EUROPEAN SOUTHERN OBSERVATORY

Organisation Européenne pour des Recherches Astronomiques dans l'Hémisphère Austral

Europäische Organisation für astronomische Forschung in der südlichen Hemisphäre

La Silla Observatory

Procedure for the calibration of time sources.

LSO-PRO-ESO-60500-0002

Issue: 1.0

Language: English

Date: September 15, 2004

4 pages

Keywords (up five) :   { _____Time_____ , _____calibration_____ ,

_____TCS_____ ,

Prepared:	Jaime Alonso		
	Name	Date	Signature (in hard copy only)
Approved:	Gaetano Andreoni		
	Name	Date	Signature (in hard copy only)
Released:	Gaetano Andreoni		
	Name	Date	Signature (in hard copy only)

	Quality Management System LSO / ISO 9001:2000		
	Procedure for the calibration of time sources	Document:	LSO-PRO-ESO-60500-0002
		Issue:	1.0
		Language	English
La Silla		Date:	15/9/2004
		Page:	2 of 4

Change Record

Issue	Date	Affected Paragraphs(s)	Reason/Initiation/Remarks
1.0	15/9/2004	All	First release

	Quality Management System LSO / ISO 9001:2000		
	Procedure for the calibration of time sources	Document:	LSO-PRO-ESO-60500-0002
		Issue:	1.0
		Language	English
		Date:	15/9/2004
		Page:	3 of 4

La Silla

1. Introduction

The time distribution used at LSO for the operation of telescopes and instruments is currently synchronized with the GPS system. As such no calibration is needed since the accuracy provided by this system largely exceeds the one required for our operation.

It has however been also foreseen the possibility of an outage of the GPS system, not unlikely in case of a military conflict. All our time sources will be able to continue to operate using internal clocks (either quartz or rubidium). In this circumstance there will be no longer an external reference and these clocks will have to be calibrated periodically.

The worst case scenario includes also an outage of the electrical power distribution. In this case any reference will be lost.

1.1 Purpose

The purpose of this procedure is to list the steps required to properly calibrate the time sources in case of permanent failure of the primary reference.

1.2 Scope

This procedure applies to the time sources to be used by the most accurate telescopes: NTT and 360. The sources in use for the 220 and 154 have far less stringent requirements and can be calibrate using the sources previously mentioned.

1.3 Applicable Documents

LSO-DSD-ESO-60200-0001   GPS independent TIM clock – J Alonso – 5/11/2002

1.4 Reference Documents

La Silla time distribution system requirements. M Mornhinweg.

1.5 Abbreviations and Acronyms

GITC   GPS Independent TIM Clock
GPS   Global Positioning System
LSO   La Silla Observatory
OCXO   Oven Controlled Crystal Oscillator
TIM   Time Interface Module
UT   Universal Time
UTC   Conventional Universal Time

	Quality Management System LSO / ISO 9001:2000		
ESO La Silla	Procedure for the calibration of time sources	Document:	LSO-PRO-ESO-60500-0002
		Issue:	1.0
		Language	English
		Date:	15/9/2004
		Page:	4 of 4

2.   Overview

The procedure is based on two capabilities of the GPS Independent Tim Clock developed specifically for this case:

1.   Time can be manually entered.
2.   An offset can also be entered in order to adjust the current time.

As a source of calibration stars transit over LSO is being used. In this way the time source will provide the real UT and not the conventional UTC as usual. This is irrelevant as far as the corresponding correction factor in the control systems is set to zero.

3.   DETAILED PROCEDURE

The following steps have to be executed in the order here given:

1.   Manually enter UTC into the GITC. If no adequate clock is available, a short waves receiver can be used to listen to the WWWWV transmission on 10 MHz. An accuracy of a couple of tens of second can be easily achieved.
2.   Distribute the time to 360 and NTT telescope, following the related procedure.
3.   Set to zero the UTC correction parameter in the NTT TCS.
4.   Perform a 60 stars pointing model using the NTT telescope and the related automatic procedure. The residual should be of the order of one arcsecond. If the residual is larger, wait for better sky conditions and repeat the procedure.
5.   Convert the Delta RA parameter into seconds and adjust the time in GITC.
6.   Perform a new pointing model using the NTT. The Delta RA parameter should now be close to zero.

4.   EXPECTED RESULT

After the successful execution of this procedure the time source will be set to UT with a precision better than 0.07 seconds. No further action should be taken during a period of one year thanks to the stability of the OCXO inside the time source.

_____oOo_____