Overview
Autolab provides all the measurement data capture requirements for the R&D laboratory or small test department environment. Although fully programmable, Autolab provides common measurement tasks, data capture and presentation facilities to cover most of what is required in today’s modern engineering and tests environments without any programming effort required by the end user. For specialist requirements, Autolab contains all the power needed to create new test sequences and drive any piece of remote control equipment. Alternatively users can employ ARK RF systems programming bureau to supply test scripts.

Main Features
- Autolab includes all of SPview's S-parameter extraction and analysis functions.
- Load-Pull data import and 3D contour mapping.
- Differential/Mixed mode S-parameter transformations.
- System calibration sequences to reduce errors.
- 2 and 3 port Noise figure Measurements.
- Virtual real time Noise figure measurement for 2-port systems.
- 2 and 3-port Intermodulation distortion measurements.
- Harmonic distortion.
- Adjacent carrier power ratio testing (ACPR) swept over level and frequency.
- Swept compression test for P1dB and Psat type measurements.
- Spectrum Analyser Multi-Carrier power Monitoring.
- Gain/response Test.
- Script customisable Test sequences.
- VNA, Spectrum, Scalar Analyser and Oscilloscope screen capture.
- Built in scripting using VBscript and JavaScript.
- Syntax highlighted script editor.
- Advanced script-programming environment.
- 2D and OpenGL 3D reporting/charting system.
- Huge programming API.
- COM connectivity to other COM-enabled applications.
Instrumentation

Autolab’s built in remote control system can drive RF and uW test equipment from all major instrument suppliers. Autolab’s device independent drivers reduce all test instrument remote control command sets to a common command set that can be programmed through Autolab’s API. Remote control interfaces supported include GPIB, RS232 and LAN.

Autolab’s internal drivers support VNA’s Spectrum Analysers, Scalar Analysers, Oscilloscopes, Power Meters and Signal generators. Additionally the generic Instrument type allows any piece of remote controllable equipment to be driven directly using its native command set.

S-Parameter Features

S-Parameter data is particularly well catered for, Autolab includes all the S-Parameter extraction and analysis functions of SPview including K-factor stability, Power gain, group delay and Time domain transforms, stability circles, reference plane adjustments etc.

For more information see the SPview data sheet.

Trace capture

Trace capture is an essential requirement in the engineering environment. Autolab includes comprehensive facilities for capturing trace data from supported equipment including snapshots, triggered and live update modes. Traces can be amalgamated onto one chart or split between several charts. Curve data can be copied and pasted between charts.

Internal test sequences

Autolab’s internal test sequence control panels, contain a wealth of settings to allow testing of a wide variety of devices and systems. Each Test sequence can be overridden or enhanced using Visual Basic scripts. All of the control panel parameters have read/write access from the script. Test sequences can be overridden to provide alternative test methods using differing test equipment. The ACPR test includes scripts to set up the digital modulation scheme on the signal generator before starting the test.

Noise Figure Measurements

Autolab can save several thousand dollars by avoiding the need to buy an expensive Noise figure meter. The measurement routines have several modes including classic noise source, small signal (using a signal generator) and the fast noise source mode giving virtual real time updates. These test sequences are designed to measure noise using a spectrum analyser.

The classic and fast modes utilise a noise source for a Y factor measurement, this is the most accurate mode for noise figure measurements. The small signal mode uses a signal generator to examine the device gain characteristics, noise is calculated with respect to the system 50 ohm noise floor. The fast mode sweeps the entire measurement band on each analyser sweep and segments and integrates the resultant data. The fast screen update mode allows real time tuning to be achieved.

Autolab can also control and take measurement sweeps using the older HP8970B noise figure meter.
Intermodulation distortion

Measure Intermodulation distortion swept over both frequency and level, graph the results in 3D mode. Start stop and step, variable tone spacings and measurements of 3rd 5th and 7th order products are all catered for. Automatic calibration routines are used to remove the signal Combiner losses and also the Analyser frequency response errors (including Input attenuator). The measurement routines can cater for high power amplifiers.

Compression

Measure Compression swept over both frequency and level, graph the results in 3D mode. Chart compression curves, 1dB compression point and Saturation point. The integrated test uses a Scalar analyser to provide a continuous swept signal, which is stepped up in level to the saturation point. A linear search algorithm searches the data to find the compression and saturation point. This method gives a very detailed view of compression and can finds narrow response suck-outs. An external script can be used as an alternative (simpler) test method using just a signal generator and 2 power meters.

ACPR

Measure Adjacent carrier power swept over frequency and level, graph the results in 3D to show the sideband variations as output power increases. Using a digital signal generator such as the Agilent ESG or the RS SMIQ to generate any digital modulation scheme. The power spectrum is measured using a spectrum analyser and integrated over the selected bandwidth to find the true power level. Sidebands power levels at the offset specified in the control panel are measured and the ACPR computed.

Multi-Carrier Power

Real time Multi-carrier power Monitoring using any spectrum analyser. This is available for all supported analysers, including older models with no internal ACP measurement capabilities.

Harmonic Distortion

Measure Harmonic distortion swept over frequency, graph the results in 3D.

Load Pull Features

Import Data files produced from Focus and Maury Load pull test systems. Autolab utilises 2D spline interpolation algorithms and then a mapping algorithm to produce contour maps of any measurement data within the files. Data can be charted in 2D and 3D modes.
Mixed mode S-Parameters

Mixed mode S-parameters are commonly used in signal integrity applications especially in the latest high speed digital systems and microprocessor-PCB interfaces. This analysis mode can be used to highlight such problems as crosstalk between interconnects.

4-port Single ended to Differential port mapping

Specialist VNA’s are employed to measure differential S-parameters.

Autolabs mixed mode S-parameter facility allows multi-port differential and common mode excited networks to be measured and analysed using only a 2-port single ended VNA a software transform algorithm is then applied to calculate the mixed-mode network responses.

Autolabs transforms work with 4-98 port network data stored as touchstone compatible files.

Output data can be transformed and plotted in 4 modes

- Common mode input and output.
- Differential input to Common mode output.
- Common mode input to Differential output.
- Differential input and output.

Mixed mode transform control panel and sample output response
Device independent programming

Autolab makes it easy to program instrumentation by removing most of the hard work in setting up and finding how to drive equipment. Autolab automatically knows how to drive GPIB cards, RS232 interfaces and LAN socket interfaces. You just tell Autolab which one you want to use for each bit of kit you want to connect to. Similarly, all similar instruments such as spectrum analysers, signal generators or power meters etc are grouped together and driven through translator drivers. This means you can forget having to know the instruction set of any particular piece of kit, Autolab provides one instruction set, which works with all supported equipment.

This allows the programmer to concentrate on programming algorithms rather than specific bits of code, it also means that any test can be run with any piece of equipment that is at hand. For specialist applications or for programming unsupported pieces of equipment Autolab still allows the native instruction set to be used directly.

Script Programming

Autolab provides a syntax highlighted editor for writing program scripts, Internally supported languages are Vbscript and Jscript. The editor contains all the features expected of an editor including search and replace, cut, copy, paste etc. Facilities include the ability to reference external ActiveX objects which allows connection to any other COM enabled application and the use of ActiveX forms and components written in any other system or language. The ability to write and host script runtimes gives Autolab integrated programmability but as an alternative Autolab may be programmed using any COM enabled language including Visual Basic, VBA (in excel word etc), Delphi and C languages.

Example scripts include,

Direct output of chart data into an excel spreadsheet.
VNA calibration data import and export.
Live control of a simulator program with VNA data.
Frequency gain/response test.

Frequency response example script.

Most Autolab test sequences are implemented using internal code however an example script is included that implements a complete test sequence controlled from a Control panel which can be user altered to perform any desired operation.
Supported Equipment

The following table lists the currently supported equipment, this list is for equipment that is fully supported for automatic extraction. The Script system can access and control any piece of equipment using its native command set.

<table>
<thead>
<tr>
<th>Vector Network Analysers</th>
<th>Spectrum Analysers</th>
<th>Scalar Analysers</th>
<th>Oscilloscopes</th>
<th>Signal Generators</th>
<th>Noise Figure Meters</th>
<th>Power Meters</th>
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License options

Autolab can be supplied in 3 license options,

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<th>Software Nodelock</th>
<th>Low cost single user</th>
<th>single installation</th>
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<tr>
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