RESISTANCE METROLOGY IMPROVEMENT IN CAMET

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Abstract: A proposal for improvement in resistance metrology in the Central America Metrology subregion (CAMET) of Sistema Interamericano de Metrologia (SIM). Collaboration is received from developed institutes and manufacturers for the designated institute ICE-LMVE in Costa Rica. This collaboration is expected to be shared by ICE-LMVE among the other CAMET countries.

Key words: metrology, resistance, SIM, CAMET.

1. INTRODUCTION

CAMET is a sub region in the Sistema Interamericano de Metrología (SIM) [1], the regional metrology organization (RMO) of America . It includes Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panamá. Support in developing metrology capability has been provided by NMIs from several countries, mainly PTB Germany, NIST USA, CENAM Mexico, NRC Canada, INMETRO Brazil, INTI Argentina, UTE Uruguay.

The CAMET countries have different levels of development in the metrology infrastructure needed for improvement of commerce and quality of life.

In the metrology field of resistance there has been support from NIST to the designated NMI in Electricity, Magnetism, Time and Frequency, actually Laboratorio Metrológico de Variables Eléctricas (LMVE) belonging to the state owned electricity and telecommunications company Instituto Costarricense de Electricidad [2]. Expert metrologist Marlin Kraft from NIST made a technical visit to LMVE in 2008 for an assessment of the local capabilities in resistance and training to the local staff. LMVE had medium value resistance capabilities with precision mutimeters and multifunction calibrators, 1 ohm and 10 kohm standards and high value resistance with 10 Mohm, 100 Mohm, 1 Gohm, 10 Gohm and 100 Gohm, and a teraohmmeter. Some other medium value resistance standards and a resistance bridge were available at LACOMET (the national NMI) [3], in the temperature laboratory. There was no knowledge of the capabilities in other CAMET countries.

After the visit Marlin Kraft continued looking for support for LMVE, getting the donation by Measurements International of a resistance bridge in 2009, and providing regular support via electronic mail.

2. RESISTANCE METROLOGY SITUATION OF ICE-LMVE IN 2008

During the 2008 visit to ICE-LMVE Marlin Kraft of NIST gave training on general concepts of resistance metrology.

2.1. ICE-LMVE TRACEABILITY CHART IN 2008

Figure 1 shows the capabilities of ICE-LMVE during 2008.(*Note to reviewers: figures to be updated in final text Showing precision mutimeters and multifunction calibrators, 1 ohm and 10 kohm standards and high value resistance with 10 Mohm, 100 Mohm, 1 Gohm, 10 Gohm and 100 Gohm, and a teraohmmeter*)

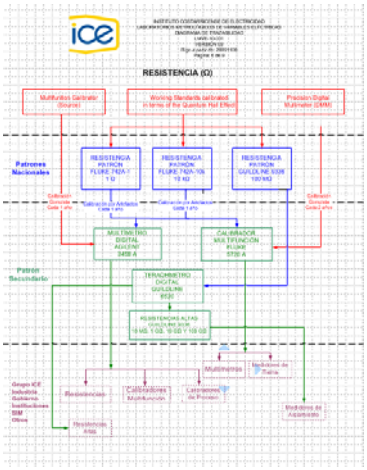

Fig. 1. ICE-LMVE Resistance Traceability Chart in 2008

2.2. ICE-LMVE TRACEABILITY CHART IN MARCH 2010 INCLUDING 2 NEW 10 OHM RESISTORS AND DONATED MI 6010B BRIDGE

Figure 2 shows the capabilities of ICE-LMVE during 2010.(*Note to reviewers: figures to be updated in final text Showing improvements in different color or shading*)

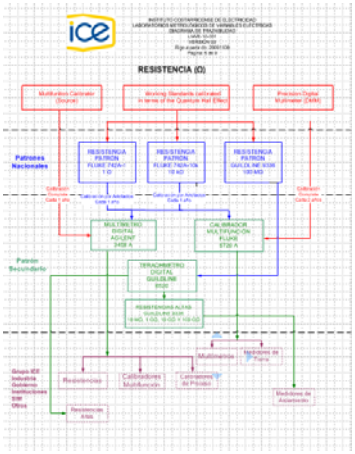

Fig. 2. ICE-LMVE Resistance Traceability Chart in 2010

Marlin Kraft, and Duane Brown from Measurements International, visited again LMVE in March 2010 for more training in resistance metrology, now with the use of the bridge donated by Measurements International. They also advised LMVE in the way of improving the traceability configuration, for better local capability, without the need of sending all the standards for calibration abroad.

Since 2010 LMVE is purchasing new equipment for completing the resistance chain that can be calibrated with the bridge, teraohmmeter, and a few externally calibrated resistors.

Marlin Kraft proposed an improved Traceability chart for a complete resistance value chain, as shown in Figure 3(*Note to reviewers: figures to be updated in final text Showing improvement needs in different color or shading*)

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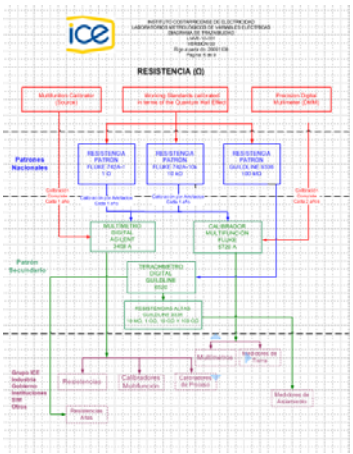

Fig. 3. Resistance Traceability Chart proposed for ICE-LMVE.

2.3. PROPOSED ORGANIZATION IN CAMET.

LMVE would get support from developed NMIs and SIM to improve its resistance capability and traceability.

Other NMIs in CAMET would be encouraged and supported by SIM and NMIs to get basic standards, such as decade resistors in low, intermediate and high values.

LMVE would transfer traceability and knowledge to other NMIs in CAMET through receiving metrologists from CAMET NMIs once every two years, for working during the calibration by LMVE of their resistors. LMVE would not charge CAMET NMIs for these calibrations. Travel and per diem would be provided by each CAMET NMI.

LMVE would organize a CAMET interlaboratory comparison in resistance every 4 years.

3. CONCLUSION

Institutional support by ICE Costa Rica for its designated laboratory LMVE is critical for the metrology development in Costa Rica.

Collaboration obtained by ICE-LMVE as designated laboratory in Electricity, Magnetism, Time and Frequency, from other National Metrology Institutes in SIM can be useful for Costa Rica and other countries in Central America.

AKNOWLEDGMENTS

Institutional support by Instituto Costarricense de Electricidad is important for providing budget for its designated metrology institute. Support by NIST Marlin Kraft and Measurements International Duane Brown have been critical for the technical expertise and equipment improvement required.

REFERENCES (Model)

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