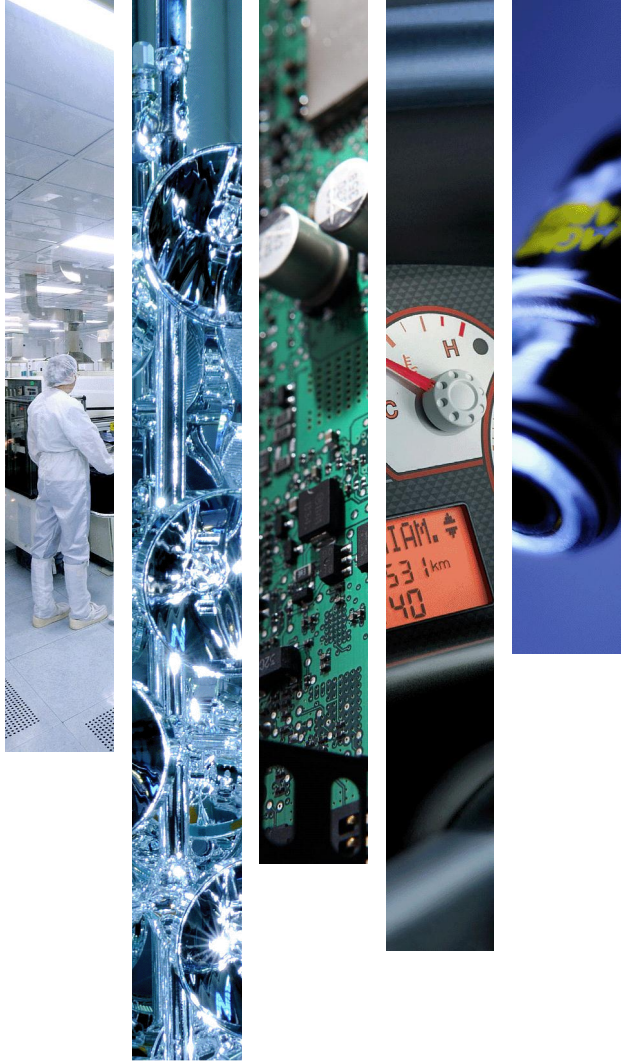


University Of Michigan
MMM Product and Tools training

October 1st 2014

Products description

Device		Function	Data logging	Telemetry	Software open	Simulink ability
SRT		Engine control	YES (64 Mo)	NO	NO	NO
SRG		Engine control	YES (1 Go)	NO	YES	YES
MDU		Dashboard	NO	NO	NO	NO
HRDL		Data logger	YES (1 Go)	YES	NO	NO

SRT : Engine control unit

Inputs

- Analog single ended : ……..14
- Lambda : ……2
- Knock : ……...2
- NTC/PT1000 : ……...4
- TCK : ……...2
- VR Pickup or Hall effect: ……..6
- On/Off digital : ……...6
- Lap trigger : ……1

Outputs

- PFI Injector drivers : ……8
- Ignition drivers : ……6
- H-Bridge: ……2
- Lambda heater: ……2
- PWM: ……..4

Communications

- CAN Line: ……...2
- Ethernet:……..1
- Serial: ……..1

SRG : Engine control unit

Inputs

- Analog single ended : ……..20
- Lambda : ……2
- Knock : ……...1
- NTC/PT1000 : ……...6
- TCK : ……...2
- VR Pickup or Hall effect: ……..10
- Lap trigger : ……1

Outputs

- PFI Injector drivers : ……4
- GDI Injector drivers: ……4
- Ignition drivers : ……4
- H-Bridge: ……2
- Lambda heater: ……2
- PWM: ……..14
- High side 100 mA: ……4

Communications

- CAN Line: ……...3
- Ethernet:……..1
- USB: ….,……..1

MDU : Dashboard

Inputs

- Analog single ended : ……..6
- NTC/PT1000 : …….. 2
- VR Pickup or Hall effect: ……. 3
- Internal 3 axial accelerometer: ……1
- Remote push button: ……1
- Lap trigger : ……...2

Outputs

- External lamp driver : ……1
- Green shift led: ..……...2
- Yellow shift led: ……..2
- Red shift led: ……..2
- Blue alarm led:……3
- RGB function led:……3

Communications

- CAN Line: ……...2
- Ethernet:……..1

HRDL: Data logger

Inputs

- Analog single ended : ……..16
- Differential:……..4
- NTC/PT1000 : ……4
- TCK: ……2
- VR Pickup or Hall effect: …… 5
- Lap trigger : ……...2

Communications

- CAN Line: ……...2
- Ethernet:……..1
- ARCNet line:……1
- Serial:……1

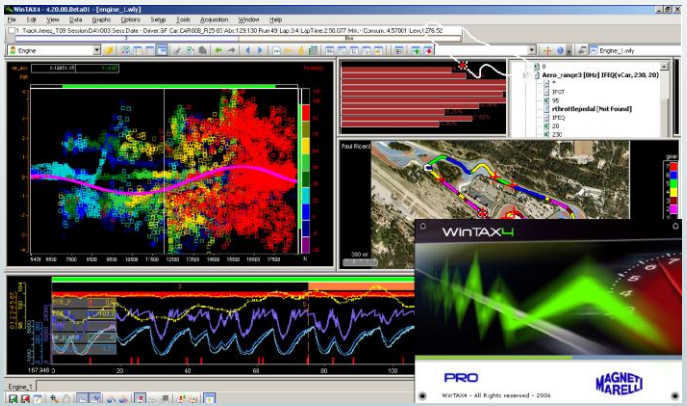
Logging

- Flash memory :……..……1 Go
- Logging channels :……..300
- Logging rate :……...128 Kbyte/s
- Sampling rate:……..1000 Hz

Tools description

- SYSMA
  - ✓ ECU configuration
  - ✓ Data logger configuration
  - ✓ ECU calibration edition
  - ✓ Measurements
  - ✓ Dash board configuration
  - ✓ Code loader

- WINTAX
  - ✓ Advanced data analysis
  - ✓ Real time analysis
  - ✓ Data download



ECU & data logger configuration tool

SYSMA Project concept

A project contains all files needed to configure and use the ECU

- PRJ : Whole Sysma project file
- DEV: System description file
- CLX: ECU configurable parameter and measurements
- TPX: Logging table
- CDL: Code loader configuration file
- BIN: Software binaries file

SYSMA Project structure

Each node of the project represent a device of the system

- ECU & DataLogger : Master ECU (SRT, SRG, HRDL)
- Dashboard: Dashboard…
- Module: GPS module, Input module, inertial platform, …

Communication SYSMA / ECU

- Two systems to communicate with
  - Control : Engine/Chassis control system of the ECU
    - Code loading
    - Control parameter reading/writing
    - ECU measurement monitoring
  - Logging: ECU data logger
    - Acquisition table reading/writing
    - Logging sensors calibration and zeroing
    - Logger time & alias setting
    - Logging memory clearing
- Two communication modes
  - CAN: Control only
  - Ethernet : Control and/or logging

SYSMA Database concept

- A CLX file contains ECU control parameters (calibrations) and ECU control measurements (logging variables).
- A project can host multiple CLX files for different purposes
  - One CLX for calibrations
  - One or more CLX for measurements
  - One CLX for a specific set of calibration (IE: injection map only)
- The set of CLX files hosted in the project is called “Database”
- Only one database at a time can be active in the project
- A database can be duplicated using the “Database manager”
- CLX “Save As” function doesn’t exist in SYSMA !
  - After a “Save” the previous version of the CLX is lost for ever !
  - Unless the database has been duplicated before.
    - In that case, previous version still exists in the previous database
    - Switching to the previous database the restore the original CLX version

SYSMA CLX Structure

Double click on a CLX to open the CLX editor

Each node of the tree view on the left hand side represents a type of item of the CLX

- Group: Group of items related to the same function (injection, ignition)
- Measurements: Control parameter variables (for logging or monitoring)
- Calibrations: Control parameter values (injection quantity, spark advance)
- CAN signals: Description of values received by CAN from a third party unit
- Messages: Description of CAN message received (Id, DLC)
- Acquisition Lines: Parameter sources (SCI1: Internal / CAN X: External)
- Boxes / Units: Parameter owner device and/or processor

CLX parameters edition

With SYSMA Junior, the only editable CLX parameter are:

- Calibrations: Control parameter values (injection map)
  Edition limited at the parameter value, parameter properties (size, address) remain inaccessible
- CAN signals: External logging values coming from a third party unit
  All properties fully open since it's a "custom" parameter

Double click on a parameter to edit its properties

Optionally save the modification clicking on "Save database"

Control parameters reading and writing

Two different concepts:

- Read: Reading of values from the ECU memory to the CLX parameters
- Write: Writing of CLX parameter values into the ECU memory

Right click on CLX containing calibration parameter and click “Read” or “Write” in order to perform the operation you want

- Reading or writing operation will be done on the whole CLX: All CLX parameter will be read or written

Edit the CLX and right click on a single (or a selection) parameter and click on “Read” or “Write” in order to perform the operation only with the parameter selection.

CLX comparison

- Comparison CLX – CLX
  - Comparison of two CLX files
- Comparison CLX – ECU
  - Comparison of a CLX file with the ECU memory
- Right click on the CLX to compare and click on:
  - “Compare CLX – CLX” to compare two CLX files
  - “Compare CLX – ECU” to compare a CLX file with the ECU memory
- Once comparison operation done, the comparator window allows to merge compared files.

Acquisition table

An acquisition table is the data logger configuration file.

Multiple acquisition tables can present in a single project, but only one can be loaded into the logger.

An acquisition table is composed of:

- Channels: Actual ECU measurements or CAN signals logged
- Group: Group of the logging channels
- Zeros: Channels values zeroed by the logger
- Trigger: Condition triggering the storage of the logged data
- Partial time: Circuit section definition for split lap time feature
- Dashboard (Optional) : Dashboard configuration in slave mode

Acquisition table edition

Right click on “ECU & DataLogger”, click “Create file” and then “New Table (TPX)” to create a new acquisition table.

Double click on an acquisition table to edit it.

Select the “Channels” node, open the channel browser and simply drag and drop channels from the browser to the TPX editor to add logging channels.

Hit the “Delete” key (or right click\ “Delete”) to remove channels from the logging table.

Acquisition channel properties

Double click on a logging channel to edit its properties

The channel properties window has four tabs:

- Channel : General channel properties (name, unit, logging frequency
- Format: Channel logging format
  - Type: (float, word, etc…) Should be adapted to the magnitude of the channel
    If your channel value is either 0 or 1, from a logger memory standpoint it is better to log it as a byte even if it is defined as a float.
- Elaboration: Channel logging linearization
  - In case of need of linearization from a raw to an engineering value
    Typical case of external sensor logging
- Group: Channel group member

Acquisition channel zeroing

Definition of an offset in order to have a channel value on a certain target.

Typical case : Shock travel sensor

- Once mounted, those sensors are typically taking a ‘random’ value that have to be zeroed (zeroing target value being basically 0) in order to log sensible values.

A channel present in the “Zeros” group can be easily zeroed using the zeroing function of the logger.

Just drag and drop the channel onto the “Zeros” group and define the zero value target.

Click on “Datalogger\ Set Zeros” to perform all sensors zeroing.

Dashboard

Click on “Datalogger\ Dashboad\ Select Dashboard” to add a dashboard in the acquisition table.

All logging channels are available in the dashboard for display without any need of further configuration !

Double click on the dashboard node to open its configuration window.

MDU is fully configurable through this interface

All details in the Sysma documentation

Code loading

1. Set ENCP ECU input to ground (Code load switch)
2. Power cycle the ECU
3. Double click on the CDL file of the device to program
4. Check communication line (SRT CAN / SRG CAN or ETH)
5. Click “Run” button
6. Wait…. Just a little bit
7. Turn off the code load switch

Optionally, once control communication back on make an ‘ECU\ ECU Info\ Info release’ to verify what software version is actually loaded into the ECU.

WINTAX

Data analysis tool

- Post processing data analysis
- Real time data analysis
- Data download
- Logging data archiving
- Virtual channel computation

WINTAX

Different versions of Wintax

- Junior : Basic version (free) very limited
- User: Standard version
- Pro: Full version including advanced features (automation)

WINTAX

Wintax data structure

- Event
  - Session
    - Car 1
      - Run 1
        - Lap 1
        - Lap 2
      - Run 2
        - Lap 1
        - Lap 2
    - Car 2
      - Run 1
        - Lap 1
        - Lap 2

- Each data file represent a single lap.
- Object “Event” is a simple folder
- Object “Session” may contain some information
- Object “Car” may contain some information
- Object “Run” is automatically managed by Wintax
- Object “Lap” is automatically managed by Wintax

Wintax session setup

For data storage purpose, a “session” must be setup prior to any data download.

Click on “Acquisition\ Acquisition manager” to setup a session

Click on “Acquisition \ Session startup wizard” to start a new session or retrieve a previous session settings.

Just follow the wizard procedure to complete session settings.

Wintax data download

Once the session defined, click on the “Activate Marvel” button to establish the communication between Wintax and the ECU.

If everything goes well, the button should turn green. Otherwise it’s gonna turn red and you won’t be able to download any data…

Then, click on “Request laps from Data Logger Marvel”

A window containing all laps available for download should pop up.

Select all laps that you wanna download and click “OK” to start downloading.

Open data into Wintax

Click on “File \ Open data” to open the “Data browser window”

This window allows you to browse all the data file present in your machine (hard drive, pen drive, CD, DVD, memory card)

Select a root folder clicking on “Browse directory”. Wintax will analyze the content of that folder in order to display all record sessions in the left hand side panel.

Click on one of those sessions to display all laps of this session into the right hand side panel

Then, select a lap or a bunch of lap and hit “Enter” to load your selection.

Data analysis with Wintax

Once your data loaded, if you have some graphic windows set up already, data will be showed into your windows.

If you don’t have any graphic widows, click on “Graph \ Graph window” to create a new graphic window.

If the channel list doesn’t appear, click on “Toggle channel browser” to see the list of logging channels.

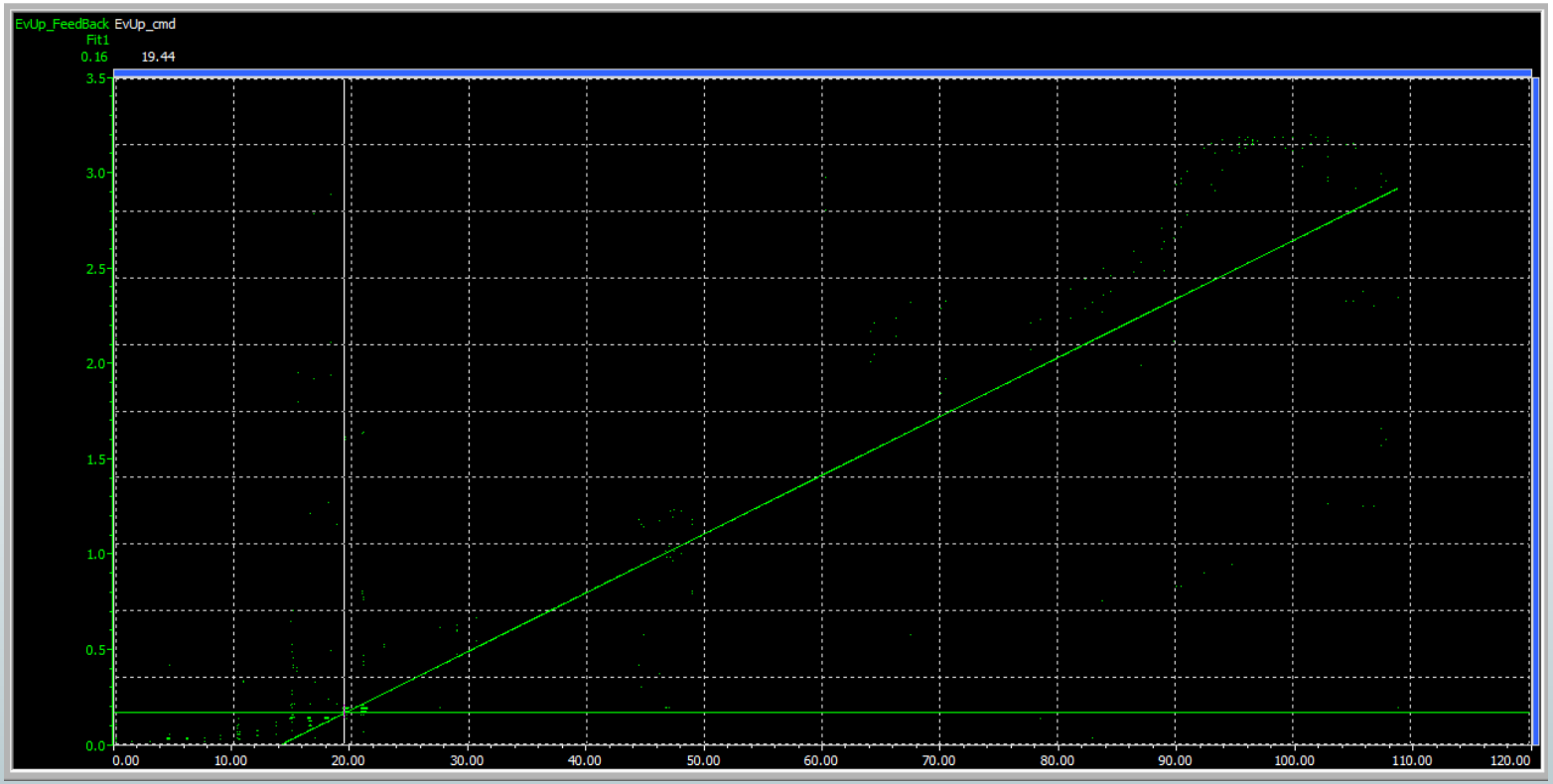
Then, simply drag and drop channels from the channel browser to your graphic window in order to trace them.

Wintax graph window

Plot data channel as a function of time or distance.

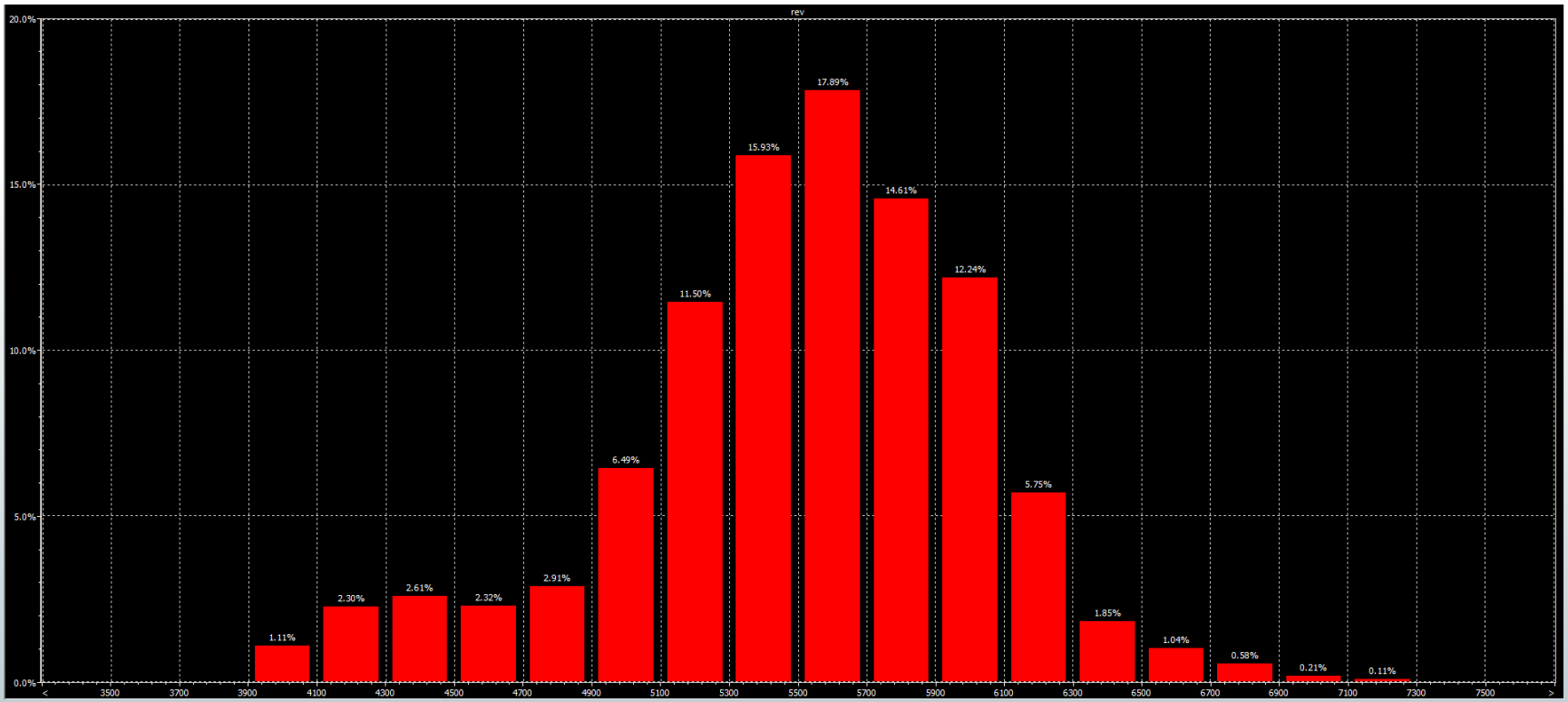
Wintax XY window

Plot data channel as a function of another channel (dot cloud).



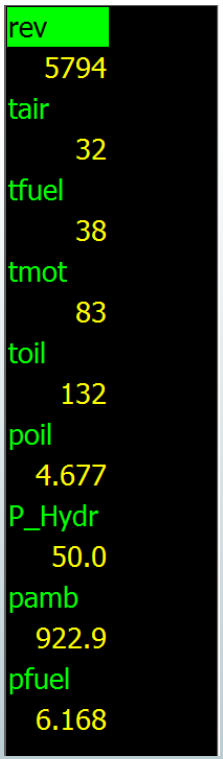
Wintax histogram window

Plot the values repartition histogram of a channel



Wintax channels window

Show values of some channels at the cursor point of a graph window



Wintax Numeric table window

Show a table of one or more channels values function of the time

Time	rev	speed	gear	poil	pfuel	tmot	toil
0.000	5309	200.8	5	3.906	5.808	83	132
1.000	5515	208.8	5	3.855	5.294	83	132
2.000	5641	213.4	5	3.701	5.448	83	132
3.000	5759	217.2	5	3.701	5.808	83	132
4.000	5463	216.7	5	4.420	5.911	83	132
5.000	6200	172.9	3	4.420	6.219	83	132
6.000	6360	139.1	2	4.266	5.705	83	132
7.000	5413	117.5	2	4.163	6.014	83	132
8.000	5057	107.2	2	4.163	5.962	83	132
9.000	5040	106.5	2	4.061	6.065	83	132
10.000	4966	106.1	2	4.112	6.117	83	132
11.000	4981	103.9	2	3.804	5.962	83	132
12.000	5682	114.1	2	3.752	5.448	83	132
13.000	6250	127.2	2	3.290	5.551	83	132
14.000	5451	140.9	3	3.649	5.654	82	132
15.000	5949	152.5	3	3.906	5.346	82	132
16.000	5145	161.6	4	3.495	5.191	82	132
17.000	5432	167.5	4	3.598	5.294	82	132
18.000	5648	178.1	4	3.701	5.500	82	132
19.000	6144	173.3	3	4.163	5.448	82	132
20.000	6017	130.5	2	4.420	5.860	83	132
21.000	4749	100.8	2	3.958	5.962	83	132
22.000	4105	88.0	2	4.575	6.014	83	132
23.000	4300	86.2	2	3.804	5.860	83	132
24.000	4716	95.0	2	3.341	5.705	83	132

Wintax track window

Show the circuit map and set the car position for a graph window cursor position

THANK YOU !