

17 00.06.03 00.45.27 00.03.02 00.0



51 00.08.62 00.08.63 00.08.64 00.08.65 00.08.66

Prodigy-ET

Automated Test Control



Contents

1	Introduction
1	User Access & Security
2	Display Builder
3 - 4	Test Sequences
5 - 6	Data Logging
7 - 8	Alarms
9 - 10	Trending
11 - 12	Reporting Tools
13	Calibration
14	Slang
15	Hardware & Connectivity
16	Distributor Network

Introduction

Tried and Tested Solution

Building on the widely used Prodigy package, Prodigy-ET is an integrated suite of software for automatic test control and data collection. Running on a single PC under Microsoft Windows XP® and Vista® in its simplest form Prodigy-ET combines the benefits of low cost, industry standard hardware with a modern software package that is simple to use and flexible enough to handle the most complex test procedures.

Applications

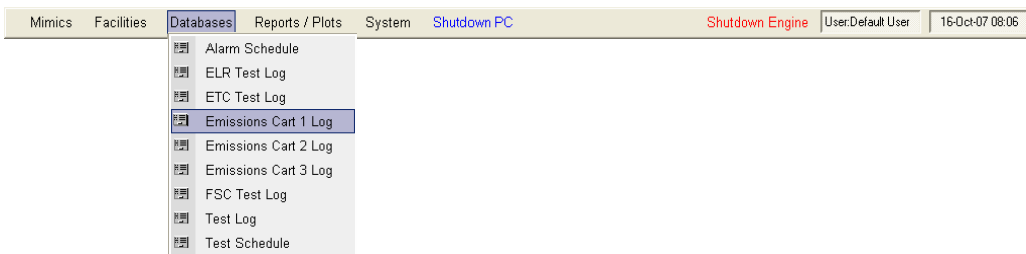
Working closely with our customers, Prodigy-ET can be supplied pre-configured for many different applications including: engine test cells; component test rigs; gearbox, axle or clutch test rigs; and rolling road test systems.

About This Document

Prodigy offers a huge range of facilities, the details of which are beyond the scope of this document. The aim here is to give an overview of the main features and facilities that comprise a Prodigy-ET system.

User Access & Security

Prodigy makes it easy for the user to find the facilities they need. Its configurable menu system provides direct and secure access not only to Prodigy facilities but also to other Windows™ applications.



User Access

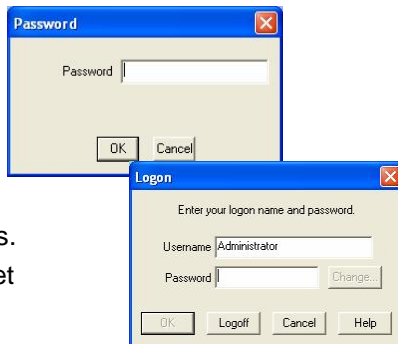
Navigating around Prodigy-ET is simple. Using the built-in graphical editor the menu layout can be fully configured, with multiple levels, and can be used to launch not only Prodigy components but also any Windows application used by a customer, for example, an ECM Calibration Tool.

Security

Two levels of security are built in to Prodigy-ET systems:

- Simple password control where users enter a password to gain access.
- User privilege control where users log on and their access is then governed by their assigned privileges.

Prodigy's security mechanisms have been designed to meet the strict requirements of FDA 21 CFR Pt 11 and GAMP.



Facilities

- Fully Configurable Displays
- Automatic Control
- Up to 50Hz Log Rate
- Alarm Monitoring
- Emergency Shutdown
- Data Logging
- Trend Graphs
- Customised Reports
- Versatile Graph Tools
- Unmanned Running
- Calibration Traceability
- Multiple PID Control
- Post Mortem Log
- Derived Calculations
- Manual Data Capture
- Network Access

Applications

- Engine Testing
- Development
- End Of Line
- QA
- Cold Test
- Gearbox/Axle Rigs
- Rolling Road
- Component Testing
- Clutch Test Rigs

Access & Security

- Quick Access
- Password Protection
- User Logon
- Simple To Use
- Graphical Configuration

Display Builder

Prodigy Display Builder is an object oriented graphics package that allows you to interactively design an operator interface that is both intuitive and visually appealing.

Operator Interactions

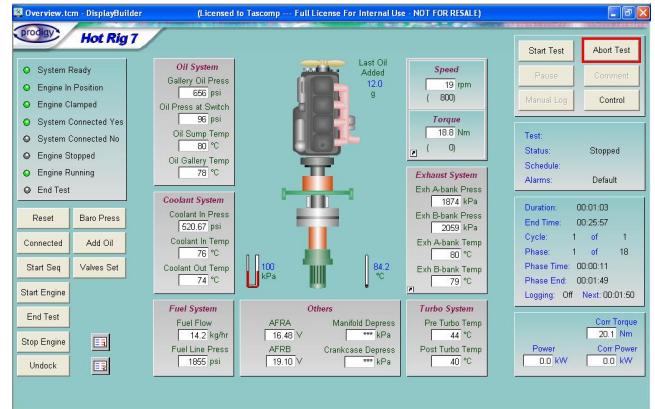
Typically an overview display is configured to provide a simple interaction for an operator, showing the current status of all key signals and providing buttons to start and stop the test sequences.

Graphical Configuration

Any number of displays can be created with the graphical configuration tool, and each time a display is created it will automatically appear on the menu bar for the operator.

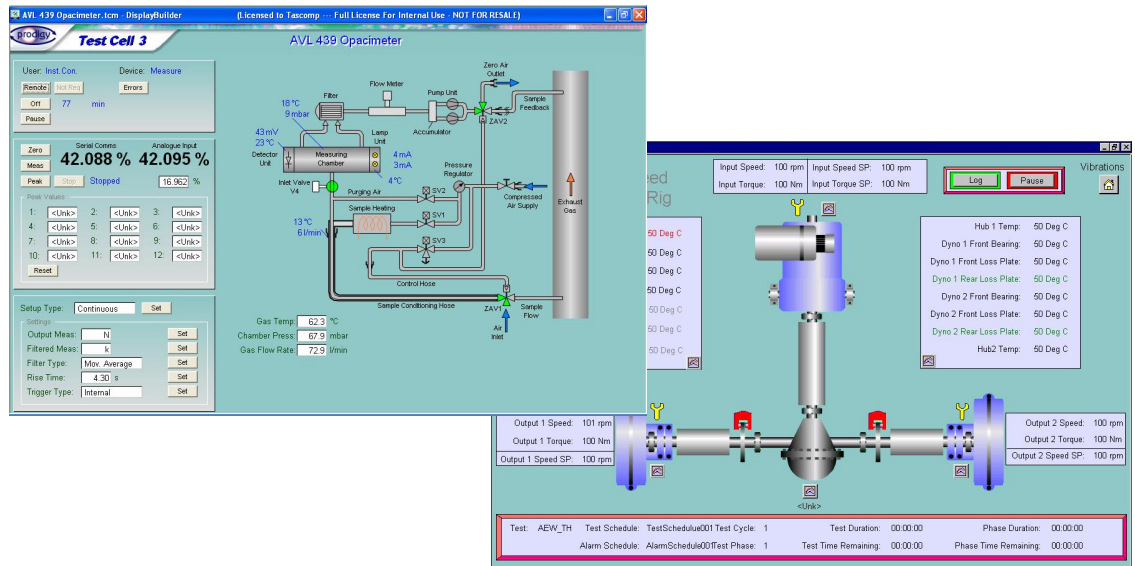
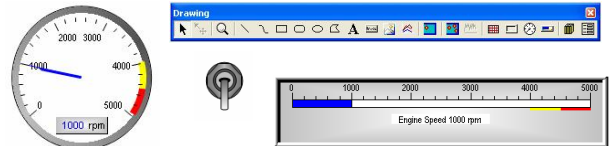
Object Library

More complex objects are available through the built in library and can be simply dropped onto your displays.



Dynamic Attributes

A whole range of dynamic attributes can be assigned to an object (size, position, fill, colour, line colour, %fill ...).



Designed for Real Use

Displays can be created to match the way operators work, with individual displays for different items of equipment and links between them to make interacting with the system even easier.

Display Builder

- Unlimited Displays
- Easy Graphical Configuration
- Object Library
- Link Displays

Object Attributes

- Size
- Colour
- Orientation
- Vector Text
- Anti-aliasing
- Load Configuration
- Load Xform
- Set Value
- Define Alarms

Dynamic Attributes

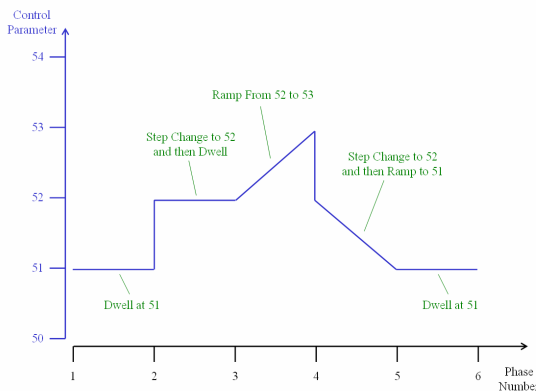
- Size
- Horizontal and Vertical Position
- Clockwise and Anti-Clockwise Rotation
- Text Colour
- Line Colour
- Fill Colour
- Flashing
- Up, Down, Left and Right Fill Level
- Visibility

Test Sequences

Prodigy-ET makes complex test sequences look simple giving operators and engineers easy selection and configuration interactions.

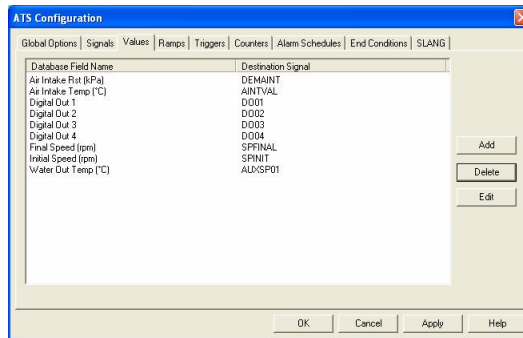
Automatic Test Sequences

Test sequences can be defined in terms of a number of stages, each of which will last an amount of time and will result in a change of control conditions, for example, a temperature setpoint being increased. Prodigy-ET refers to each stage as a phase and groups of phases can be combined into a test schedule which can then be repeated any number of times.



ATS Configuration Tool

The Automatic Test Sequencer (ATS) provides an easy to configure rule based mechanism that defines how the Test Schedules link with the controlled variables. This may be by causing a ramp between two conditions, turning a signal on or off, step changing and then holding in a defined condition, etc.



Defining Test Schedules

A simple spreadsheet style form is all that is used to create or modify a Test Schedule. The columns available will be configured to match the system requirements. They may include: the phase length; data logging points; an early phase end (when defined conditions are met); required controller setpoints; initial ramp values; final ramp values; control modes; specific alarm limits; auxiliary output settings; and relay output states.

Phase	Length	Log Interval	Initial Engine Speed (rpm)	Final Engine Speed (rpm)	Auxiliary Demand	Alarm Schedule	Log Check
1	30s	25s	1000	1500	10	Startup	<input type="checkbox"/>
2	2m	1m 55s	1500	1500	15		<input checked="" type="checkbox"/>
3	2m	1m 55s	2000	2000	10		<input checked="" type="checkbox"/>
4	5m	2m 45s	2000	3000	10	High Speed	<input checked="" type="checkbox"/>
5	2m	1m 55s	2000	2000	15		<input type="checkbox"/>

Automatic Testing

- Simple Operator Interactions
- Rule Based Configuration
- Spreadsheet Style Test Schedules

Test Schedules

Can Define:

- Phase Length
- Data Logging Points
- Conditional Phase Ends
- Controller Setpoints
- Ramp Conditions
- Control Modes
- Alarm Schedules
- Auxiliary Outputs
- Relay Output States

Standard Emissions Test Cycles

Including:

- European Stationary Cycle (ESC) Test
- European Load Response (ELR) Test
- European Transient Cycle (ETC) Test
- US Heavy Duty Federal Test Procedure (FTP) Test
- US Ramped Mode Cycle (RMC) Test
- Japanese JE05 Emissions Test Cycle
- Nonroad Transient Cycle (NRTC) Test
- Millbrook Transient Test

Starting a Test

- Simple Form Entry
- Enter Test Details
- Enter Number of Phases
- Enter Number of Cycles
- Enter Starting Phase
- Enter Starting Cycle
- Enter Starting Conditions

Central File Servers

- Single Location for Test Schedules
- Holds All Test Results
- Can Show Current Status of All Systems

Unmanned Running

- Automatic Progression
- Changes Test Details at Start of Each Test
- Only Continues When Previous Test Completes Successfully

Starting A Test Sequence

Starting an automatic test is also an easy procedure. In its simplest form an operator only needs to select the Test Identity (to log data points to), and identify the Test Schedule being used.

More complex tests will include Start Test forms that ask for other information from the operator such as a Part Number or the number of times to cycle through the Test Schedule.

Central File Servers

Where multiple Prodigy-ET systems are used, it is often essential that each one will run exactly the same version of a Test Schedule. Therefore, Prodigy-ET can also employ a central File Server that acts as a repository of Test Schedules. When an operator wants to start a test the Test Schedule is automatically selected from the central File Server and copied onto the requesting Prodigy-ET system. Likewise, logged data that is collected during the course of a test is transferred in the other direction, thus providing a central point of access for all test data.

Batched Tests and Unmanned Running

Prodigy-ET also allows a series of tests to be batched together and run automatically without the need for manual intervention. As long as the tests are run successfully, each time one finishes the next one in the list will start, until all have been completed. In the event of a failure, the operator will be informed of the problem and the whole test sequence will be stopped.

Test No	Test Type	Test ID	Auxiliary File	Test Schedule	Alarm Schedule	Start Phase	Start Cycle	Total Cycles	Start Duration	Frequency
1	Std Auto	Test 1		Schedule 1	Default	1	1	10	0s	
2	Std Auto	Test 2		Schedule 2	Default	1	1	1	0s	

All information that is common to every test is entered by the operator in a 'header' section, as are parameters such as the starting test number and the ending test number. Then each individual test is defined in the grid section with its own specific parameters, such as: its Test Identity (to log data points to); the required Test Schedule; the number of times to repeat the selected schedule; and the alarm limits to use.

Pausing or Stopping A Test Sequence

Tests can be paused by an operator, so that a particular measurement can be checked or an adjustment made, by simply clicking on a button. Once the checks have been completed and the button reset, the test will be resumed from its previous point.

When a test is complete an automatic shutdown sequence can be employed to ramp the test parameters down until they reach a safe, stopped, state. This mechanism can also be triggered by an operator at any point during a test, by clicking on a button on a display or on the menu bar.

Data Logging

Prodigy-ET is designed to log all information relating to a test into an individual test log database, making it easy for an engineer to copy and then analyse the data at their desktop.

Database Formats

Prodigy-ET records all data relating to a test into either a Microsoft Access or SQL Server database. Each database consists of a set of tables, one for each type of data: the Test Header table contains one-off information; the Test Log table contains the logged data points; and the Test Commentary table contains any automatically generated or manually entered comments.

Each aspect of this data can be isolated and used on printed reports and plots, can be reviewed on Prodigy's xforms, and can be loaded into Microsoft Excel by an engineer.

Test Header Information

When an operator starts a test all the information they provide, such as the Part Number being tested, is added into the Test Log database. The time that the test is started and any pre-defined 'start conditions' for example, the ambient temperature, are also automatically added in.

On completion of the test the one-off header information is augmented with another set of data, including the time that the test finished, and any parameters monitored throughout the test such as the maximum pressure achieved.

The screenshot shows a 'Test Log Viewing' dialog box with multiple sections for data entry. The 'Test' section includes fields for Test ID, Start/End times, and Cell number. 'Engine Details' includes Engine Model, Serial No., CPL Number, Swept Volume, No. of Cylinders, Rated Power, Aspiration, and Fuel Type. 'Injector Details' includes Injector Type, Part Number, Configuration, and other details. There are also sections for 'Calculations' and 'Test Notes'.

Test Log Data

The ETLogger facility is used to record snap-shots of data into the Test Log table at defined points of time. These points are typically configured as part of a Test Schedule (the Log Interval) but ETLogger can also be manually triggered by an operator (through a 'Manual Log' button on the main display) to record test data. For each set of test data recorded, ETLogger also stores the current timestamp (in milliseconds), the type of data, for example, Automatic or Manual, and the position in the test sequence (the phase and cycle numbers).

This screenshot shows the 'Test Log Viewing' dialog box with a table of test log records and a control panel. The table has columns for Log Type, Time, Fractional Time, Duration, Phase, Torque, Speed, Fuel Rate, AVL Smoke, and Peak Cylinder Pressure. The control panel includes buttons for Start Test, Abort Test, Pause, Comment, Manual Log, and Control. The test ID is 12_FFBox_41123 and the status is Running.

Log Type	Time	Fractional Time	Duration (s)	Phase	Torque (Nm)	Speed (rpm)	Fuel Rate (kg/hr)	AVL Smoke (FSN)	Peak Cylinder Pressure (bar)
Manual	27/02/2007 08:47:07	0.306	2.11	1	1072.5	801.2	59.28		24
Manual	27/02/2007 08:47:08	0.306	3.31	1	546.2	879.2	59.29		24

Database Formats

- Microsoft Access Databases
- SQL Server Databases
- Test Header Table
- Test Log Table
- Test Commentary Table

Test Headers

- One-off Test Information
- Start Time
- End Time
- Test Schedule Name
- Start Conditions
- End Conditions
- Overall Test Statistics

Test Logs

- Automatic / Manual Types
- Steady State / Transient Types
- Millisecond Timestamps
- Current Phase
- Current Cycle Number
- Snap-shot Values

Transient Test Data

Systems can also be configured to capture transient test data where a set of parameters are recorded at a much higher speed over a state change from one set of conditions to another. Typically this results in a data set of a few minutes with recordings every 10 to 50Hz. This type of data recording can be automatically triggered as part of a Test Schedule and can also be manually requested by an operator. The resulting points can then be viewed and reports generated in the same ways as for the standard test data.

Test Commentary

The Test Commentary provides a step by step description of the test run. Comments are automatically added at the start and end of the test, if the test is paused and later resumed, if an alarm limit is exceeded, when an alarm is acknowledged by an operator, if a controlled or emergency shutdown sequence is run, and if an operator manually enters a comment. Each is timestamped to the nearest millisecond and can be reviewed alongside the recorded test data.

Test Comment Records (1 of 7 records)	
Time	Comment
29/04/2008 13:19:26	Automatic test started
29/04/2008 13:47:41	Test complete
29/04/2008 13:47:43	Controlled shutdown started
29/04/2008 13:47:44	Shutdown is initiated
29/04/2008 13:48:49	Controlled shutdown complete

Additional Data Sources and Derived Calculations

Once a raw data set has been recorded it can be processed to combine it with any additional data sources, such as auxiliary parameters (for example any parasitic losses) or secondary recording systems such as emissions analysers. Once a complete data set has been produced it can then be further processed to add in any required derived calculations. These might be simple calculations such as the power at the recorded point, or can be more complex such as a regression analysis. The results of these calculations will then be added into the Test Log database and will then be available for use on printed reports, plots etc.

Time	Test	Cyc	Ph	rpm	Trq	Pwr	Fuel			Water			Oil			Int	Xover		
							Rate	BSFC	Temp	Pr	Del	In	Out	Pr	Temp			Pr	B-B
hrs	No	No	No		Nm	kW	kg/hr	g/kWh	°C	kPa	mm3	°C	°C	kPa	kPa	°C	°C		
13:23	0.065	1	1	699	23.7	1.7	1.0	561	40	4	9.2	79	82	68	97	112	-0.1	25.3	40
13:25	0.099	1	2	1479	1090.2	168.8	33.1	196	41	6	148.3	73	82	117	104	258	0.3	26.2	147
13:27	0.132																		

Air Mass Flow = $0.3685 \times k_0 \times \sqrt{\Delta P} \times \sqrt{\frac{(WBP - 0.38 \times VP - RST)}{(IAT + 273.15)}}$

Phase	Speed (rpm)	Weighting Factor	Parasitic Power Additions (kW)	Parasitic Power Subtractions (kW)	WCA
1	749	0.150	0.000	0.000	0.000
2	1451	0.090	0.000	2.130	
3	1828	0.100	0.000	3.230	
4	1828	0.100	0.000	3.230	
5	1451	0.090	0.000	2.130	
6	1451	0.090	0.000	2.130	
7	1451	0.090	0.000	2.130	
8	1828	0.090	0.000	3.230	
9	1828	0.100	0.000	3.230	
10	2226	0.090	0.000	4.580	
11	2226	0.090	0.000	4.580	
12	2226	0.090	0.000	4.580	
13	2226	0.090	0.000	4.580	

Transient Tests

- Data Rates of 10 to 50Hz
- Log to Existing Test Log Database
- Triggered to Capture Phase Changes
- Manual or Automatic Triggers

Test Commentary

- Start Time
- Pause / Resume
- Alarm Conditions
- Event Messages
- Operator Comments
- Shutdown Type
- End Time

Additional Data Sources

- Emissions Data
- Auxiliary Parameters
- Parasitic Losses

Derived Calculations

- Any Number of Calculations
- Adds to Existing Test Log Table
- Adds to Existing Test Header Table
- Performed on Central Server in Multi-System Configuration

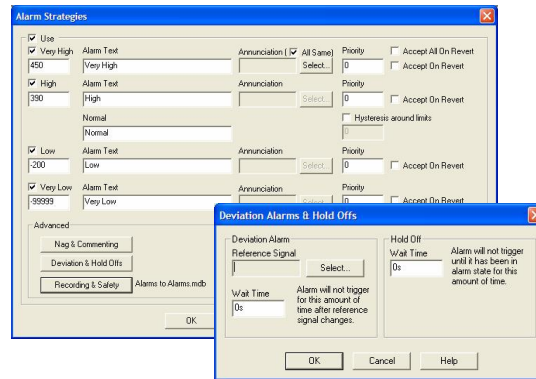
Alarms

Prodigy-ET provides sophisticated alarm monitoring, reporting and logging facilities that enable operators to react quickly to problems arising and to analyse faults over any given time period.

Alarm Strategies

Individual alarm strategies can be applied to every signal, be it an input, output or a calculated value.

These include the ability to define the alarm text used on the displays and in the historic logs, the levels at which different alarm conditions occur, a requirement for an operator to enter a reason for an alarm before being allowed to accept it, hysteresis levels, and hold off periods in the event of a signal moving in and out of an alarm condition too frequently.



Alarm Notifications

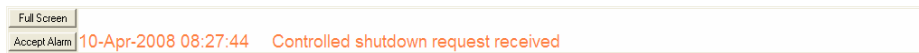
If a signal exceeds the alarm levels defined for it an operator can be notified in a number of different ways. This may include simply flashing the alarm message on a banner, triggering a beacon or siren, sending an SMS text message, or emailing the notification.



The alarm banner is a two line display, permanently displayed that shows messages chronologically or according to their defined priorities. The lower line being used for unaccepted alarms and the upper line for accepted alarm messages that are still active.

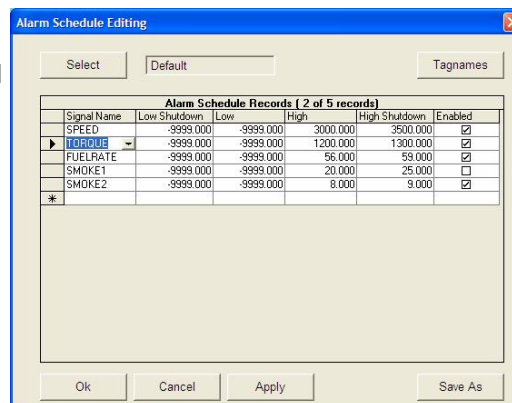
Event Messages

The alarm banner can also be used to display non-critical information to the operator during a test, such as manually triggered events, for example, the request for a smoke reading.



Alarm Schedules

Sometimes different alarm limits need to be applied at different times throughout a test, and at other times the alarms may need to be disabled altogether. These can be applied individually but Prodigy-ET also provides a facility to group together a set of alarm conditions into an Alarm Schedule. Different Alarm Schedules can then be loaded at different points during the test and when a test is complete and the rig has stopped, any alarms can be disabled through use of a default schedule.



Alarm Strategies

Can Define:

- Alarm Levels
- Annunciators to Trigger e.g. Beacons and Sirens
- Priorities on the Displays
- Nag Periods
- Operator Comments
- Hysteresis Levels
- Deviation Alarms
- Hold Off Periods
- Historic Recording

Alarm Annunciators

- Different for Different Signals
- Different for Different Alarm Conditions

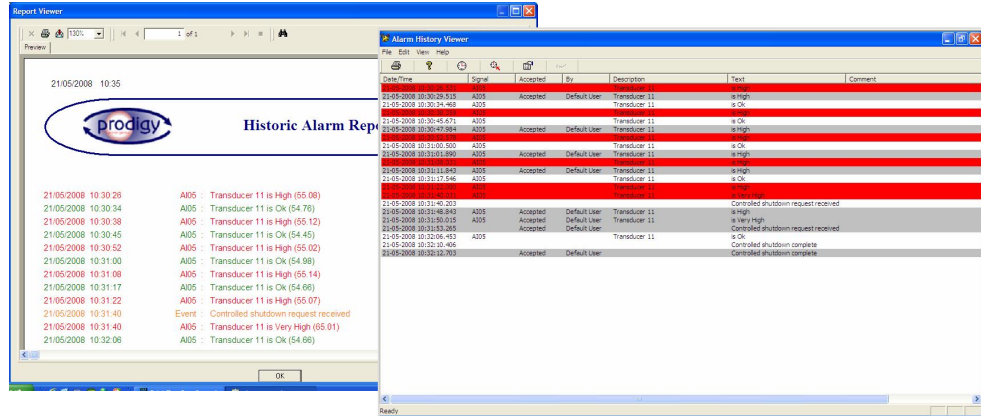
Alarm Schedules

- Any Group of Signals
- Applied Manually
- Applied Through Test Schedule
- Applied Through Slang Program

Recording Alarm Conditions

Any alarm condition that occurs during a test run will be recorded into the commentary table of the Test Log database for the test. This information can then be easily reviewed alongside the test data and can be output on printed reports or plots.

A continuous recording facility is also employed that will log any alarm condition, even when a test is not running. An Alarm History Report facility and an Alarm History Viewer tool are provided to allow this data to be searched and analysed at a later date.



Controlled Shutdowns

In the event of a serious alarm condition Prodigy-ET can be configured to stop any running test. Rather than simply turning everything off and potentially damaging the part under test, a shutdown sequence will be employed that ramps down the control parameters in a predefined manner until everything reaches a safe, stopped state. One type of shutdown sequence is not appropriate in all cases, so Prodigy-ET has the ability of defining the sequence that will be employed by any shutdown alarm condition. Typically this will be a Controlled Shutdown for relatively slow sequence and an Emergency Shutdown when the test needed to be stopped quickly but still in a controlled manner.

Black Box Recordings and Shutdown Logs

Prodigy-ET uses a Black Box Recorder that stores a current history of typically 10 minutes of test conditions and if there is a failure in the part being tested, it can be reviewed and analysed. In effect this is a rolling buffer of recordings that in the event of an alarm condition or an operator aborting a test sequence, can be dumped out. This data can be recorded separately into a Shutdown Log or can be added to the standard test data in a Test Log database. In both cases it can then be accessed using Prodigy-ET's standard reporting tools and can also be exported into third party packages such as Microsoft Excel.

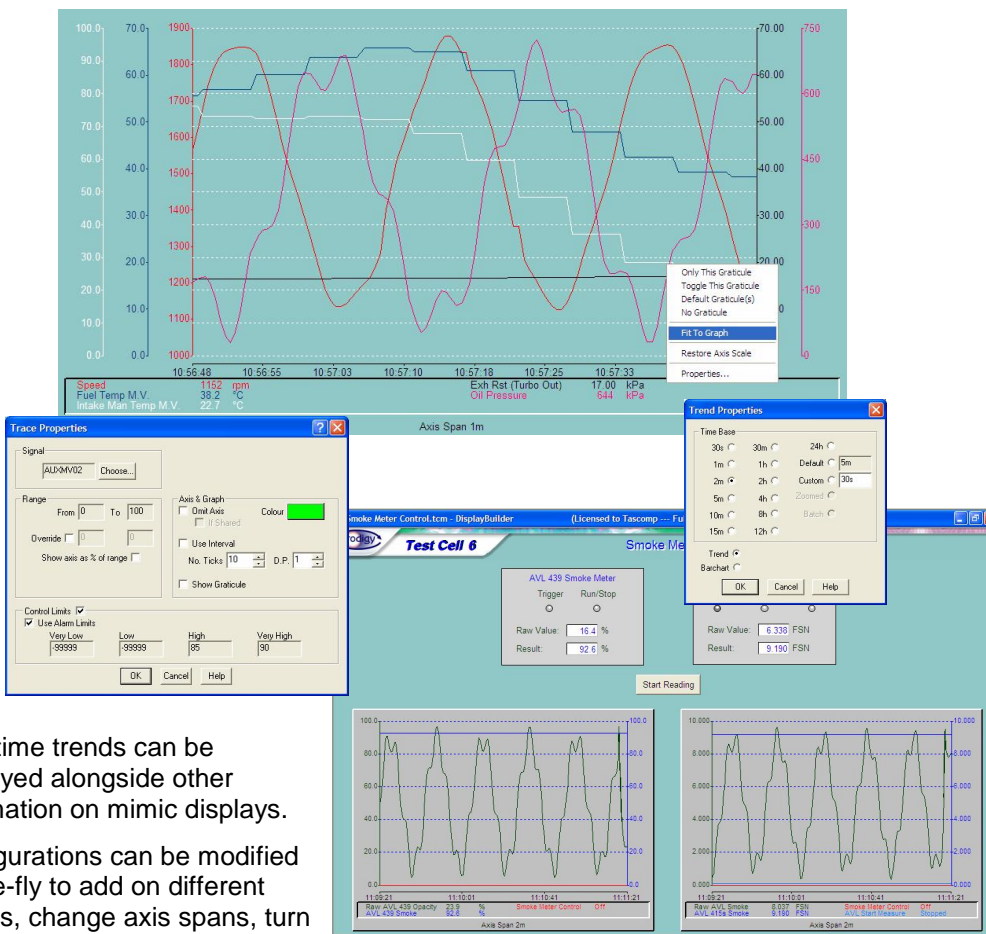
Time	Fractional Time	Speed	Torque (Torque meter)	Throttle Position	Transducer 11	Transducer 12	Transducer 13	Transducer 14	Transducer 15	Water Out Temperature
16-04-08 17:01:47	0.580	1416	125.1	51.83	0.05	0.10	-0.13	-0.09	-0.25	86
16-04-08 17:01:48	0.680	1416	140.3	52.11	0.05	0.07	-0.13	-0.10	-0.21	86
16-04-08 17:01:49	0.780	1416	145.1	52.08	0.05	0.10	-0.13	-0.07	-0.23	86
16-04-08 17:01:50	0.880	1416	141.4	52.02	0.05	0.10	-0.16	-0.07	-0.20	85
16-04-08 17:01:51	0.980	1416	133.8	52.17	0.05	0.10	-0.13	-0.08	-0.19	85
16-04-08 17:01:53	0.980	1416	145.1	52.08	0.05	0.10	-0.13	-0.08	-0.19	85
16-04-08 17:01:54	0.180	1416	140.3	52.10	0.05	0.10	-0.13	-0.07	-0.25	85
16-04-08 17:01:55	0.280	1416	137.6	52.20	0.05	0.07	-0.10	-0.07	-0.20	85
16-04-08 17:01:56	0.380	1416	128.6	52.14	0.05	0.13	-0.13	-0.08	-0.25	85
16-04-08 17:01:57	0.480	1416	136.9	52.23	0.05	0.10	-0.13	-0.08	-0.20	85
16-04-08 17:01:58	0.580	1416	135.7	52.15	0.05	0.10	-0.13	-0.07	-0.25	84
16-04-08 17:01:59	0.680	1416	130.8	52.10	0.05	0.07	-0.13	-0.07	-0.20	84
16-04-08 17:02:00	0.780	1416	129.9	52.32	0.05	0.10	-0.13	-0.05	-0.23	84
16-04-08 17:02:01	0.880	1416	141.9	52.14	-0.00	0.10	-0.13	-0.08	-0.18	84
16-04-08 17:02:02	0.980	1416	135.2	52.26	0.05	0.10	-0.13	-0.09	-0.21	84
16-04-08 17:02:04	0.080	1416	130.5	52.22	-0.00	0.07	-0.13	-0.09	-0.19	84
16-04-08 17:02:05	0.180	1416	138.8	52.52	0.05	0.10	-0.13	-0.07	-0.22	84
16-04-08 17:02:06	0.280	1416	135.7	52.06	0.05	0.10	-0.13	-0.08	-0.18	84
16-04-08 17:02:07	0.380	1416	127.4	52.21	-0.00	0.10	-0.10	-0.06	-0.16	85
16-04-08 17:02:08	0.480	1416	125.9	52.29	-0.00	0.10	-0.13	-0.08	-0.18	85
16-04-08 17:02:09	0.580	1416	129.6	52.34	0.05	0.10	-0.13	-0.08	-0.19	85
16-04-08 17:02:10	0.680	1416	129.4	52.24	0.05	0.10	-0.13	-0.11	-0.21	85
16-04-08 17:02:11	0.780	1416	128.2	52.32	0.05	0.10	-0.13	-0.09	-0.24	85
16-04-08 17:02:12	0.880	1416	132.1	52.28	0.05	0.10	-0.13	-0.08	-0.20	85

Trending

Prodigy-ET includes state of the art trending facilities. Whether you are looking for sub-second detail or a seasonal variation, Prodigy-ET's trend facilities will quickly provide the information you required.

Real-time Trends

Real-time trends provide an easy to use chart recorder facility that can be configured to show any number and any combination of signals together over any time period, be it several weeks or less than a second.



Real-time trends can be displayed alongside other information on mimic displays.

Configurations can be modified on-the-fly to add on different signals, change axis spans, turn on graticules etc.

Real-time trends can be configured to allow run-time saving or to simply change back to the default settings when a different display is selected.

Real-time Trends

- Any Number of Signals
- Analogue and Digital Signals
- Over Any Time Period
- Refresh Rate up to 10Hz
- Show Current Values
- Adjust Colour
- Adjust Range
- Shift Y Axes
- Set Tick Marks
- Set Decimal Places
- Define Control Limits
- Turn On / Off Graticules
- Show Current Alarm Levels
- Link to Historic Mode
- Runtime Save Capability

Historic Trends

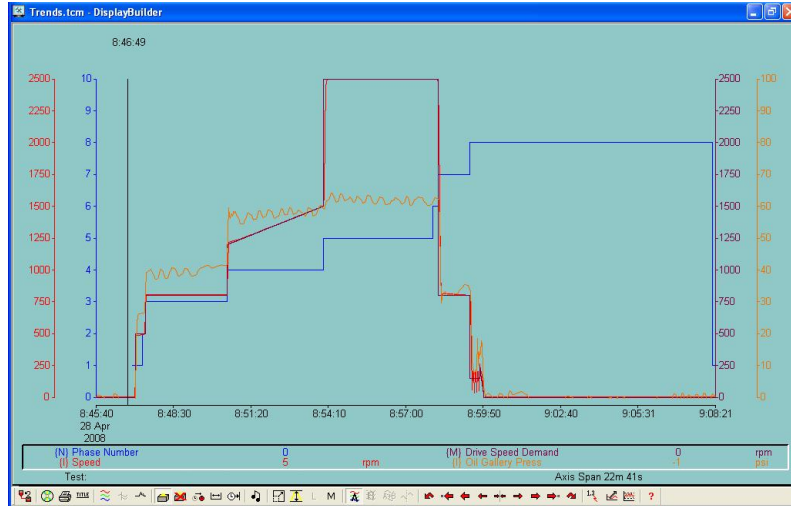
Double clicking on a Real-time Trend changes it into Historic Mode and opens the door to a new set of capabilities including: selecting any period in time; automatically showing the time period that a selected test was run over; smoothing noisy signals; exporting data to CSV files, Excel spreadsheets and Prodigy's SPC package.

Historic Trends

- Any Time Span
- Any Point in Time
- Over Test Run Time
- Any Number of Signals
- Analogue and Digital Signals

Functions:

- Pan
- Zoom
- Page Forward / Back
- Read-off Values
- Show Min / Max
- Show Mean
- Automatically Scale Y Axes
- Shift Y Axes
- Add Signals
- Adjust Colour
- Adjust Range
- Increase Smoothing
- Decrease Smoothing
- Dual Trend View
- View Comments
- Export to CSV
- Export to Excel
- Export to SPC



Unlimited Recording

Prodigy-ET provides a continuous data recording facility that is capable of handling every signal in a system. This means that any signal's data values can be reviewed not only on the real-time trends but also in the historic trending facility. By automatically managing the trend data, any system will typically hold several years worth of data on its own hard disk. Older data can also be easily accessed by the click of a button from an archive, be it on a CD / DVD or a file Server located on the LAN.

Individual Intelligent Recording Strategies

Every signal in a system can be configured with its own unique recording strategy, be it simply recording regularly or making use of the sophisticated intelligent recording mechanisms. Signals can also be grouped to use the same strategy so that changes can be made to a set of signals in one go.

Recording strategy options include triggering at regular intervals, on value changes, on slope changes, on percentage of normal range value changes, and on percentage slope changes. They can also have minimum and maximum recording frequencies, and be configured to handle interpolated or stepped recording options.

Index	Signal	Description	Signal Type	Record
25	AFRATIO	Air to Fuel Ratio	Real Derived	No recording
26	AI01	Torque	Real Input	On % value ch. +/- 0.25, 0s < Period < 1h, Never init, Normal
27	AI02	Speed	Real Input	On % value ch. +/- 0.25, 0s < Period < 1h, Never init, Normal
28	AI03	Fuel Rate	Real Input	On % value ch. +/- 1.00, 0s < Period < 1h, Never init, Normal
29	AI04	Raw AVL Smoke	Real Input	
30	AI05	Transducer 11	Real Input	
31	AI06	Transducer 12 700Kpa	Real Input	
32	AI07	Transducer 13	Real Input	
33	AI08	Transducer 14 700Kpa	Real Input	
34	AI09	Transducer 15 700Kpa	Real Input	
35	AI10	Transducer 16 700Kpa	Real Input	
36	AI11	Throttle Position	Real Input	
37	AI12	Turbo Speed	Real Input	
38	AI13	Dew Point Temperature	Real Input	
39	AI14	Soot Rate	Real Input	
40	AI15	Torque (Torquemeter)	Real Input	

Reporting Tools

Printed reports provide a convenient way of sharing and understanding detailed information. Prodigy-ET provides comprehensive facilities that allow you to combine test graphics and trends to help make complex information easy to understand.

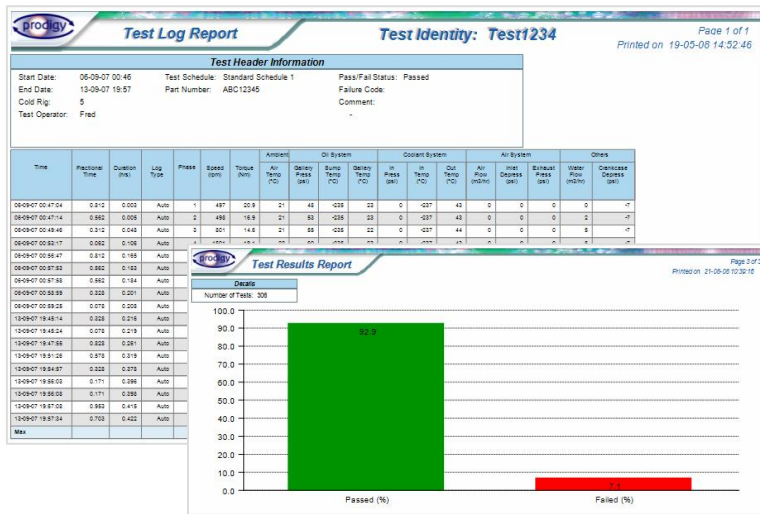
Easy Report

Easy Report is an easy to configure, free format graphical tool that allows data to be shown and printed in either tabular or graphical formats.

One off header information such as the test identity or which operator ran the sequence can be added anywhere on the page and can be set to just appear on the first page or to be shown on every page of a report.

Test Log data can be displayed in a tabular format with totals, minimum, maximum, and mean values at the bottom.

Other formats of output can also be generated such as simple or statistical bar charts and pie charts.



Easy Report

Displays:

- Fixed Text
- Bitmaps
- Drawn Objects
- Test Header Information
- Tabular Grid Data
- Derived Calculations
- Statistical Information
- Bar Charts
- Pie Charts
- Automatic Paging
- Multiple Pre-defined Pages

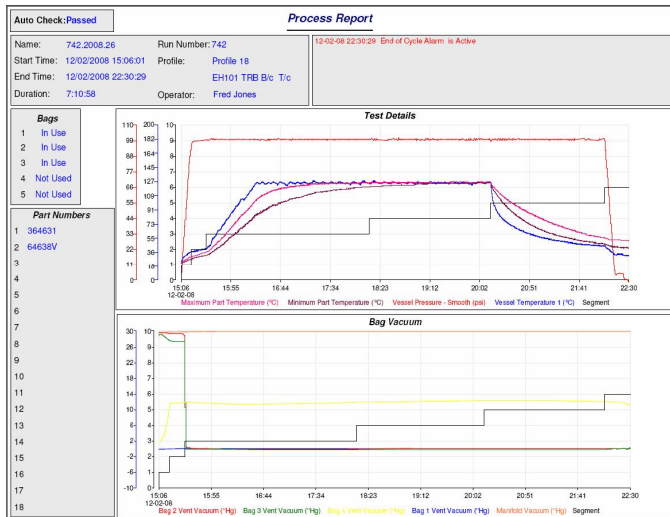
Proof of Process Reports

Can Show:

- Fixed Text
- Test Header Information
- Alarm Conditions
- Multiple Trend Graphs
- Automatic Pass / Fail Results

Proof of Process Reports

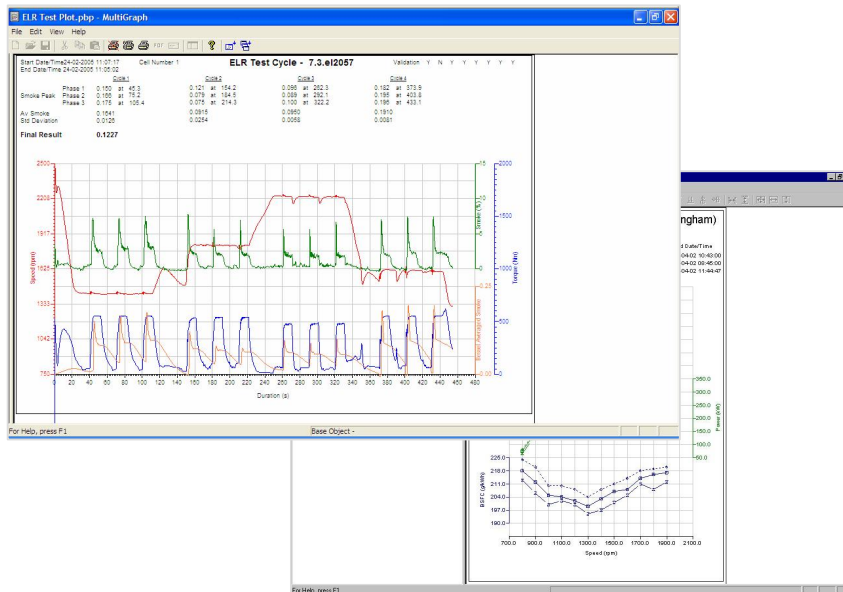
Test sequences can be designed to automatically check that they meet a pre-defined set of parameters, and on completion of a test an overall Pass / Fail result will be generated and added into the test data. Proof of Process Reports allow a one page summary of the test results to be produced, showing any relevant test header information such as the part being tested, along with any alarms that occurred, any relevant trend data, and the overall Pass / Fail result. As with Easy Report, they are fully configurable through a graphical configuration tool and can be automatically generated on completion of each test.



Multigraph

Sometimes test data is better understood when it is viewed against other parameters rather than time. In this case Multigraph provides the ideal solution as it allows any combination of X and Y axes, and any number of graphs per page. It also provides the capability of plotting multiple sets of test data on the same page so that one test can be easily compared to another.

As with the other types of reporting tool, Multigraph is a free format graphical tool that once configured can be used again and again by simply selecting a different Test Log database. Even the overplotting is easy to set up with different line styles, colours, and markers applied automatically to each set of data.



Multigraph

- X-Y Plots
- Test Header Data
- Test Log Data
- Any Number of Axes
- Any Number of Graphs

Overplotting

- Multi Test Comparisons with Overplotting
- Automatic Test Header Offsets
- Automatic Line Style Changes
- Automatic Line Colour Changes
- Automatic Marker Changes

Crystal Reports

- Develop in Familiar Environment
- Integrated with Prodigy
- Show Data from Different Tables

Crystal Reports and Microsoft Excel Spreadsheets

By storing test data in Microsoft databases, it can be easily loaded into standard reporting packages such as Crystal Reports, and tools such as Excel Spreadsheets. This means that more complex reports can be developed using software that you are already familiar with and further analysis of the data becomes easy.

Excel Spreadsheets

- Load in Entire Test Log Table
- Load in Trend Data Exports

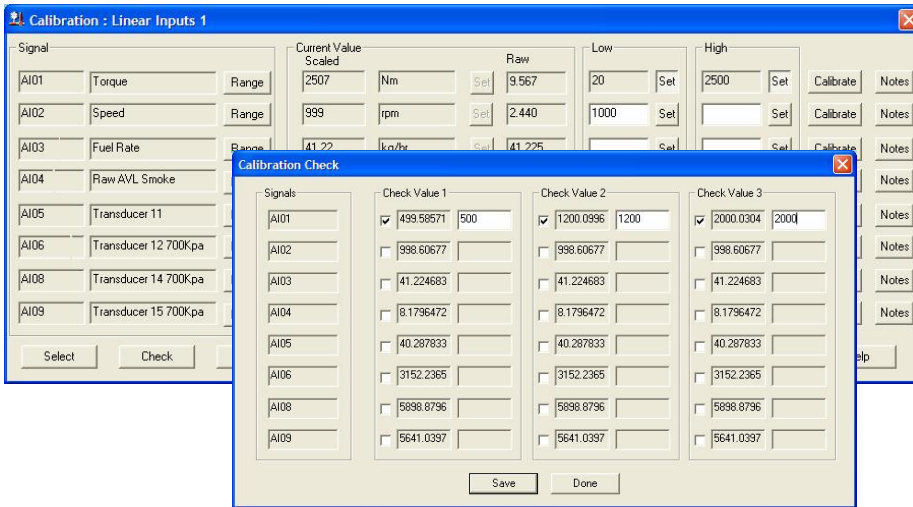
Time	Test	Cyl	Ph	rpm	Trq	Pwr	Fuel				Water			Oil			Int	Xovi	
							Rate	BSFC	Temp	Pr	Del	In	Out	Temp	Pr	B-B			Temp
hrs	No	No	No		Nm	kW	lg/hr	g/kWh	°C	kPa	mmHg	°C	°C	kPa	°C	kPa	kPa	°C	°C
13:23	0.095	1	1	999	23.7	1.7	1.0	561	40	4	9.2	79	82	88	97	112	-0.1	25.3	40
13:25	0.099	1	2	1479	1090.2	168.8	33.1	196	41	6	148.3	73	82	117	104	258	0.3	28.2	147
13:27	0.132	1	3	1891	568.5	108.8	21.9	201	40	9	78.1	83	89	154	106	327	0.1	24.4	110
13:29	0.165	1	4	1860	828.8	161.5	31.9	197	40	5	113.6	82	86	155	109	316	0.2	25.4	143
13:31	0.199	1	5	1479	556.5	86.2	16.4	190	40	11	73.5	80	88	118	107	257	0.1	24.9	86
13:33	0.232	1	6	1480	829.9	128.6	25.3	197	40	7	113.3	81	88	117	107	251	0.2	25.2	117
13:35	0.265	1	7	1479	285.2	44.2	9.4	214	39	12	42.3	85	87	115	103	272	0.0	25.1	61
13:37	0.299	1	8	1861	1100.7	214.5	43.4	202	40	8	154.7	79	88	152	109	312	0.3	24.7	164
13:39	0.332	1	9	1891	285.8	55.7	12.1	217	39	4	43.1	81	89	151	105	332	0.0	24.4	77
13:41	0.365	1	10	2242	942.0	221.1	45.6	207	40	7	135.6	79	87	193	111	328	0.3	26.0	164
13:43	0.399	1	11	2241	249.9	58.7	13.9	236	40	7	41.0	81	87	194	107	345	0.1	24.5	89
13:45	0.432	1	12	2239	709.8	166.4	34.2	205	40	6	101.1	84	91	192	111	328	0.3	25.5	150
13:47	0.465	1	13	2241	480.8	112.8	23.7	210	40	9	70.0	81	90	192	109	335	0.2	24.3	120

Calibration

Prodigy-ET provides easy to use Calibration facilities that allow groups of signals to be calibrated together and a calibration history to be maintained.

Multi-signal Calibration

Prodigy's calibration tools walk an engineer through the process, allowing them to set low and high points for both input and output signals, and to log check measurements after the calibration has been completed. Through the easy to use Configuration tool, any combination of up to eight input or output channels can be defined as a group that will be calibrated at the same time.



Calibration Tracking

As each signal is calibrated, its settings are recorded into a Tracking database for later review. This can then be used to determine when a signal was last calibrated and by whom, the current and previous values, the drift that occurred since the last calibration etc.

Date	Signal	Signal Description	External Values		Engineering Values	
9/5/07 15:04	AI01	Torque	Previous	-0.099 6.864	0.00	1812.00
			Current	0.768 6.873	226.60	1814.00
21/5/07 10:28	AI01	Torque	Previous	0.768 6.873	226.60	1814.00
			Current	-0.083 1.654	1.00	453.00
13/8/07 16:07	AI01	Torque	Previous	-0.083 1.654	1.00	453.00
			Current	0.770 3.386	226.60	906.40
22/8/07 10:43	AI01	Torque	Previous	0.770 3.386	226.60	906.40
			Current	0.113 1.060	74.00	317.00
22/8/07 14:00	AI01	Torque	Previous	0.113 1.060	74.00	317.00
			Current	-0.089 1.072	13.00	314.00
22/8/07 14:13	AI01	Torque	Previous	-0.069 1.072	13.00	314.00
			Current	0.182 1.082	80.00	314.00
23/8/07 16:19	AI01	Torque	Previous	0.182 1.082	80.00	314.00
			Current	0.027 1.112	45.00	328.00
24/8/07 11:53	AI01	Torque	Previous	0.027 1.112	45.00	328.00
			Current	0.080 1.193	30.00	320.00
24/8/07 12:49	AI01	Torque	Previous	0.080 1.193	30.00	320.00
			Current	0.343 1.231	97.00	328.00

Calibration

- Analogue Input or Output Signals
- 2 Point Calibration, typically 10% and 90%
- View Raw Voltages etc.
- 3 Point Validation Checks
- Calibrate 8 Signals at a Time

Calibration Tracking

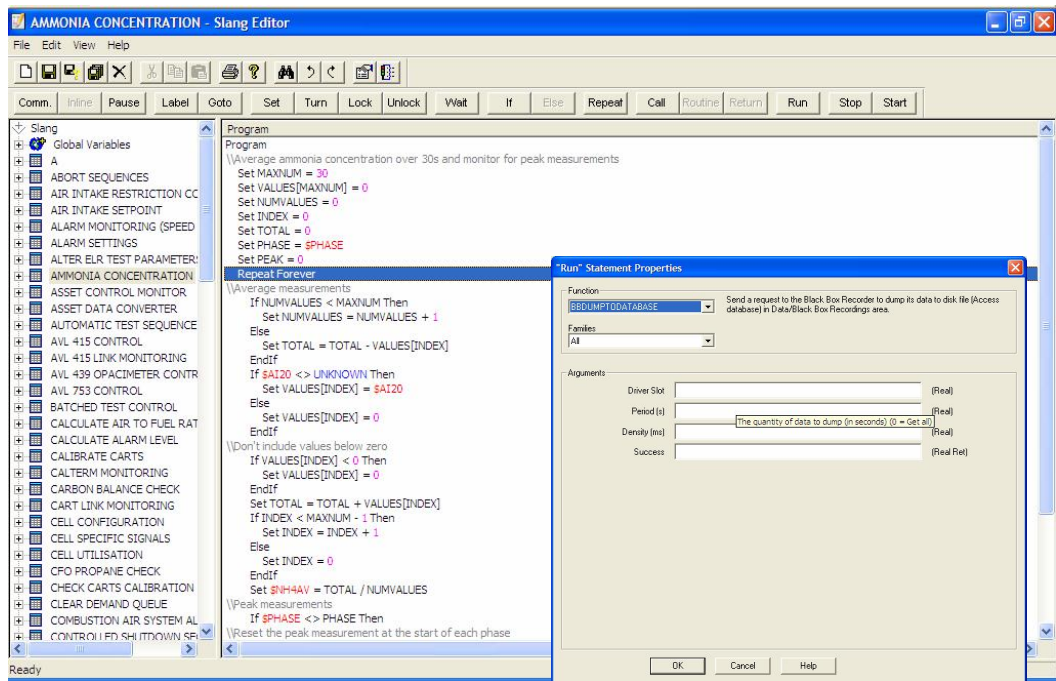
- Calibration Date
- Operator
- Time Since Last Calibration
- Current and Previous Calibration Settings
- Monitor Transducer Drift

Slang

Prodigy provides a powerful yet simple to use Sequence LANGUAGE (Slang) that allows you to quickly develop one-off control programs and derived calculation routines, specific to your application.

Programming for Non-Programmers

In its simplest form, Slang provides the ability for Non-programmers to perform control actions, produce derived calculations, and interact with the system. By controlling the way that programs are entered through a set of context sensitive buttons, Slang ensures that programs are syntactically correct as they are being written.



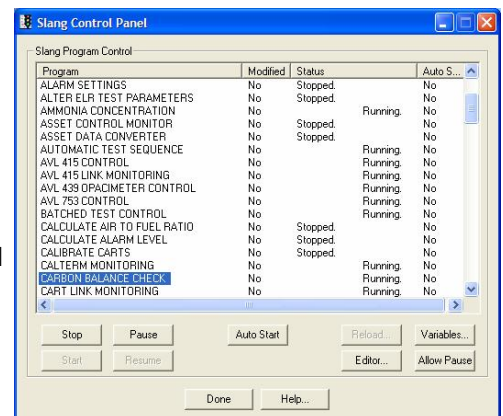
Slang Extensions

An ever expanding library of Slang Extensions is also available to provide more complex functionality, such as regression calculations, pop-up dialogs, and reading values from the Black Box Recorder's rolling buffers.

Starting, Stopping and Monitoring Programs

The Slang Control Panel allows individual programs to be started and stopped by a user. It is also used to give status information such as if a program has been modified and whether it is set to 'Auto Start' when Prodigy is started up.

Debugging functionality is also available through the Slang Control Panel so that programs can be stepped through, line by line, their local and global variables can be monitored along with the current status of any signal that they interact with.



Slang Editor

Commands Include:

- Set
- Turn On / Off
- Wait for Time
- Wait for Event
- If-Then-Else
- Repeat-Until
- Repeat-Forever
- Repeat-Number of Times
- Sub-routines
- Start / Stop Programs
- Goto-Label
- Comments
- Comment Out
- Lock / Unlock Semaphore

Slang Extensions

Include:

- Load Alarm Schedule
- Get Current Alarms
- Ask For Comment
- Ask For Number
- Bitwise Shift
- CSV Read / Write
- Database Interactions
- Display Event Message
- Get Last Signal Update Time
- Move / Copy Files
- Run Program
- Mathematical Functions
- Start / Stop a Driver

Slang Control Panel

- Start / Stop a Program
- Reload
- Pause
- View Local Variables
- View Global Variables
- View Signal Values
- Step Line-by-Line

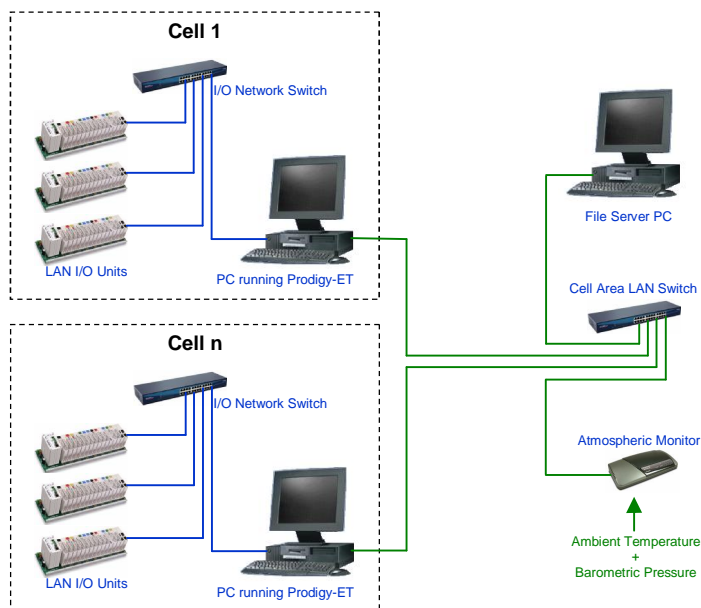
Hardware and Connectivity

Prodigy-ET runs on standard hardware making it easier to upgrade and not leaving you reliant on bespoke equipment.

Hardware

Prodigy-ET systems are typically run on industrial rack mount Pentium PCs that are running either the Microsoft Windows XP or Windows 2003 Server operating system.

Where a multi system configuration is being employed, such as that shown below, each Prodigy-ET system is typically fitted with two network cards. One for the I/O devices and one to connect it to the main Cell Area LAN.



Example Multi System Configuration Layout

Drivers

Prodigy-ET provides a wide range of standard drivers that allow it to connect to thousands of industrial devices, through PC plug-in cards, IEE-488 connections, Ethernet LAN connections, and serial RS-232 and RS-485 connections. This allows Prodigy-ET to take measurements from all common input types including: mV; V; mA; T/C; pulse; quadrature; and RTD, and to communicate with all manner of auxiliary equipment such as exhaust gas analysers, flow meters, motor controllers, laser micrometers, and temperature scanners.

Distributed

Interconnect drivers allow signal values to be transferred in real time between Prodigy-ET systems. In the example layout shown above, the atmospheric measurements could be read by the File Server PC and transmitted to all cell PCs over the Cell Area LAN.

Prodigy Viewstations

Prodigy Viewstation software can also be employed to allow users to gain access to the systems from their office PCs. This allows them to view the current status of a test and to use all of Prodigy-ET's reporting and analysis tools without interfering with the running test.

Hardware Platform

- Windows XP
- Windows Vista
- Windows 2003 Server

Interfaces

- Plug-in Cards
- Ethernet LAN
- IEEE-488
- RS-232
- RS-485
- OPC
- DDE

Drivers

Including:

- Advantech PCL / PCI Plug-in Cards
- Computer Boards
- CIO/DAS Plug-in Cards
- Advantech Adam 6000 LAN I/O Modules
- Advantech Adam 5000 LAN I/O Units
- Opto 22 SNAP I/O LAN Units
- Horiba Mexa Emissions Carts
- AVL Opacimeters and Smoke Meters
- AVL Fuel Weigh Rigs and Fuel Temperature Controllers
- AVL Smart Samplers
- Pierburg Particulates Samplers
- Froude Consine Texcel Controllers
- MKS Exhaust Gas Analysers
- Pierburg CVS Dilution Tunnels
- Allen Bradley PLCs
- Mitsubishi PLCs
- Siemens PLCs
- Adam 4000 RS-485 Units
- Modbus and Modbus TCP devices

Distributor Network

By selling Prodigy through approved distributors and system integrators around the world, Tascomp ensures that first line support is available to end users in their own language and time zone.

All Prodigy distributors and system integrators are fully trained to ensure that this support is of the highest standard. This is backed up by direct telephone and email access to the Prodigy development team, ensuring that all enquiries are resolved quickly by people who are fully conversant with the Prodigy package.



