

A. Introduction

Title: Automatic Time Error Correction

Number: BAL-004-WECC-01

Purpose: To maintain Interconnection frequency within a predefined frequency profile under all conditions (i.e. normal and abnormal), and to ensure that Time Error Corrections are *effectively* conducted in a manner that does not adversely affect the reliability of the Interconnection.

Applicability:

1. Balancing Authorities (BA) that operate synchronously to the Western Interconnection.

Effective Date: On the first day of the first quarter, after applicable regulatory approval.

B. Requirements

R1. Each BA that operates synchronously to the Western Interconnection shall continuously operate utilizing Automatic Time Error Correction (ATEC) in its Automatic Generation Control (AGC) system. [Risk Factor: Lower]

$$ACE_{ATEC} = (NI_A - NI'_S) - 10B_i(F_A - F_S) - T_{ob} + I_{ME}$$

Where:

NI_A = Net Interchange Actual (MW).

F_A = Frequency Actual (Hz).

F_S = Frequency Scheduled (Normally 60 Hz).

B_i = Frequency Bias for the Balancing Authority's Area (MW / 0.1 Hz).

T_{ob} = Remaining Bilateral Payback for Inadvertent Interchange created prior to implementing automatic payback (MW).

I_{ME} = Meter Error Correction (MW).

$$NI'_S = NI_S - \frac{\Pi_{Primary}^{on/off\ peak}}{(1 - Y) * H}$$

NI_S = Net Interchange Scheduled (MW).

$Y = B_i / B_S$.

H = Number of Hours used to payback Inadvertent Interchange Energy. The WECC Performance Work Group has set the value of H to 3.

B_S = Frequency Bias for the Interconnection (MW / 0.1 Hz).

$\Pi_{primary}^{on/off\ peak}$ = is the Balancing Authority's accumulated primary inadvertent interchange in MWh. An On-Peak and Off-Peak accumulation accounting is required.

Where:

$$\Pi_{primary}^{on/off\ peak} = \text{last period's } \Pi_{primary}^{on/off\ peak} + (1 - Y) * (\Pi_{actual} - B_i * \Delta TE / 6)$$

Π_{actual} is the hourly Inadvertent Interchange for the last hour.

ΔTE is the hourly change in system Time Error as distributed by the Interconnection Time Monitor.

Where:

$$\Delta TE = TE_{\text{end hour}} - TE_{\text{begin hour}} - TD_{\text{adj}} - (t) \cdot (TE \text{ offset})$$

TD_{adj} is any operator adjustment to the control center Time Error to correct for differences with the time monitor.

t is the number of minutes of Manual Time Error Correction that occurred during the hour.

$TE \text{ offset}$ is 0.000 or +0.020 or -0.020.

R1.1. The absolute value of the WECC Automatic Time Error Correction term is limited as follows:

$$\left| \frac{\prod_{\text{primary}}^{\text{on/off peak}}}{(1-Y) \cdot H} \right| \leq L_{\text{max}}$$

Where L_{max} is chosen by the Balancing Authority and is bounded as follows:

$$0.20 * |B_i| \leq L_{\text{max}} \leq L_{10}$$

L_{10} is the Balancing Authority CPS2 limit in MW. If the WECC Automatic Time Error Correction term is less than the upper limit, use the calculated WECC Automatic Time Error Correction term.

R1.2. Large accumulations of primary inadvertent point to an invalid implementation of ATEC, loose control, metering or accounting errors. A BA in such a situation should identify the source of the error(s) and make the corrections, recalculate the primary inadvertent from the time of the error, adjust the accumulated primary inadvertent caused by the error(s), validate the implementation of ATEC, set L_{max} equal to L_{10} and continue to operate with ATEC reducing the accumulation as system parameters allow.

R2. Each BA that is synchronously connected to the Western Interconnection and operates in any AGC operating mode other than ATEC shall notify all other BAs of its operating mode through the designated Interconnection communication system. Each BA while synchronously connected to the Western Interconnection will be allowed to have ATEC out of service for a maximum of 24 hours per calendar quarter, for reasons including maintenance and testing. [Risk Factor: Lower]

R3. BAs in the Western Interconnection shall be able to change their AGC operating mode between Flat Frequency (for blackout restoration); Flat Tie Line (for loss of frequency telemetry); Tie Line Bias; Tie Line Bias plus Time Error control (used in ATEC mode). The ACE used for NERC reports shall be the same ACE as the AGC operating mode in use. [Risk Factor: Lower]

R4. Regardless of the AGC operating mode each BA in the Western Interconnection shall compute its hourly Primary Inadvertent Interchange when hourly checkout is complete. If hourly checkout is not complete by 50 minutes after the hour, compute Primary Inadvertent Interchange with best available data. This hourly value shall be added to the appropriate accumulated Primary Inadvertent Interchange balance for either On-Peak or Off-Peak periods. [Risk Factor: Lower]

R4.1. Each BA in the Western Interconnection shall use the change in Time Error distributed by the Interconnection Time Monitor.

R4.2. All corrections to any previous hour Primary Inadvertent Interchange shall be added to the appropriate On- or Off-Peak accumulated Primary Inadvertent Interchange.

- R4.3.** Month end Inadvertent Adjustments are 100% Primary Inadvertent Interchange and shall be added to the appropriate On- or Off-Peak accumulated Primary Inadvertent Interchange, unless such adjustments can be pinpointed to specific hours in which case R4.2 applies.
- R4.4.** Each BA in the Western Interconnection shall synchronize its Time Error to the nearest 0.001 seconds of the system Time Error by comparing its reading at the designated time each day to the reading broadcast by the Interconnection Time Monitor. Any difference shall be applied as an adjustment to its current Time Error.

C. Measures

- M1.** For Requirement R1, a BA shall provide upon request a document showing that it is correctly calculating its hourly Primary Inadvertent Interchange number that is used to calculate its accumulated Primary Inadvertent Interchange and how it is used in its ACE equation for Automatic Time Error Correction.
- M2.** For Requirement R2, a BA shall record the date, time, reason, and notification [to other BAs within the Western Interconnection] for any time it is not operating utilizing Automatic Time Error Correction (ATEC) in its AGC system.
- M3.** For Requirement R3, a BA in the Western Interconnection must be able to demonstrate its ability to change its AGC operating mode when requested or during compliance audits and readiness reviews.
- M4.** For Requirement R4, a BA in the Western Interconnection must record its hourly Primary Inadvertent Interchange and keep an accurate record of its accumulation of Primary Inadvertent Interchange for both On-Peak and Off-Peak accounts. These records must be available for review when requested or during compliance audits and readiness reviews.

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Monitoring Responsibility

Regional Entity

Compliance Monitoring Period and Reset time Frame

The reporting period for ATEC is one calendar quarter, starting on the first second of the quarter and ending on the final second of the quarter.

The Performance-reset Period is one calendar quarter.

1.2. Data Retention

Each Balancing Authority in the Western Interconnection shall retain its hourly calculation of total and Primary Inadvertent Interchange calculated hourly, as well as the amount of Primary Inadvertent paid back hourly for the preceding calendar year (January – December) plus the current year.

Each Balancing Authority in the Western Interconnection shall retain its total accumulated Inadvertent and total Primary Inadvertent, updated hourly, for On- and Off-Peak for the preceding calendar year (January – December) plus the current year.

Each Balancing Authority in the Western Interconnection shall retain its record of the amount of time it operated without ATEC and the notification to the Interconnection of these times for the preceding calendar year (January – December) plus the current year.

The Compliance Monitor shall retain audit data for three calendar years.

1.3. Additional Compliance Information

The Compliance Monitor shall use quarterly data to monitor compliance. The Compliance Monitor may also use periodic audits (on site, per a schedule), with spot reviews and investigations initiated in response to a complaint to assess performance.

The Balancing Authority in the Western Interconnection shall have the following documentation available for its Compliance Monitor to inspect during a scheduled, on-site review or within five business days of a request as part of a triggered investigation:

- 1.3.1. Source data for calculating Primary Inadvertent.
- 1.3.2. Data showing On- and Off-Peak Primary Inadvertent accumulations.
- 1.3.3. Data showing hourly payback of Primary Inadvertent.
- 1.3.4. Documentation on number of times not on ATEC and reasons for going off ATEC.

2. Violation Severity Levels

- 2.1. Lower:** Time not in ATEC Mode greater than one day and less than or equal to three days, or if a Balancing Authority in the Western Interconnection operates without ATEC and does not notify other Balancing Authorities in the Western Interconnection 2 times in quarter.
- 2.2. Moderate:** Time not in ATEC Mode greater than three days and less than or equal to five days, or if a Balancing Authority in the Western Interconnection operates without ATEC and does not notify other Balancing Authorities in the Western Interconnection 3 times in quarter.
- 2.3. High:** Time not in ATEC Mode greater than five days and less than or equal to seven days, or if a Balancing Authority in the Western Interconnection operates without ATEC and does not notify other Balancing Authorities in the Western Interconnection 4 times in quarter.
- 2.4. Severe:** Time not in ATEC Mode greater than seven days, or if a Balancing Authority in the Western Interconnection operates without ATEC and does not notify other Balancing Authorities in the Western Interconnection more than 4 times in quarter or Balancing Authority in the Western Interconnection cannot change AGC operating mode or Balancing Authority in the Western Interconnection incorrectly calculates Primary Inadvertent.

Standard BAL-004-WECC-01 — Automatic Time Error Correction

Version History

Version	Date	Action	Change Tracking
1	February 4, 2003	Effective Date.	New
1	October 17, 2006	Created Standard from Procedure.	Errata
1	February 6, 2007	Changed the Standard Version from 0 to 1 in the Version History Table.	Errata
1	February 6, 2007	The upper limit bounds to the amount of Automatic Time Error Correction term was inadvertently omitted during the Standard Translation. The bound was added to the requirement R1.4.	Errata
1	February 6, 2007	The statement “The Time Monitor may declare offsets in 0.001-second increments” was moved from TEoffset to TDadj and offsets was corrected to adjustments.	Errata
1	February 6, 2007	The reference to seconds was deleted from the TE offset term.	Errata
1	June 19, 2007	The standard number BAL-STD-004-1 was changed to BAL-004-WECC-01 to be consistent with the NERC Regional Reliability Standard Numbering Convention.	Errata