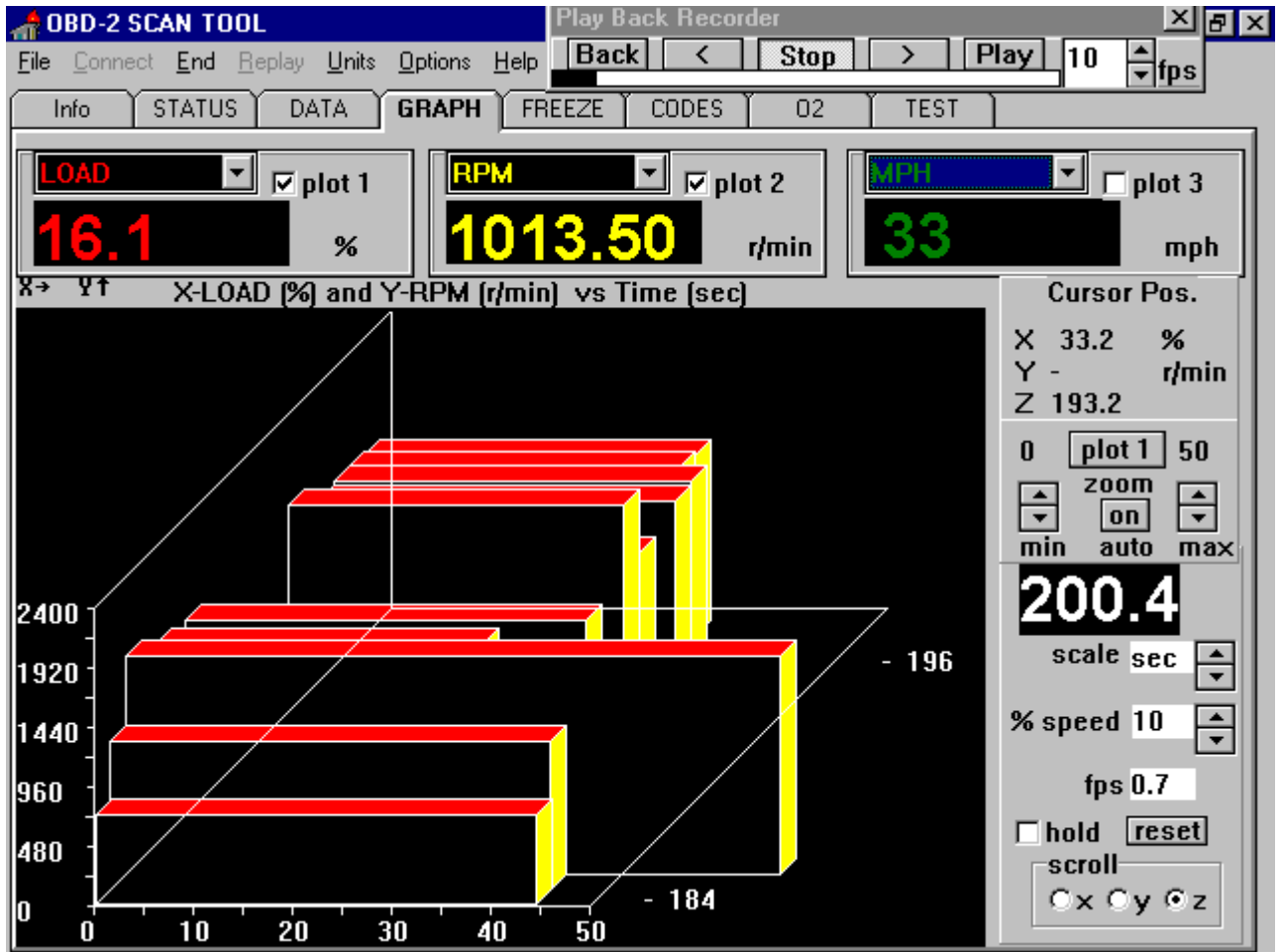
3-D scrolling graph screen shot



These graph pages provide different viewpoints for real time data analysis. The X-axis graph page contains 3 individual multi pen graphs that scroll based on time from right to left. The Y-axis graph is a conventional 32 pen strip chart. The 3-D graph plots two variables as a function of time.

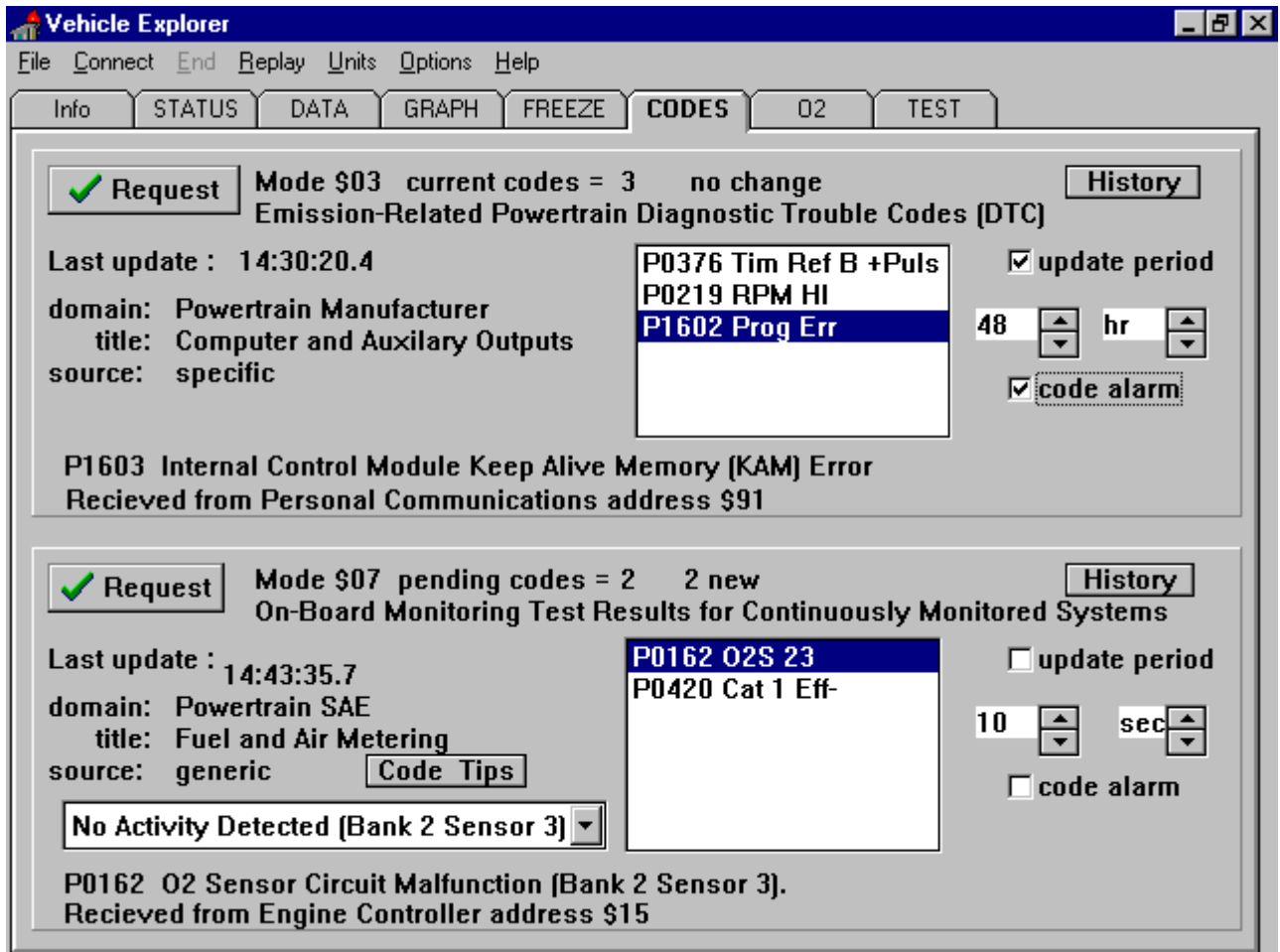
Common to all graphs is a control panel and 3 digital panel meters. The control panel provides a scaled mouse position display, an auto or manual 10 power zoom scaling control, and selection of the time base time units, and time reset. The panel meters allow selection of current axis labels and data to plot. Pen, meter, axis and background colors and pen width can be changed in real time using menu-options-color.

Freeze Frame data screen shot



When an emission related diagnostic trouble code is set, real time data is recorded marking the event, thus you can see the actual running parameters of your vehicle when the malfunction occurred. There are 256 frame numbers available 0-255. Frame 0 is assigned for regulated mandated data. Frames 1-255 can be used for other purposes. Some vehicles use these frames for additional time based fail records before the finalized test period is complete.

Diagnostic Trouble Codes screen shot



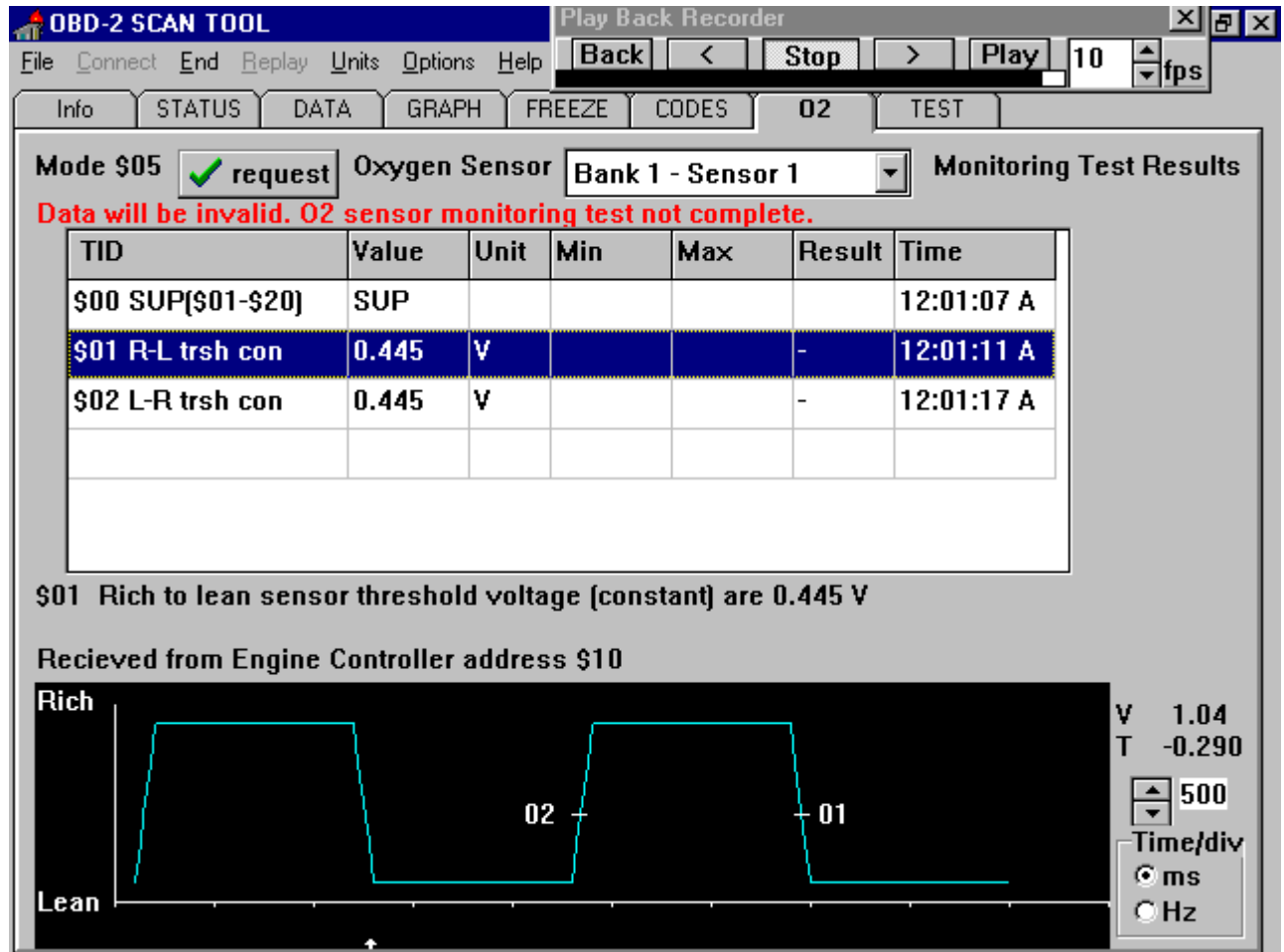
Trouble codes are assigned an alphanumeric identifier, a short acronym and a full descriptive name. The alpha descriptor references the server domain: P=Powertrain, C=Chassis, B=Body, U=Network. The 1st digit identifies the site author, 0=SAE, 1, 2, 3 is by the manufacturer or reserved. The 2nd digit references the code group title, for a powertrain server: 1, 2=Fuel and Air Metering, 3=Ignition System or Misfire, 4=Auxiliary Emission Controls, 5=Vehicle Speed, Idle control, and Auxiliary Inputs, 6=Computer and Auxiliary Outputs, 7, 8=Transmission 9,0=reserved or determined by SAE. The last two digits 00-99 define the actual body of the message. The site author has the option to use a specific source code or a generic source descriptor in the message. This browser will identify a generic message and provide a list of additional code tips. Note: sites authored by manufacturers are strongly encouraged to use the same titles as SAE. If a manufacturer code is not listed in the browser library, it will cross reference the source code to SAE.

Mode 07 will provide a mid term test grade for continuously monitored systems. If a device fails the first test, the code will be listed, and the device will be given another

chance to pass by taking the test over. If it again fails the makeup test, it will be reported in the Mode 03 list of trouble codes and the MIL light will be commanded on.

This page also provides for automatic requests for trouble codes, and an alarm if any codes have been cleared or added by the vehicle controller. The history list provides a listing of past transactions. The number of codes and if any were added or deleted for the current request is indicated above each list.

Oxygen sensor data screen shot



This page provides your oxygen sensor output characteristics and test results, with limits listed in a time stamped grid and a voltage output vs time scaleable graph. You can select your available sensors for location and viewing. There is a warning message if any test is not complete. Note, not all vehicles will support O2 sensor test results as is optional per regulations. If no support, the results must be included in Test results described next.

Test results screen shot

OBD-2 SCAN TOOL Play Back Recorder

File Connect End Replay Units Options Help Back < Stop > Play 10 fps

Info STATUS DATA GRAPH FREEZE CODES 02 TEST

Mode \$06 – On-Board Monitoring Test Results for Non-Continuously Monitored systems

✓ 1-SEND **Test Results could be invalid. One-Trip Monitoring Tests not Complete**

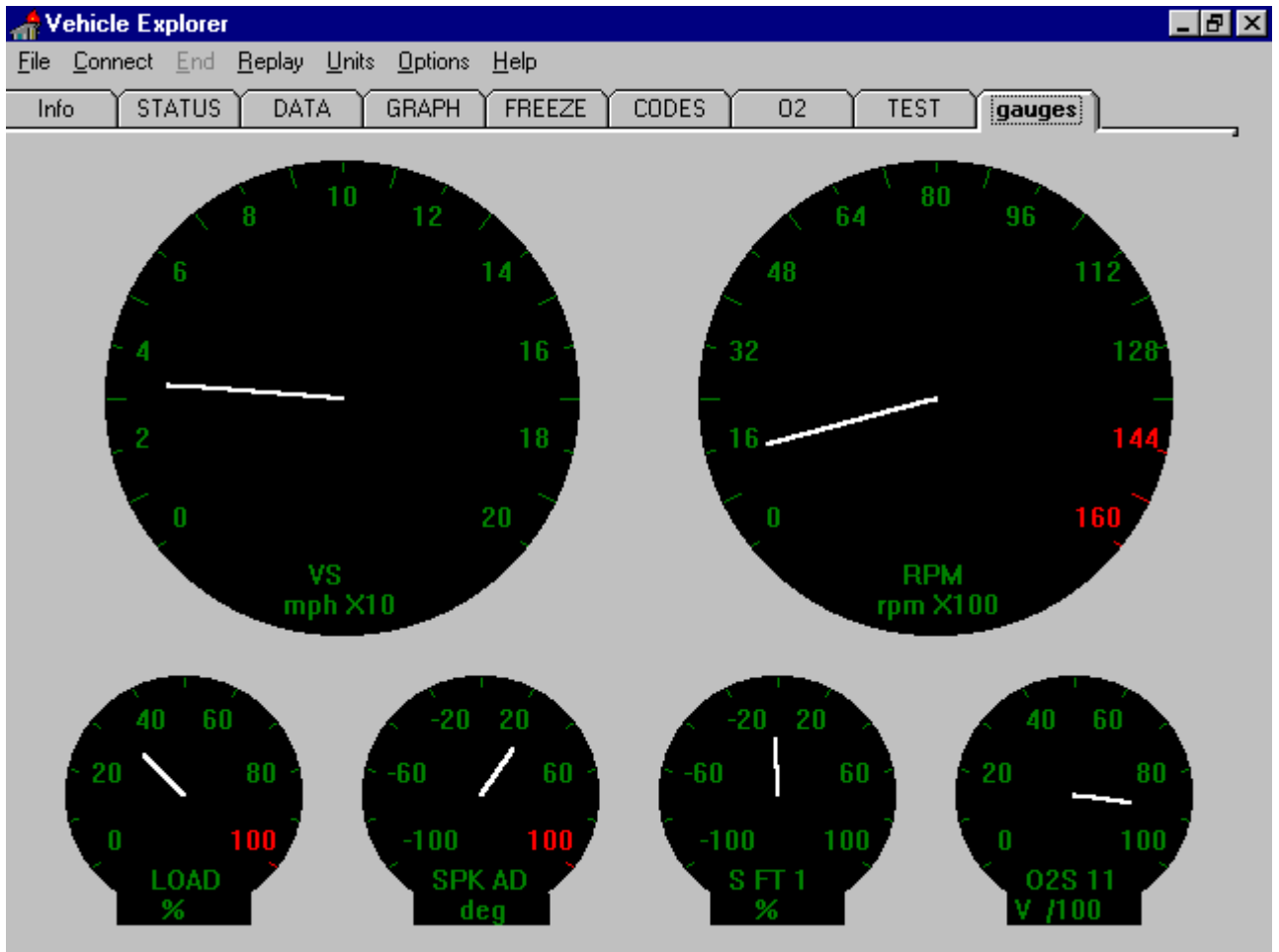
TID	CID	Value	Unit	Min	Max	Result	Time
\$00 TEST SUP{\$01-\$		SUP					12:01:43 A
\$01 MANUF DEF	\$11	0			214	PASS	12:01:44 A
\$02 MANUF DEF	\$11	0			22	PASS	12:01:44 A
\$03 MANUF DEF	\$11	0			29	PASS	12:01:44 A
\$04 MANUF DEF	\$01	92		0		PASS	12:01:44 A
\$04 MANUF DEF	\$02	92		0		PASS	12:01:44 A
\$05 MANUF DEF	\$01	72		0		PASS	12:01:44 A
\$06 MANUF DEF	\$01	113		0		PASS	12:01:44 A
\$11 MANUF DEF	\$11	65535		24		PASS	12:01:45 A

\$04 values defined by manufacturer for component \$01 are 92 with minimum limit of 0 has PASSED

Recieved from Engine Controller address \$10

This page provides test information on various components that are not tested continuously, but only during certain operational times and conditions. Results will report a minimum and or maximum range of values and a pass or fail grade. One test can be given to a class of components (such as all O2 sensors). Each component will have an ID number. There is a warning message if any test is not complete, and possible incorrect data. Note the supported test type request is optional for this mode. To find out all available tests select the all possible listing. Note this data is manufactured defined and most manufactures to not provide definitions. Possible that data over 32767 is represented in some type of negative notation, and the result would then pass. In menu units you can select various negative number formats. For Ford vehicles you can download Defined Ford test results file which will provide definitions, units and scaled results.

Dash board screen shot



There are two 4 inch and four 2 inch diameter gauges. All gauges conform to OBD2 range specification. For example the tachometer is 16 bit providing a range to 16,000 rpm with a resolution of 0.25 revolutions. You have a choice of selecting 22 different gauges. To set minimum, maximum and red lines, click on the gauge. For example the tach can have a range of 0-1600 or 6000-8000, or both high and low range gauges. Selectable colors are available for needle, numbers and face plate.