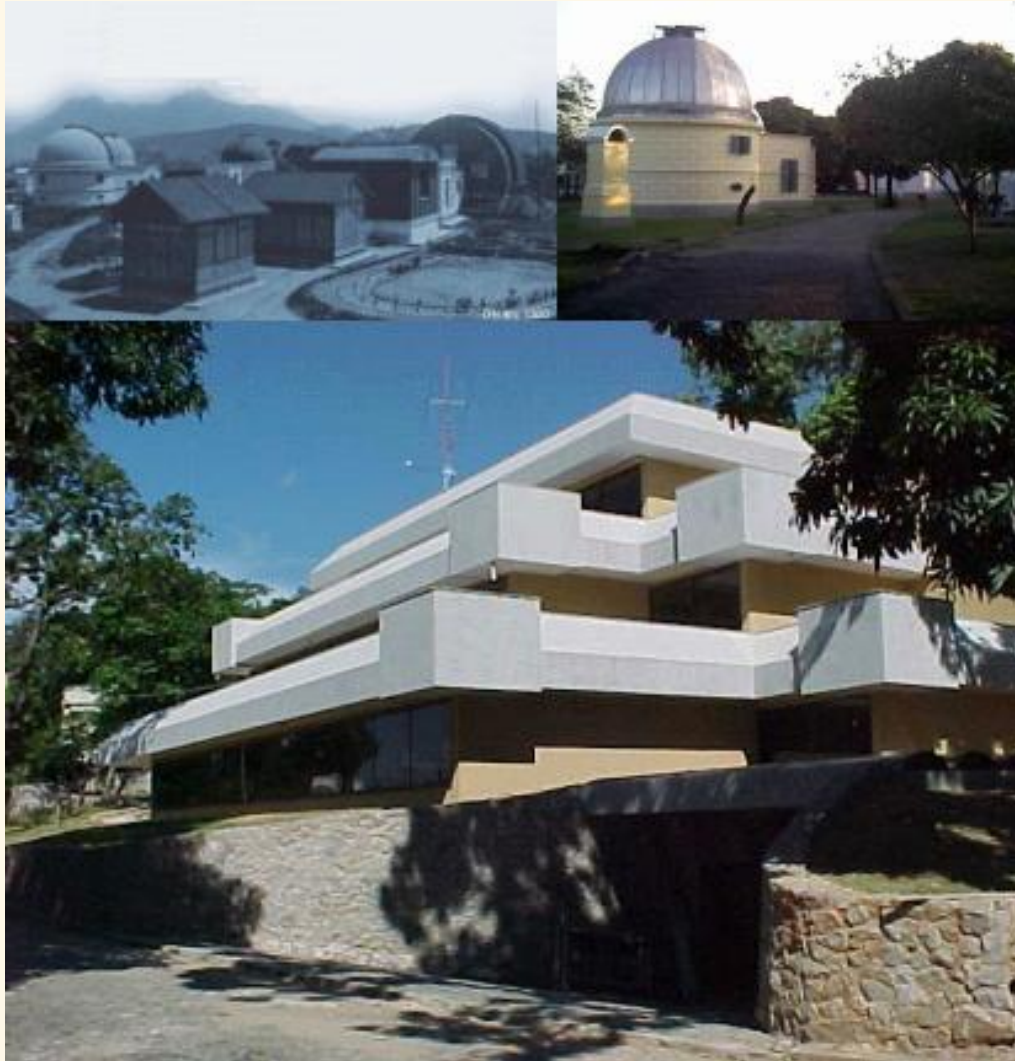


2015 SIM TFWG Workshop and Planning Meeting

January 27 – 29 Panamá City, Panamá.

**TIME AND FREQUENCY METROLOGY AT
OBSERVATÓRIO NACIONAL - TIME SERVICE DIVISION
LABORATORY REPORT**

Ricardo José de Carvalho - Head of ON/DSHO
Observatório Nacional – Brasil
January 29, 2015



**The Observatório
Nacional was created in
October 15, 1827 by the
Brazilian Imperator D.
Pedro I**

The Observatório Nacional has one scientific and one technological branch.

The scientific branch consists of three areas:

Astronomy, Geophysics and Time&Frequency
Metrology.

The technological branch are the following specialized services:

- time and frequency calibrations;
- time & frequency dissemination;
- developing equipments and instruments to time & frequency;
- magnetic and gravimetric calibrations.



The Time Service Division (DSHO) of the Observatório Nacional (ON) maintains the standard for frequency and time interval for the Brazil, generate, keep and disseminate the Brazilian Legal Time (HLB) in accordance with the Brazilian Laws and also has research and service activities in time and frequency metrology.

As a Designated Institute by Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (Inmetro), the ON/DSHO is in charge of the standardization of the Brazilian National Time and Frequency (TF) Reference since 1982 and also affords the activities of accreditation of laboratories by Inmetro.

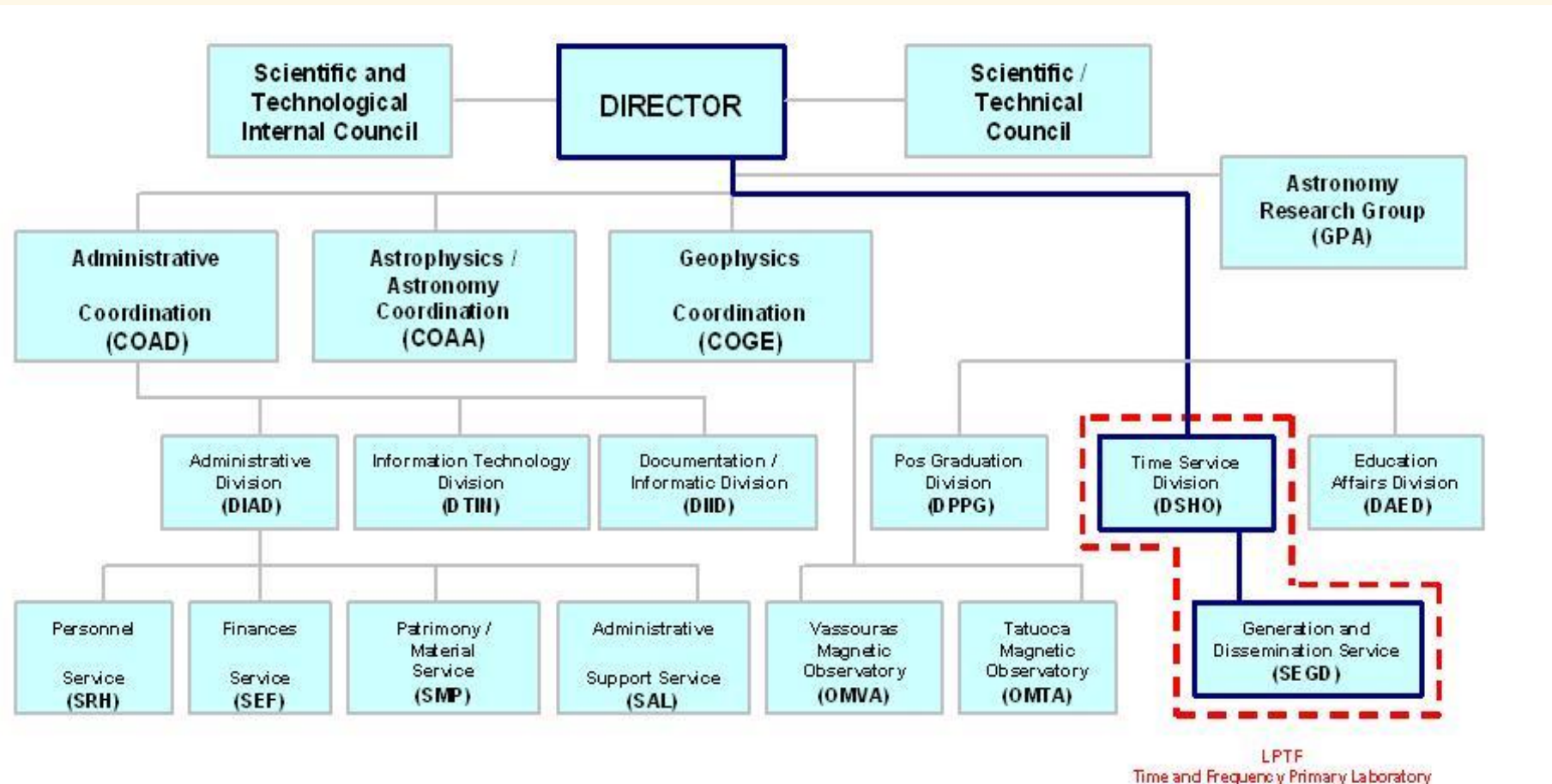


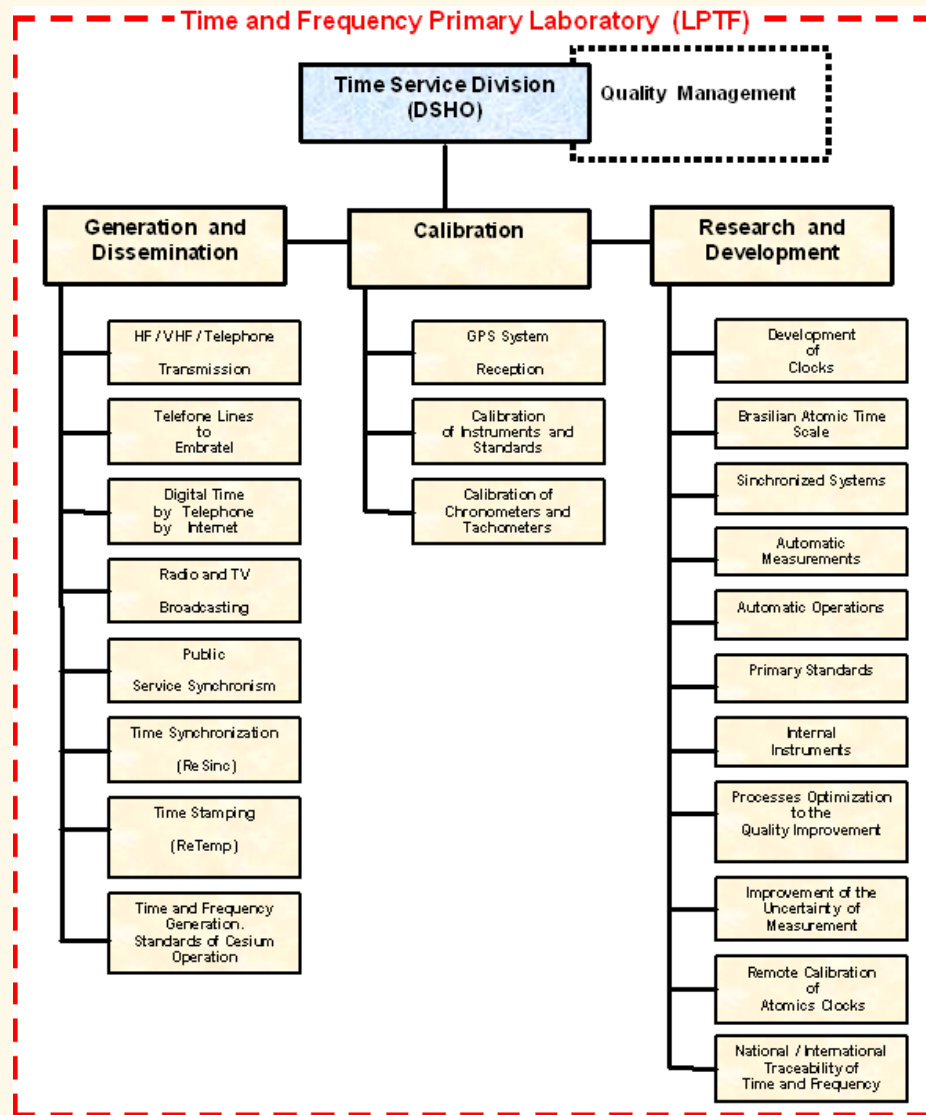
The actual legislation about legal time is:

- 1 - Law 2.784 (june 18, 1913)**
- 2 - Decree 10.546 (november 5, 1913)**
- 3 - Decree 4.264 (june 10, 2002)**
- 4 - Law 11.662 (april 24, 2008)**



Observatório Nacional Organization Chart





Time Service Division Organization Chart

ON/DSHO NEW BUILDING

In the end of 2005, the construction of the DSHO's new building of 1600m² was concluded. From 2006 to 2007 all the equipments was moved from the old building to the new one and the DSHO has achieved status up-to-date considering the structures of the most modern laboratories of Time and Frequency.

ON/DSHO NEW BUILDING

The building was named “Carlos Lacombe” in honor of the engineer who headed the Time Service in the period 1963 to 1977.

The change to the new building was accomplished with success during the years of 2005 up to 2007 without adverse impact in the time service. This was accomplished by maintaining the two facilities in operation and interlinked during the preparations for the change. The clocks were transported powered to minimize time and frequency drift.



ON/DSHO NEW BUILDING



ON/DSHO NEW BUILDING

In the new building we have three rooms to the reference standards, a room to generation and dissemination, a network room, a development and maintenance room, a calibration room, a time scale and traceability room, and frequency comb room.



Generation and Dissemination Room



Generation and Dissemination Room



Network Room



Development and Maintenance Room



Room 1



Room 2

Reference Standards Rooms



Room 3



Room 3

Reference Standards Rooms



Calibration Room



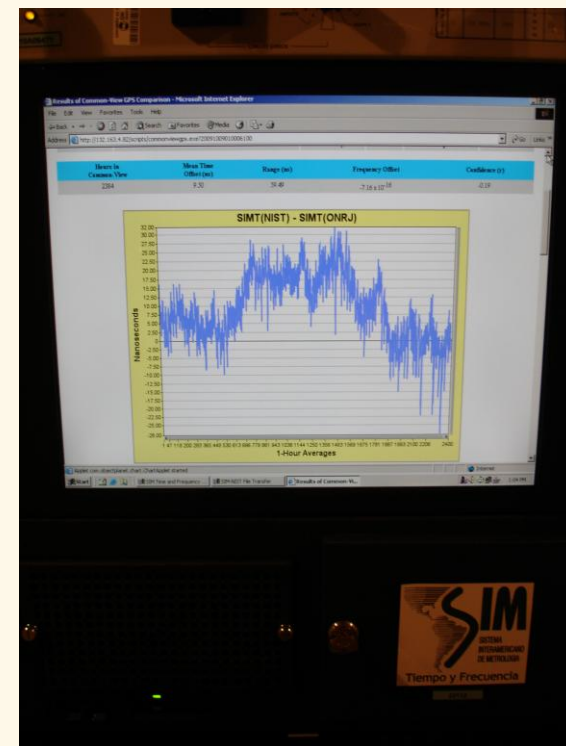
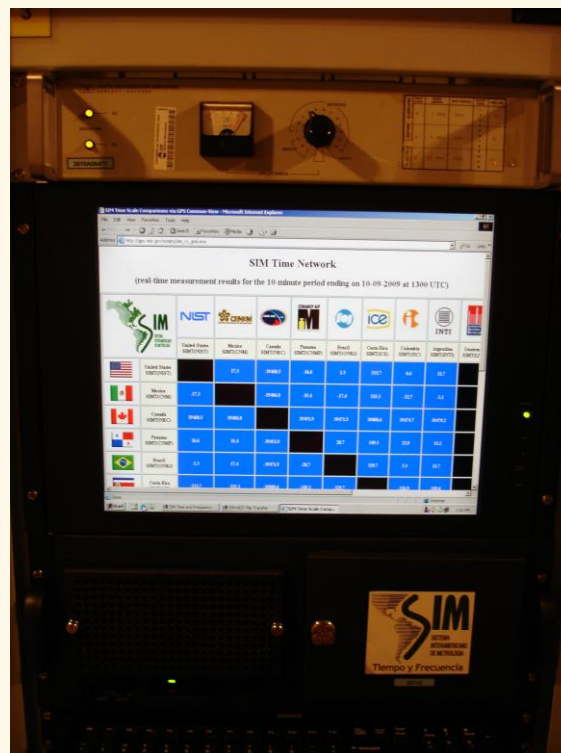
Calibration Equipments



Time Scale and Traceability Room



Equipment to Traceability with BIPM



Traceability/SIM Intercomparison

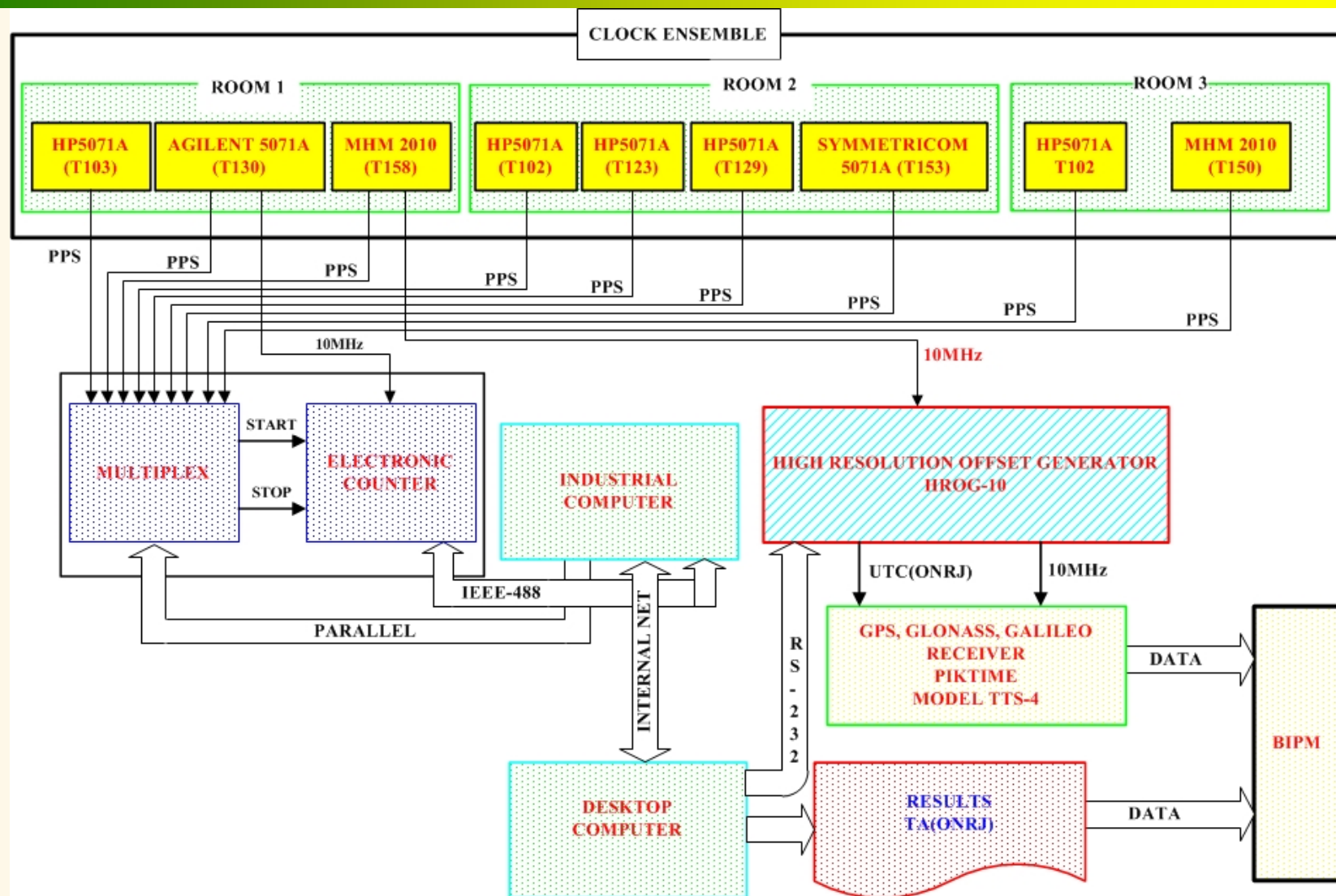


Frequency Comb Room



BRAZILIAN ATOMIC TIME SCALE SYSTEM

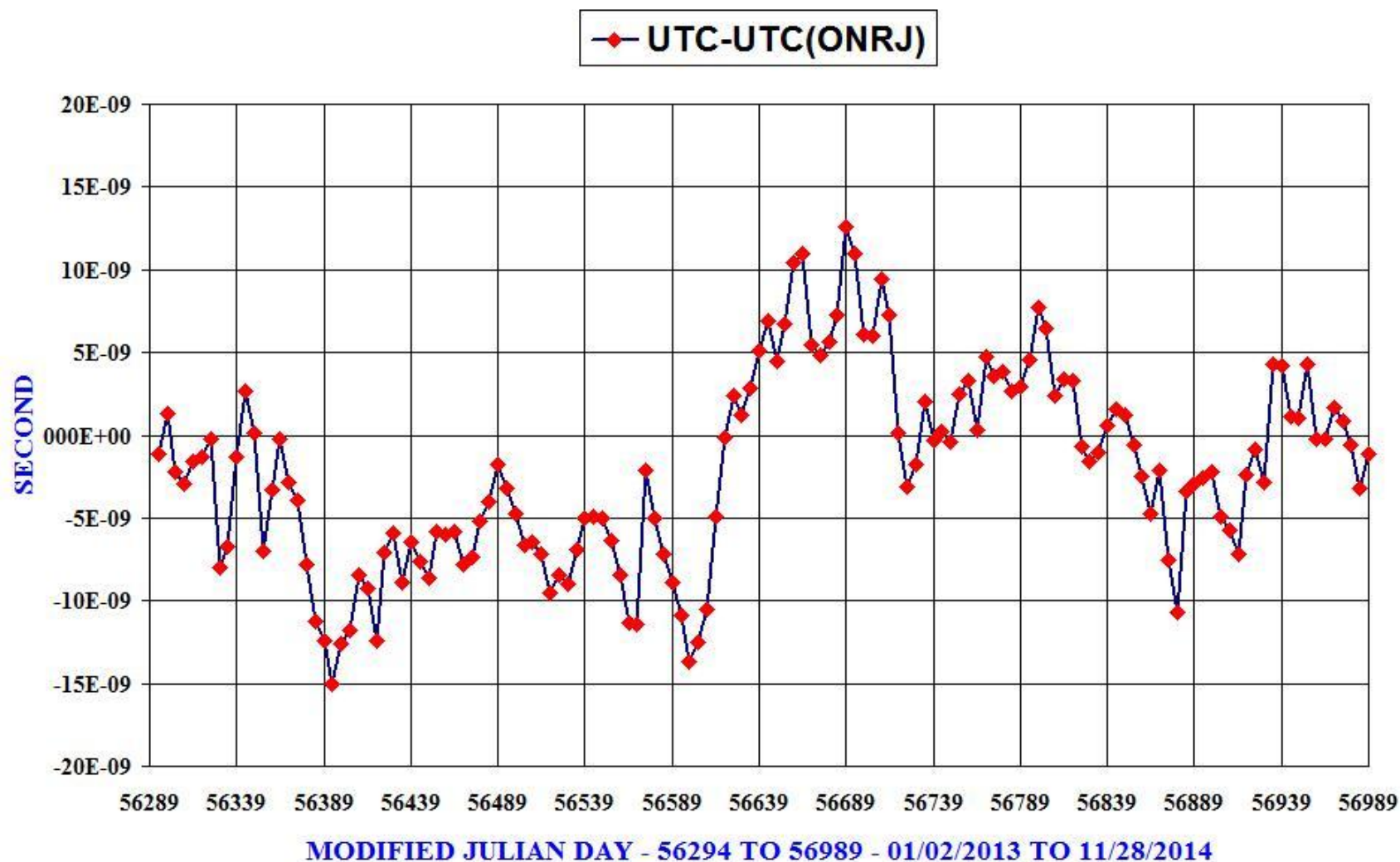
- **The clock ensemble;**
- **Automated data acquisition;**
- **The atomic time scale algorithm.**



Block Diagram of the Brazilian Atomic Time Scale



Equipment to Time Scale UTC(ONRJ)



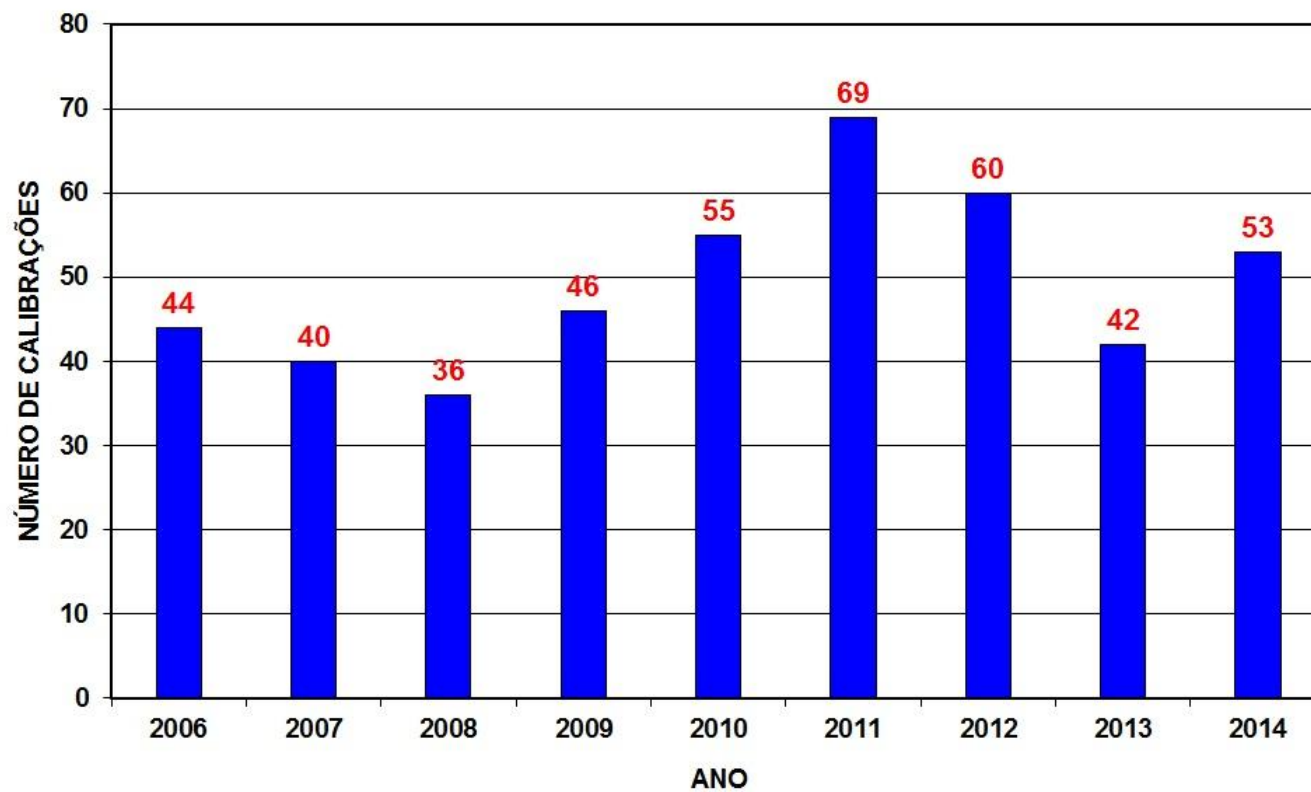
Brazilian Legal Time – UTC(ONRJ)



**Transmitter used to Broadcast Time Signal
at 10MHz with 1KW**



Approval of Quality Management System



Calibrations



The Most Important!

THE END

THANKS BY YOUR ATTENTION

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