5th VIP-SEMINAR Tekno-Sip

Integration of knowledge, technology and high quality researching systems.

Successful case of FR Quattro programming 120 paneled boards.

Eng. Rodrigo Taparelli

Technical support

Your total test solution
Electronic Test Systems

Technological partners

BPM Microsystems

JTAG Technologies

SMH Technologies

TRI innovation

Rodrigo A. Taparelli Test Engineer - Hardware
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Electronic Engineering degree by Unicamp
Qualification: Test Engineer developer
Term: 01/08/2012, current position
Test developer technician
Term: from 22/04/2008 to 01/08/2010

Job description: Maintenance and development of ICT (In circuit test) tester, functional recording of flash/eeprom for mass production of PST automotive products. Map coverage of tested components. Optimisation of test time and programming. Automated functional testing for car and home alarm modules, glass, parking sensors and scanners.

AGENDA

- About Positron
- Initial solution / Problem solving
- First results, problems & failures
- Chosen solution
- New solution / Problem solving
- Results

PST Electronics: Units

Administrative Headquarter – University City of Campinas

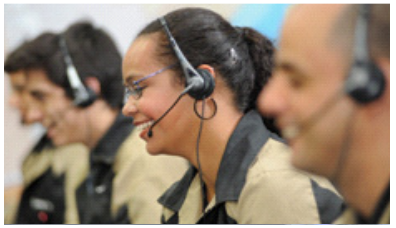
- Board of directors, administration and finance
- Sales and marketing
- Monitoring with complete structure for service 24/7
- Logistic & manufacture
- Engineering / Development: Projects, Prototyping laboratory
- Test and Plastic Injection
- Warranty Analysis and repair products
- Final assembly of panels with original instruments

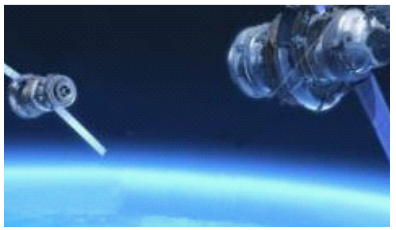
Manufacturing headquarters / Manaus Industrial District

- Plastic Injection
- SMT (Surface Mount Technology)
- Specific cell-mounting of the poduct
- Wide range of finished products for the after-market and original equipment for automakers
- Semifinished: instrument panels - supply to the automaker's assembly line
- Domestic production line of car audio

Argentinian branch - Buenos Aires

- Administration and finance
- Sales and marketing
- Services





PST Electronics: Manaus Unit


Facade, Injection



Deposit, access to assembly lines, assembly lines

Aftermarket Product Line

PAN Technology (Pósitron Area Network) - Communication network that integrates the functioning of Positron products

Tracker

Blocker

Alarm

Parking Sensor

Modules and Latches

Electric rearview

Car Stereos

Power Windows

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PST Electronics: Main clients

* PST Argentina

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Initial solution

- Microcontrollers programming using internally developed programmers and market Eg,: Cyclone, PICStart
- Programmers with very long programming times for high volume
- Automation with ATE's complicated and handcrafted case. Without standardization and dependant on Windows

Previous results and problems

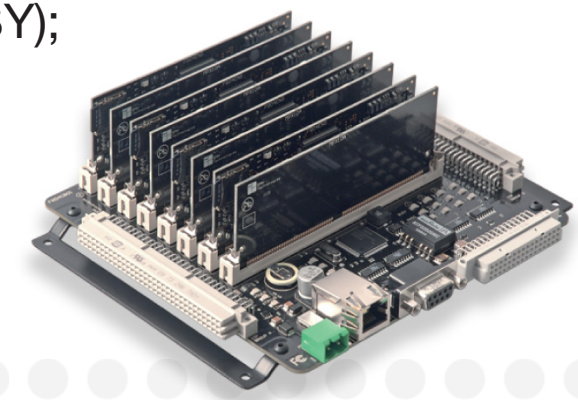
- Lack of flexibility to change microcontrollers models and communication protocols JTAG, BDM, SWD, etc.
- Debug complex gaps depending on the lack of robustness with programmers going firing line
- Lack of algorithms CRC32 verification that some programmers have no market (quality).
- Labor cost for development using the SW of each programmer.

The chosen solution: Flash Runner FR01 LAN

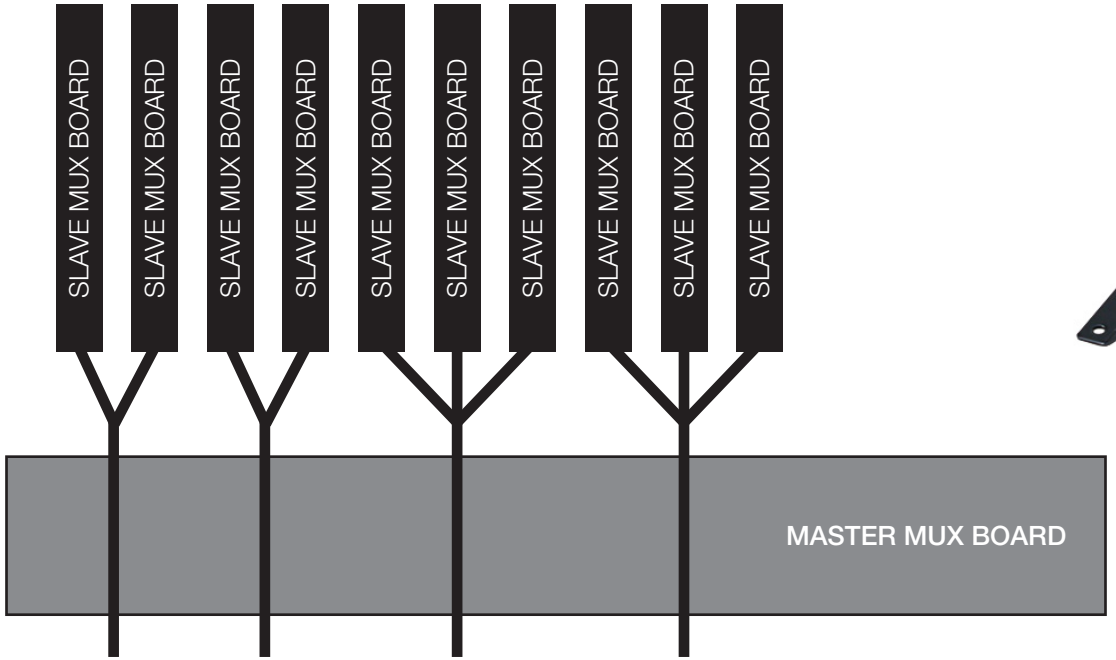
- Use Universal Programmer for “mass production” supporting PST platform
- Use a programmer oriented to quality, robustness and traceability if necessary
- Freescale Family (Low Volume) replacing Cyclone-PEMICRO PST Case Study#1
- Compatible with various programming protocols JTAG, SWD, Microchip, etc.

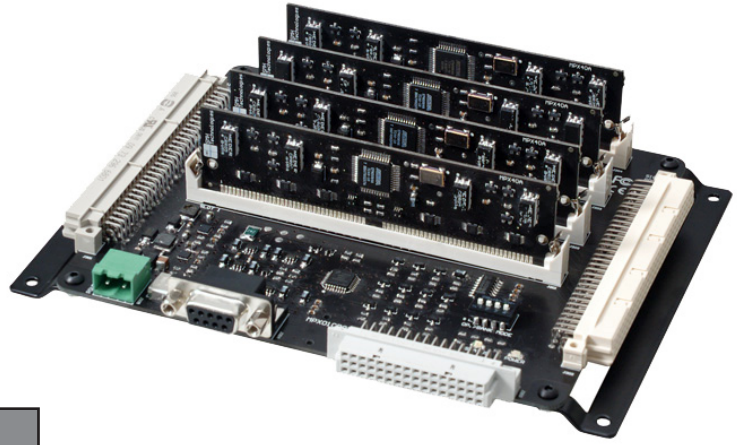
New platform (FR04 Quattro - F II)

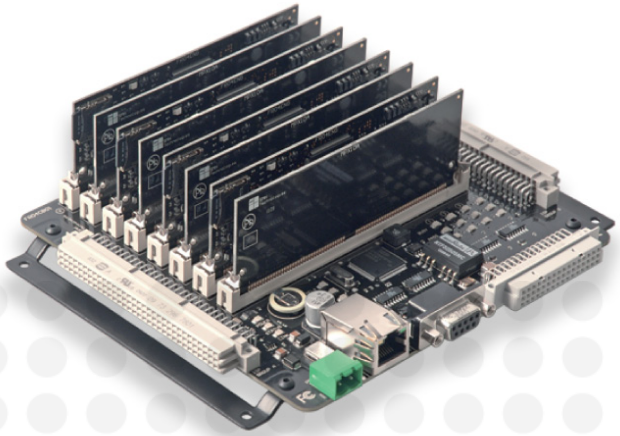
- 9 to 24V DC power supply input
- 4 x 6 digital I/O lines / Two digital I/O or anal output lines;
- Two programmable output voltage (15V, 0.25A & 5V, 0.5A);
- One analog input line / One programmable clock output;
- Secure Digital memory card (SD Card up to 2 GB);
- 512 bytes on-board dynamic memory (Variable Content);
- On-board timekeeper and calendar;
- I/O protection / Opto isolated inputs for project selection;
- Two opto isolated command inputs (START and STOP);
- Three opto isolated status outputs (FAIL, PASS, BUSY);
- Opto isolated RS-232/Ethernet channel.
- Totally compatible with FR01LAN from PST



Programming 120 boards with FR04







Total programming time 12 x 3 serial programming

225 Sec.

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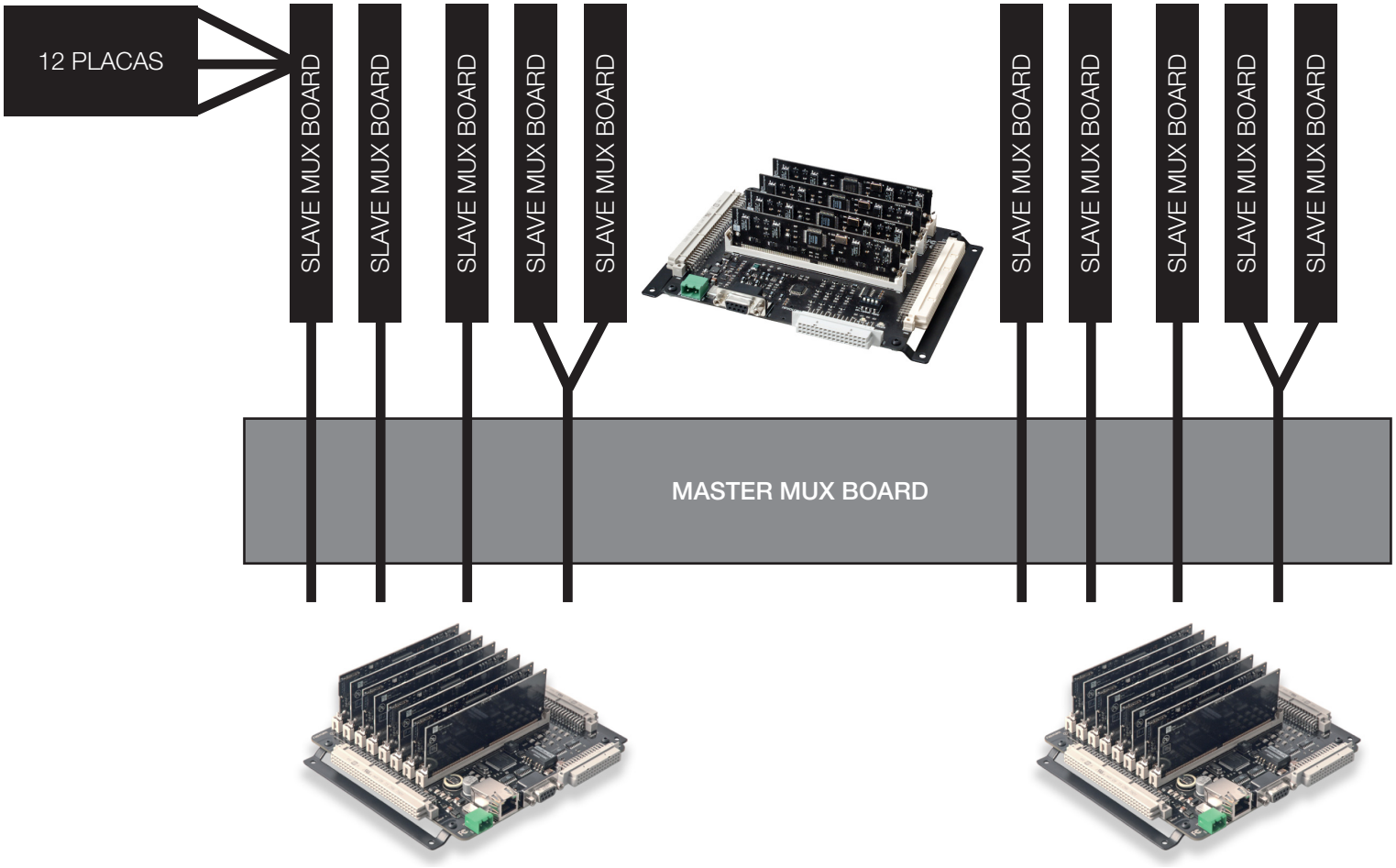
Programming 120 boards with 2 FR04



Total programming time 12 x 2 serial programming

150 Sec.

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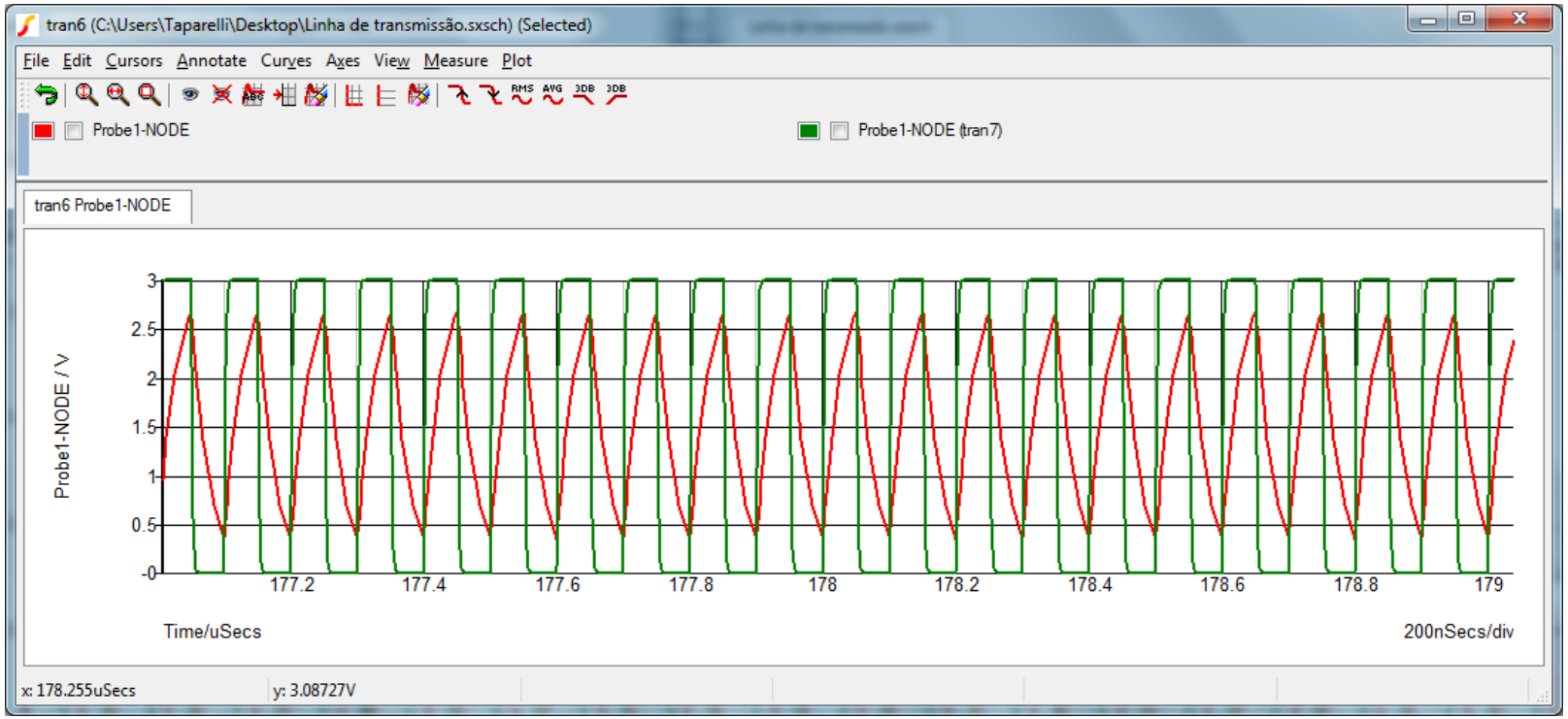
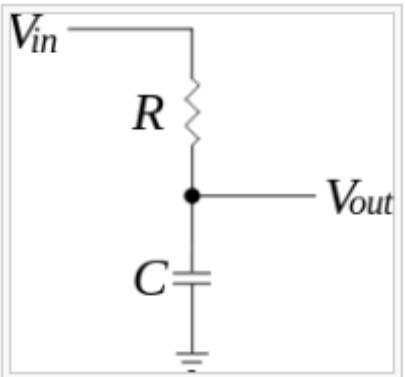
Switching and critical speed limits FR

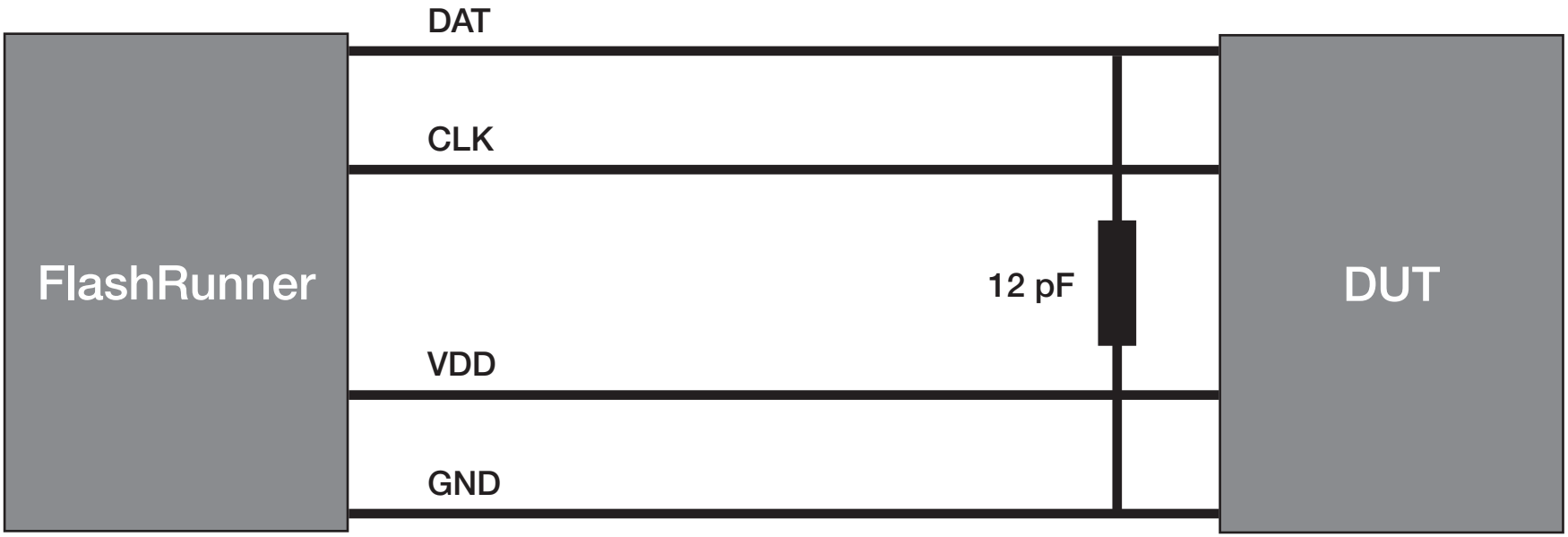


$$f_c = \frac{1}{2\pi\tau} = \frac{1}{2\pi RC}$$



Passive, first order low-pass RC filter

- A capacity of 12pF (a ~22pF) close to the DUT pins data may enable higher programming speeds.



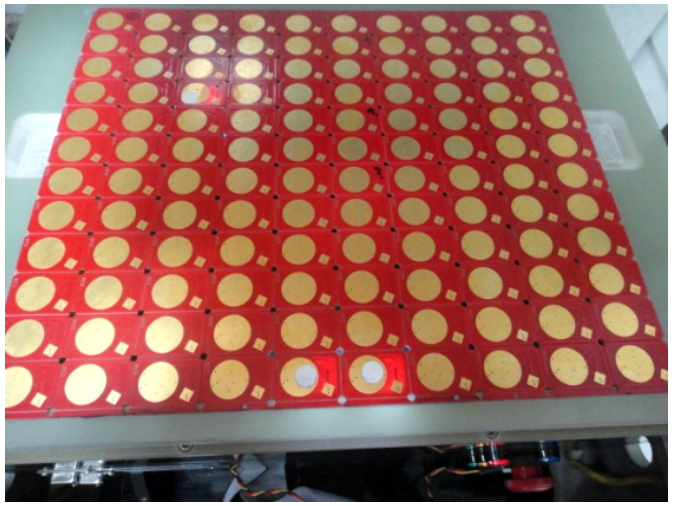
Challenge: programming panel with 120 units !!

Panels 10 x 12 boards (120 boards)

- using only 1 x FR04 in 225 sec
  –TGrav = 1,875 sec/board (225/120)

- using only 2 x FR04 in 150 sec
  TGrav = 1,25 sec/board (150/120)

And we can further reduce……



Final results

- Program 8 boards at a time, with a total test and programming time of 2 min and 30 s according to the line
- FR was **2 (two) times** faster than the R & D programmer's / IC manufacturer.
  Return of investments.
- Notification Part disapproved by LEDs placed in the cradle
- Possibility to add another FR04 or FR01 to further reduce the cycle time if necessary to the line
- Test consumption and boards components

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Doubts?

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