BALANCE SYSTEM™ SD AND BIOSWAY™

CSV FILE EXPORT

950-440	System, Balance SD, 115 VAC 15.6” display
950-441	System, Balance SD, 230 VAC 15.6” display
950-444	System, Balance SD, 100 VAC 15.6” display
950-450	Optional FreeSway Handles
950-460	BioSway, 15.6” display

BIODEX

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FN: 20-123

BALANCE SYSTEM™ SD (version 4.x) AND BIOSWAY™

This document explains the CSV File Export for the Balance System SD and BioSway.

Additional information and resources are available upon request or directly from the Biodex website: www.biodex.com/balance.

Here, the user can find information from compliance to clinical support, and if the desired information is not found, Biodex can be contacted directly at supportservices@biodex.com.

Thank you,
Biodex Medical Systems, Inc.

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Table of Contents

CSV File Export (Balance SD and BioSway)

	A	B	C	D	E
1	Name	Shahidul Mahfuz			
2	DOB	6/15/1960 0:00			
3	GenderID	1			
4	TestID	5			
5	TestType	3			
6	TestDateTime	4/20/2017 11:37			
7	PatientRecordID	1			
8	TestTrialTime	20			
9	NumberOfTrials	1			
10	CursorOnOff	OFF			
11	TracingOnOff	OFF			
12	ToneOnOff	ON			
13	RecordFootPositions	TRUE			
14	FootAngleLt	10			
15	FootAngleRt	10			
16	HeelPosLt	D6			
17	HeelPosRt	D16			
18	RestCountDownTime	10			
23	ImpairmentComposite	34			
24	ImpairCompAmended	FALSE			
25	AvailableForMyNorms	TRUE			
26	CPTCode	NONE			
27	Comments				
28	ICDCode				
29	Diagnosis				
30	Age	56			
31	Height	5' 8"			
32	Weight	0			
33	UnitAddress				
34	DeviceName	BioSway			
35	FacilityID	0			
36	SwayIndex_1	2.292760457			
37	Goal_1	0.8			
38	ImpairmentValue_1	34			
39	ImpairmentAmended_1	FALSE			
40	Data start				
41	Number of Conditions	1			
42	Condition: 1	Trial: 1			
43	2632	5000			
44	2632	5000			
45	2719	4912			
848	3246	6930			
849	3158	6842			
850	Data end				

Figure C.1. Sample CSV File Export Format.

CSV File Format Explanation – Balance Test File Format Description

The Balance CTSIB Test results are used as an example to explain the CSV file format. Similar formats apply to other Balance Test types. Please note that row headings may vary.

The example CTSIB test result presented below is for the patient: Shahidul Mahfuz performed on April 20th, and was a 20-second trial of the Single Condition – 'Eyes Open Firm Surface' single trial test.

The CSV file is divided into two different segments:

1. Device, Patient, Test/ Exercise results segment.
2. X, Y Coordinate Data points segment.

Segment A – Device, Patient, Test/Exercise Results

Starting from the top of the file, it displays the device information, patient information, and different test results. The left column contains the heading/label and the right column(s) displays the corresponding values.

	A	B	C	D
1	Name	Shahidul Mahfuz		
2	DOB	6/15/1960 0:00		
3	GenderID	1		
4	TestID	5		
5	TestType	3		
6	TestDateTime	4/20/2017 11:37		
7	PatientRecordID	1		
8	TestTrialTime	20		
9	NumberOfTrials	1		
10	CursorOnOff	OFF		
11	TracingOnOff	OFF		
12	ToneOnOff	ON		
13	RecordFootPositions	TRUE		
14	FootAngleLt	10		
15	FootAngleRt	10		
16	HeelPosLt	D6		
17	HeelPosRt	D16		
18	RestCountDownTime	10		
23	ImpairmentComposite	34		
24	ImpairCompAmended	FALSE		
25	AvailableForMyNorms	TRUE		
26	CPTCode	NONE		
27	Comments			
28	ICDCode			
29	Diagnosis			
30	Age	56		
31	Height	5' 8"		
32	Weight	0		
33	UnitAddress			
34	DeviceName	BioSway		
35	FacilityID	0		
36	SwayIndex_1	2.292760457		
37	Goal_1	0.8		
38	ImpairmentValue_1	34		
39	ImpairmentAmended_1	FALSE		
40	Data start			
41	Number of Conditions	1		
42	Condition: 1	Trial: 1		
43	2632	5000		

Figure C.2. Sample CSV File for Patient Shahidul Mahfuz.

The file rows and columns are defined in Table C.1 below.

Table C.1. Sample CSV File for Patient Shahidul Mahfuz.

Field Heading	Description
Username	The patient's name. This field is only present in USB exported records, not serial exported records (example above is from a serial export).
DOB	Date of Birth of the Patient.
GenderID	Male = 1, Female = 2.
TestID	Used to identify the unique Test ID in database.
TestType	3=CTSIB.
TestDateTime	The date/time the test or training exercise was performed.
PatientRecordID	Used to identify the unique Patient ID in database.
TestTrialTime	Time in seconds used for the test for each condition.
NumberOfTrials	Number of Trials.
CursorOnOff	Cursor was used or not – ON/OFF.
TracingOnOff	Tracing is ON or OFF.
ToneOnOff	Tone is ON or OFF.
RecordFootPositions	Foot position recorded or not – True/False.
FootAngleLt	Foot Angle Left.
FootAngleRt	Foot Angle Right.
HeelPosLt	Heel Position Left.
HeelPosRt	Heel Position Right.
RestCountDownTime	Rest count down in seconds.
ImpairmentComposite	Impairment Value for Composite Score.
ImpairCompAmended	Impairment Value for Composite Score amended or not – True/False.
AvailableForMyNorms	Available for use in MyNorms.
CPTCode	ON or OFF (if CPT Codes were used/saved wit this result).
Comments	Comments entered with test results (optional).
ICDCode	ICD Codes, if used/saved with this result.
Diagnosis	Diagnosis commentary entered with test results (optional).
Age	Calculated age of Patient.
Height	Height information of the Patient.
Weight	Weight information of the Patient.
UnitAddress	Unique identifier for the Balance unit used for the test (i.e., MAC address).
DeviceName	Device name of the unit on which the test was performed (i.e., Balance SD/ BioSway).
FacilityID	Facility Information.
SwayIndex_1	Sway Index of the Condition. In this example, condition number 1, Eyes Open Firm Surface, was used. However, the Sway Index is used in a similar manner for: • SwayIndex_1- Eyes Open Firm Surface • SwayIndex_2- Eyes Closed Firm Surface • SwayIndex_3- Visual Conflict Firm Surface • SwayIndex_4- Eyes Open Foam Surface • SwayIndex_5- Eyes Closed Foam Surface • SwayIndex_6- Visual Conflict Foam Surface.
Goal_1	Goal/ Normative data of that Condition. In this example, condition number 1was used. Therefore, the heading is displayed as Goals_1.
ImpairmentValue_1	Impaired value for Condition 1.
ImpairmentAmended_1	Impaired Amended reason for Condition 1.

Postural Stability Test

Note: *The fields contained in the following table are specific to test types other than CTSIB.*

Table C.2. Sample CSV File for the Postural Stability Test.

Field Heading	Description
Type	Set to PST for a Postural Stability Test.
Leg Tested	0=Left foot, 1=Right foot, 2=Both feet.
StabilityOverall	Overall Stability Index and Standard Deviation scores (Left or Both Stance).
StabilityAntPost	Anterior/Posterior Stability Index and Standard Deviation scores (Left or Both Stance).
StabilityMedialLat	Medial Lateral Stability Index and Standard Deviation (Left or Both Stances).
PercentTimeinZoneA … PercentTimeinZoneD	% Time in zones (A through D).
PercentTimeinQuad1 … PercentTimeinQuad4	% Time in Quadrant (I through IV).
PlatformInitial PlatformEnding	Initial and Ending platform.
SwayOverall SwayAntPost SwayMedialLat	Sway Index for Overall, Anterior/Posterior and Medial Lateral.

Segment B – X,Y Coordinate Data Points

This segment describes the X,Y coordinate data points. It starts within the record containing the words 'Data start' (as illustrated in the left column of the following table) and ends with the record containing the words 'Data end'. All test/exercise results have a Data Start and a Data end point. In this example, the data point values displayed as -61,36 represent the X coordinate value as -61 and the Y coordinate as 36.

	A	B	C	D	E	F
40	Data start					
41	Number of Conditions	1				
42	Condition: 1	Trial: 1				
43	2632	5000				
44	2632	5000				
45	2719	4912				
46	2719	5000				
47	2719	5088				
48	2719	5000				
49	2807	5088				
841	2982	7368				
842	3070	7193				
843	3158	7193				
844	3246	7018				
845	3246	7018				
846	3246	7018				
847	3246	6930				
848	3246	6930				
849	3158	6842				
850	Data end					

Figure C.3. CSV File Format Explanation – Data Points.

Each point is an X,Y rectangular coordinate, where 0, 0 is the center of the graph, to the left is negative X, and to the bottom is negative Y. The data points are generated at a sample rate of 40 per second.

X, Y Scaling

Dynamic Mode (Balance SD tilting platform)
For all tests and exercises performed in Dynamic mode (available in Balance SD only), the X,Y coordinate data is scaled to 1/1000th degrees for a range of 20 degrees (up to a maximum value of 20,000) of platform tilt. For tests with the yellow-ringed background, each ring represents approximately 5 degrees of platform tilt.

Static Mode (Balance SD and BioSway with fixed platform)
For all tests and exercises performed in Static mode, the X,Y coordinate data is scaled to 1/1000th for a range of 20 (up to a maximum value of 20,000), mapped to 8 degrees of body tilt angle. For example, 8 degrees of body tilt is a value of 20,000, and 2 degrees of body tilt is a value of 5,000. For tests with the yellow-ringed background, each ring represents approximately 2 degrees of body tilt.

Calculation of Sway Index from the CSV file data

The sample CTSIB test result below was a 20-second trial of a single condition 'Eyes Open Firm Surface' only.

From the file, it is easy to see that the displayed Sway Index is 2.292.

34	DeviceName	BioSway		
35	FacilityID	0		
36	SwayIndex_1	2.292760457		
37	Goal_1	0.8		
38	ImpairmentValue_1	34		
39	ImpairmentAmended_1	FALSE		

Figure C.4. CSV File Format Explanation – Data Points.

The following section describes the Sway Index and how to verify/obtain the same data using the Excel spreadsheet.

Calculation Using the Formula on an Excel Sheet – CTSIB Test – Single Trial:

Figure C.5 is the Data segment of the sample CSV file. In order to calculate the Sway Index, it is necessary to include a few formulas. On the Excel spreadsheet, cell A and cell B represent original data. In Excel, columns are often referred as cells.

	A	B	C	D	E	F
40	Data start					
41	Number of Conditions	1				
42	Condition: 1	Trial: 1				
43	2632	5000				
44	2632	5000				
45	2719	4912				
46	2719	5000				
47	2719	5088				
48	2719	5000				
49	2807	5088				
841	2982	7368				
842	3070	7193				
843	3158	7193				
844	3246	7018				
845	3246	7018				
846	3246	7018				
847	3246	6930				
848	3246	6930				
849	3158	6842				
850	Data end					
851						

Figure C.5. CSV File Format Calculation – Data Point Segment of the Original Exported CSV File

In Figure C.5, the data starts from the 43rd row and ends in the 849th row. Therefore, the total number of records/rows of data is: [(849-43) + 1] = 807. This will vary with each test since the 40Hz sample rate is an approximation. 807 is used as the total number of data points in this example, but that number is different in each test.

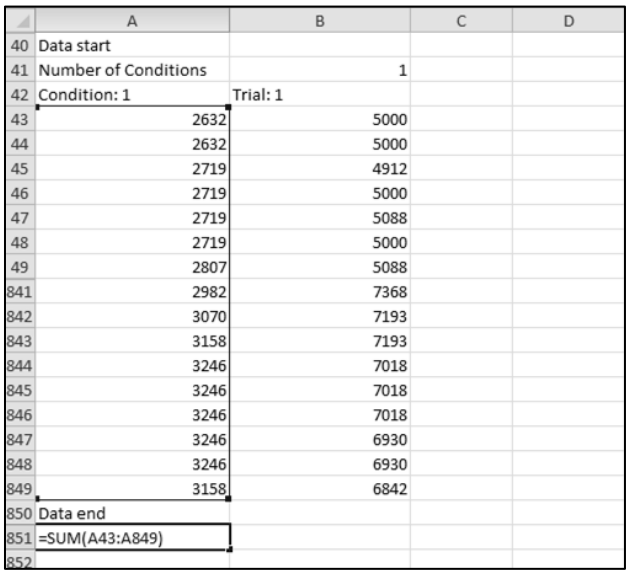
Please note that some of the rows in following figures have been hidden for better representation. For an original calculation, it is not required to hide any of the rows.

How to Determine the Total Number of Data Points within a CSV File:

Using row 851 of the Excel spreadsheet as the repository, determine the total of the individual data points starting from row 43 and ending with row 849 for cells A and B as follows:

1. In cell A, row 851 enter the following formula:

   =SUM(A43:A849)

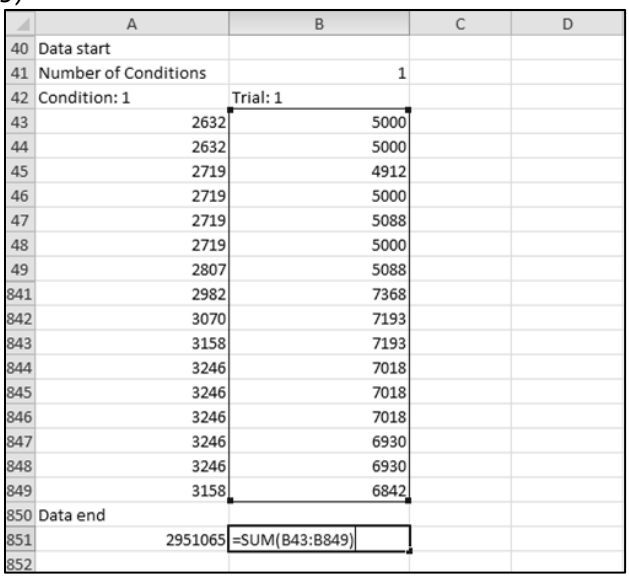


	A	B	C	D
40	Data start			
41	Number of Conditions	1		
42	Condition: 1	Trial: 1		
43	2632	5000		
44	2632	5000		
45	2719	4912		
46	2719	5000		
47	2719	5088		
48	2719	5000		
49	2807	5088		
841	2982	7368		
842	3070	7193		
843	3158	7193		
844	3246	7018		
845	3246	7018		
846	3246	7018		
847	3246	6930		
848	3246	6930		
849	3158	6842		
850	Data end			
851	=SUM(A43:A849)			
852				

Figure C.6. CSV File Format Calculation – Data Point Calculation for Condition 1

2. In cell B, row 425 enter the following formula:

   =SUM(B43:B849)



	A	B	C	D
40	Data start			
41	Number of Conditions	1		
42	Condition: 1	Trial: 1		
43	2632	5000		
44	2632	5000		
45	2719	4912		
46	2719	5000		
47	2719	5088		
48	2719	5000		
49	2807	5088		
841	2982	7368		
842	3070	7193		
843	3158	7193		
844	3246	7018		
845	3246	7018		
846	3246	7018		
847	3246	6930		
848	3246	6930		
849	3158	6842		
850	Data end			
851	2951065	=SUM(B43:B849)		
852				

Figure C.7. CSV File Format Calculation – Data Point Calculation for Trial 1

3. To determine the Sway Index for each data point within the spreadsheet, enter the following formula in cell C of every row starting with the first data point in row 43 and ending with the last data point in row 849:

   =((A43-$A$851/807)*(A43-$A$851/807))+((B43-$B$851/807)*(B43-$B$851/807))

	A	B	C	D	E	F	G	H	I
40	Data start								
41	Number of Conditions	1							
42	Condition: 1	Trial: 1							
43	2632	5000	=((A43-$A$851/807)*(A43-$A$851/807))+((B43-$B$851/807)*(B43-$B$851/807))						
44	2632	5000	5232877.284						
45	2719	4912	5429813.602						
46	2719	5000	5062125.176						
47	2719	5088	4709924.749						
48	2719	5000	5062125.176						
49	2807	5088	4552609.974						
841	2982	7368	559640.2278						
842	3070	7193	366237.027						
843	3158	7193	270698.2513						
844	3246	7018	169521.0506						
845	3246	7018	169521.0506						
846	3246	7018	169521.0506						
847	3246	6930	182041.4768						
848	3246	6930	182041.4768						
849	3158	6842	290100.6788						
850	Data end								
851	2951065	5685427							
852									

Figure C.8. CSV File Format Calculation – Calculate Sway Index for Every Data Point.

4. To find the Sway Index value, enter the following formula taking the sum of all the data points and placing it into cell C:

   =SQRT(SUM(C43:C849)/807)/1000.

   Using this formula, the resultant Sway Index value is equal to: 2.295.

	A	B	C	D	E
40	Data start				
41	Number of Conditions	1			
42	Condition: 1	Trial: 1			
43	2632	5000	5232877.284		
44	2632	5000	5232877.284		
45	2719	4912	5429813.602		
46	2719	5000	5062125.176		
47	2719	5088	4709924.749		
48	2719	5000	5062125.176		
49	2807	5088	4552609.974		
841	2982	7368	559640.2278		
842	3070	7193	366237.027		
843	3158	7193	270698.2513		
844	3246	7018	169521.0506		
845	3246	7018	169521.0506		
846	3246	7018	169521.0506		
847	3246	6930	182041.4768		
848	3246	6930	182041.4768		
849	3158	6842	290100.6788		
850	Data end				
851	2951065	5685427	=SQRT(SUM(C43:C849)/807)/1000		
852					

Figure C.9. CSV File Format Calculation – Calculate the Sum of all Sway Indices

Where: 807 = the number of samples for this example.
1000 = the scale factor.

5. The value of the Sway Index contained in the exported CSV file matches the value calculated in the Excel spreadsheet after all of the formulas have been entered and applied (see Figure C.10 below).

	A	B	C	D	E
40	Data start				
41	Number of Conditions	1			
42	Condition: 1	Trial: 1			
43	2632	5000	5232877.284		
44	2632	5000	5232877.284		
45	2719	4912	5429813.602		
46	2719	5000	5062125.176		
47	2719	5088	4709924.749		
48	2719	5000	5062125.176		
49	2807	5088	4552609.974		
841	2982	7368	559640.2278		
842	3070	7193	366237.027		
843	3158	7193	270698.2513		
844	3246	7018	169521.0506		
845	3246	7018	169521.0506		
846	3246	7018	169521.0506		
847	3246	6930	182041.4768		
848	3246	6930	182041.4768		
849	3158	6842	290100.6788		
850	Data end				
851	2951065	5685427	2.295034593		
852					
853			Sway Index		

Figure C.10. CSV File Format Calculation – Final Results.

Calculation Using Formula on Excel Sheet – CTSIB Test – Multi-Trial:

This example is presented using a single condition and single trial for ease of understanding. In the field, the CTSIB (/m-CTSIB) test can be performed using multiple conditions and multiple trials. For multiple trials, the data will be displayed as Condition 1, Trial 1, Condition 2 Trial 2, or as Condition 1 Trial 1, Condition 1 Trial 2, Condition 2 Trial 1, Condition 2 Trial 2, etc.

For the following example, the Sway index is displayed as 7.405 with one condition and two trials.

	A	B	C	D	E	F
36	SwayIndex_1	7.405026527				
37	Goal_1	0.44				
40	Data start					
41	Number of Conditions	1				
42	Condition: 1	Trial: 1				

Figure C.11. Excel Spreadsheet Illustrating the Sway Index.

The sway index for trial 1 is 10.44 and 0.71 for trial 2. Overall, the averaged sway index is 7.405. The data points calculation in this case is: (807+807) = 1614.

	A	B	C
40	Data start		
41	Number of Conditions	1	
42	Condition: 1	Trial: 1	
43	-2105	-10351	
44	-2018	-10351	
45	-2018	-10351	
46	-2018	-10351	
846	-2368	-9561	
847	-2368	-9561	
848	-2368	-9561	
849	-2368	-9561	
850	Condition: 1	Trial: 2	
851	-2719	-7982	
852	-2719	-7982	
853	-2807	-7982	
854	-2807	-7982	
1654	-2456	-9825	
1655	-2456	-9825	
1656	-2456	-9737	
1657	-2456	-9737	
1658	Data end		

Figure C.12. Excel Spreadsheet Illustrating the Conditions and Trials

1. Remove the text in between the data points (e.g., Condition 1 Trail 2) to avoid any error while calculating each individual data point.
2. Determine the total of the individual data points starting from row 43 and ending with row 850 for cells C and D as follows:
   a. In cell C, row 850, enter the following formula:

      =SUM(A43:A849)

	A	B	C
36	SwayIndex_1	7.405026527	
37	Goal_1	0.44	
40	Data start		
41	Number of Conditions	1	
42	Condition: 1	Trial: 1	
43	-702	-3333	
44	-877	-3158	
45	-965	-2982	
46	-1140	-2807	
845	14912	-4737	
846	15263	-4737	
847	15439	-4649	
848	15439	-4474	
849	15526	-4386	
850	0	0	=SUM(A43:A849)
851	-4211	-3333	
852	-4123	-3158	
853	-4035	-3070	
854	-4035	-2982	
1653	-3772	-4737	
1654	-3772	-4737	
1655	-3772	-4737	
1656	-3772	-4737	
1657	-3684	-4737	
1658	Data end		

Figure C.13. Data Point Calculation

   b. In cell D, row 850, use the following formula:

      =SUM(B43:B849)

	A	B	C	D
36	SwayIndex_1	7.405026527		
37	Goal_1	0.44		
40	Data start			
41	Number of Conditions	1		
42	Condition: 1	Trial: 1		
43	-702	-3333		
44	-877	-3158		
45	-965	-2982		
46	-1140	-2807		
845	14912	-4737		
846	15263	-4737		
847	15439	-4649		
848	15439	-4474		
849	15526	-4386		
850	0	0	-101196	=SUM(B43:B849)
851	-4211	-3333		
852	-4123	-3158		
853	-4035	-3070		
854	-4035	-2982		
1653	-3772	-4737		
1654	-3772	-4737		
1655	-3772	-4737		
1656	-3772	-4737		
1657	-3684	-4737		
1658	Data end			

Figure C.13. Data Point Calculation

3. Determine the total of the individual data points starting from row 851 and ending with row 1659 for cells C and D as follows:

   a. In Cell C, row 1659, enter the following formula:

      =SUM(A851:A1657)

	A	B	C
36	SwayIndex_1	7.405026527	
37	Goal_1	0.44	
40	Data start		
41	Number of Conditions	1	
42	Condition: 1	Trial: 1	
43	-702	-3333	
44	-877	-3158	
45	-965	-2982	
46	-1140	-2807	
845	14912	-4737	
846	15263	-4737	
847	15439	-4649	
848	15439	-4474	
849	15526	-4386	
850	0	0	-101196
851	-4211	-3333	
852	-4123	-3158	
853	-4035	-3070	
854	-4035	-2982	
1653	-3772	-4737	
1654	-3772	-4737	
1655	-3772	-4737	
1656	-3772	-4737	
1657	-3684	-4737	
1658	Data end		
1659			=SUM(A851:A1657)
1660			

Figure C.14. Data Point Calculation

   b. In Cell D, row 1659, enter the following formula:

      =SUM(B851:B1657)

	A	B	C	D
36	SwayIndex_1	7.405026527		
37	Goal_1	0.44		
40	Data start			
41	Number of Conditions	1		
42	Condition: 1	Trial: 1		
43	-702	-3333		
44	-877	-3158		
45	-965	-2982		
46	-1140	-2807		
845	14912	-4737		
846	15263	-4737		
847	15439	-4649		
848	15439	-4474		
849	15526	-4386		
850	0	0	-101196	-2470354
851	-4211	-3333		
852	-4123	-3158		
853	-4035	-3070		
854	-4035	-2982		
1653	-3772	-4737		
1654	-3772	-4737		
1655	-3772	-4737		
1656	-3772	-4737		
1657	-3684	-4737		
1658	Data end			
1659			-2952898	=SUM(B851:B1657)

Figure C.15. Data Point Calculation.

4. To find the Sway Index value, enter the following formula taking the sum of all the data points on each row from 43 to 850 and placing it into cell E:

   =((A43-$C$850/807)*(A43-$C$850/807))+((B43-$D$850/807)*(B43-$D$850/807))

	A	B	C	D	E	G	H	I	J	K	L
36	SwayIndex_1	7.405026527									
37	Goal_1	0.44									
40	Data start										
41	Number of Conditions	1									
42	Condition: 1	Trial: 1									
43	-702	-3333			=((A43-$C$850/807)*(A43-$C$850/807))+((B43-$D$850/807)*(B43-$D$850/807))						
44	-877	-3158			574284.4073						
45	-965	-2982			711197.7951						
46	-1140	-2807			1094013.656						
845	14912	-4737			228931780.2						
846	15263	-4737			239611234.4						
847	15439	-4649			244771722.1						
848	15439	-4474			244246602.2						
849	15526	-4386			246721460.1						
850	0	0	-101196	-2470354							

Figure C.16. Sway Index Value for Condition 1, Trial 1

5. Repeat step 4 to determine the Sway Index value for each row from 851 to 1659:

   =((A851-$C$1659/807)*(A851-$C$1659/807))+((B851-$D$1659/807)*(B851-$D$1659/807))

	A	B	C	D	E	G	H	I	J	K	L	M
36	SwayIndex_1	7.405026527										
37	Goal_1	0.44										
40	Data start											
41	Number of Conditions	1										
42	Condition: 1	Trial: 1										
43	-702	-3333			406368.5461							
44	-877	-3158			574284.4073							
45	-965	-2982			711197.7951							
46	-1140	-2807			1094013.656							
845	14912	-4737			228931780.2							
846	15263	-4737			239611234.4							
847	15439	-4649			244771722.1							
848	15439	-4474			244246602.2							
849	15526	-4386			246721460.1							
850	0	0	-101196	-2470354								
851	-4211	-3333			=((A851-$C$1659/807)*(A851-$C$1659/807))+((B851-$D$1659/807)*(B851-$D$1659/807))							
852	-4123	-3158			1814670.938							
853	-4035	-3070			1971101.134							
854	-4035	-2982			2216920.792							
1653	-3772	-4737			111528.0611							
1654	-3772	-4737			111528.0611							
1655	-3772	-4737			111528.0611							
1656	-3772	-4737			111528.0611							
1657	-3684	-4737			99402.59892							
1658	Data end											
1659			-2952898	-3569121								

Figure C.17. Sway Index Value for Condition 1, Trial 2

6. To find the Sway Index value, enter the following formula taking the sum of all the data points on cell C and placing it into cell E:

   =SQRT(SUM(C43:C849)/807)/1000, using this formula output is 7.4092

	A	B	C	D	E	G	H
36	SwayIndex_1	7.405026527					
37	Goal_1	0.44					
40	Data start						
41	Number of Conditions	1					
42	Condition: 1	Trial: 1					
43	-702	-3333			406368.5461		
44	-877	-3158			574284.4073		
45	-965	-2982			711197.7951		
46	-1140	-2807			1094013.656		
845	14912	-4737			228931780.2		
846	15263	-4737			239611234.4		
847	15439	-4649			244771722.1		
848	15439	-4474			244246602.2		
849	15526	-4386			246721460.1		
850	0	0	-101196	-2470354			
851	-4211	-3333			1492039.49		
852	-4123	-3158			1814670.938		
853	-4035	-3070			1971101.134		
854	-4035	-2982			2216920.792		
1653	-3772	-4737			111528.0611		
1654	-3772	-4737			111528.0611		
1655	-3772	-4737			111528.0611		
1656	-3772	-4737			111528.0611		
1657	-3684	-4737			99402.59892		
1658	Data end						
1659			-2952898	-3569121	=SQRT(SUM(E43:E1657)/1614)/1000		

Figure C.18. Using Formula to Calculate the Sum of all Sway Indexes

Where:

1614 = the number of samples for this example.

1000 = the scale factor.

7. After all of the formulas have been entered and applied, the final output matches the value of the Sway Index displayed in the exported CSV file as illustrated in Figure C.19 below.

	A	B	C	D	E	G
36	SwayIndex_1	7.405026527				
37	Goal_1	0.44				
40	Data start					
41	Number of Conditions	1				
42	Condition: 1	Trial: 1				
43	-702	-3333			406368.5461	
44	-877	-3158			574284.4073	
45	-965	-2982			711197.7951	
46	-1140	-2807			1094013.656	
845	14912	-4737			228931780.2	
846	15263	-4737			239611234.4	
847	15439	-4649			244771722.1	
848	15439	-4474			244246602.2	
849	15526	-4386			246721460.1	
850	0	0	-101196	-2470354		
851	-4211	-3333			1492039.49	
852	-4123	-3158			1814670.938	
853	-4035	-3070			1971101.134	
854	-4035	-2982			2216920.792	
1653	-3772	-4737			111528.0611	
1654	-3772	-4737			111528.0611	
1655	-3772	-4737			111528.0611	
1656	-3772	-4737			111528.0611	
1657	-3684	-4737			99402.59892	
1658	Data end					
1659			-2952898	-3569121	7.409299925	
1660						
1661					Sway Index	

Figure C.19. Excel File Format Calculation- Final Results

Calculation of Stability Index from the CSV File Data

The following section will describe the Stability Index and how to verify/ obtain that same data using an Excel spreadsheet.

The displayed Overall Stability Index for the exported Postural Stability Test file is 10.030.

18	TracingOnOff	ON				
19	ToneOnOff	OFF				
20	RestCountDownTime	10				
21	StabilityOverall	10.03069618				
22	StabilityAntPost	6.310578426				
23	StabilityMedialLat	6.495353483				
24	SwayOverall	9.975201913				
25	SwayAntPost	6.801880444				
26	SwayMedialLat	7.296511196				

Figure C.20. CSV File Format Calculation – Snippet From Original Exported CSV File.

Calculation Using the Formula on the Excel Sheet – Postural Stability Test

The process to calculate the Stability Index from the sample Postural Stability Test exported csv file is similar to that used to calculate the CTSIB (/m-CTSIB) test.

	A	B	C	D
46	Data start			
47	Trial: 1			
48	4298	9035		
49	4211	9123		
50	4123	9035		
51	4035	9035		
52	3947	9035		
53	3772	9035		
445	-2632	-8509		
446	-2018	-8509		
447	-1491	-8509		
448	-1140	-8509		
449	-877	-8421		
450	-702	-8421		
451	-614	-8421		
452	Data end			
453				

Figure C.21. CSV file format calculation – Data point segment of the original exported csv file

In the file displayed in C.21, it is evident that the data starts in the 48th row and ends in the 451th row. Therefore, the total number of records/rows of data is calculated as: [(451-48) + 1] = 404. This will vary with each test since the 40Hz sample rate is only an approximation. 404 is used in this example alone as the total number of data points.

Please note that some of the rows in following figures have been hidden for better representation. For an original calculation, it is not required to hide any of the rows.

How to Determine the Total Number of Data Points within a CSV File:

Using row 453 of the Excel spreadsheet as the repository, determine the total of the individual data points starting from row 48 and ending with row 451 for cell A:

1. In cell A, row 851 enter the following formula:

   =SUM(A48:A451)

	A	B	C	D	E
46	Data start				
47	Trial: 1				
48	4298	9035			
49	4211	9123			
50	4123	9035			
51	4035	9035			
52	3947	9035			
53	3772	9035			
445	-2632	-8509			
446	-2018	-8509			
447	-1491	-8509			
448	-1140	-8509			
449	-877	-8421			
450	-702	-8421			
451	-614	-8421			
452	Data end				
453	=SUM(A48:A451)				

Figure C.22 CSV File Format Calculation – Finding the Total of Individual Data Points

2. To determine the Stability Index for each data point within the spreadsheet, enter the following formula in cell C of every row starting with the first data point in row 48 and ending with the last data point in row 451:

   =SQRT(A48*A48+B48*B48)

	A	B	C	D	E	F
46	Data start					
47	Trial: 1					
48	4298	9035	=SQRT(A48*A48+B48*B48)			
49	4211	9123	10047.97			
50	4123	9035	9931.282			
51	4035	9035	9895.072			
52	3947	9035	9859.515			
53	3772	9035	9790.772			
445	-2632	-8509	8906.767			
446	-2018	-8509	8745.022			
447	-1491	-8509	8638.644			
448	-1140	-8509	8585.027			
449	-877	-8421	8466.544			
450	-702	-8421	8450.21			
451	-614	-8421	8443.355			
452	Data end					
453	-273762					

Figure C.23 CSV File Format Calculation- Using Formula to Calculate Stability Index for Each Data Point.

3. To find the Stability Index value, enter the following formula to take the sum of all the data points in cell C.

   =AVERAGE(C48:C451)/1000, using this formula output is 10.030

	A	B	C	D	E
46	Data start				
47	Trial: 1				
48	4298	9035	10005.2001		
49	4211	9123	10047.9675		
50	4123	9035	9931.28159		
51	4035	9035	9895.07201		
52	3947	9035	9859.5149		
53	3772	9035	9790.77162		
445	-2632	-8509	8906.76737		
446	-2018	-8509	8745.02173		
447	-1491	-8509	8638.64353		
448	-1140	-8509	8585.02656		
449	-877	-8421	8466.54416		
450	-702	-8421	8450.20976		
451	-614	-8421	8443.35461		
452	Data end				
453	-273762		=AVERAGE(C48:C451)/1000		
454					

Figure C.24. CSV File Format Calculation- Using Formula to Calculate the Sum of all Stability Indexes.

Where: 1000 = the scale factor

4. After all of the formulas have been entered and applied, the final output matches the value of the Stability Index displayed in the exported CSV file as illustrated in Figure C.25 below.

	A	B	C	D
46	Data start			
47	Trial: 1			
48	4298	9035	10005.2001	
49	4211	9123	10047.96746	
50	4123	9035	9931.281589	
51	4035	9035	9895.072006	
52	3947	9035	9859.514897	
53	3772	9035	9790.771624	
445	-2632	-8509	8906.767371	
446	-2018	-8509	8745.021727	
447	-1491	-8509	8638.643528	
448	-1140	-8509	8585.026558	
449	-877	-8421	8466.544159	
450	-702	-8421	8450.209761	
451	-614	-8421	8443.354606	
452	Data end			
453	-273762		**10.03070344**	
454				
455			Overall Stability Index	
456				

Figure C.25. CSV file format calculation- final results

Multi Record Data Export for Creating Custom Normative Data

The Balance SD system allows the user to export multiple records of any type of test in to a single CSV file. This exported file can be used to create normative data. The example in Figure C.26 is a snapshot of a previously exported CTSIB test-type CSV file.

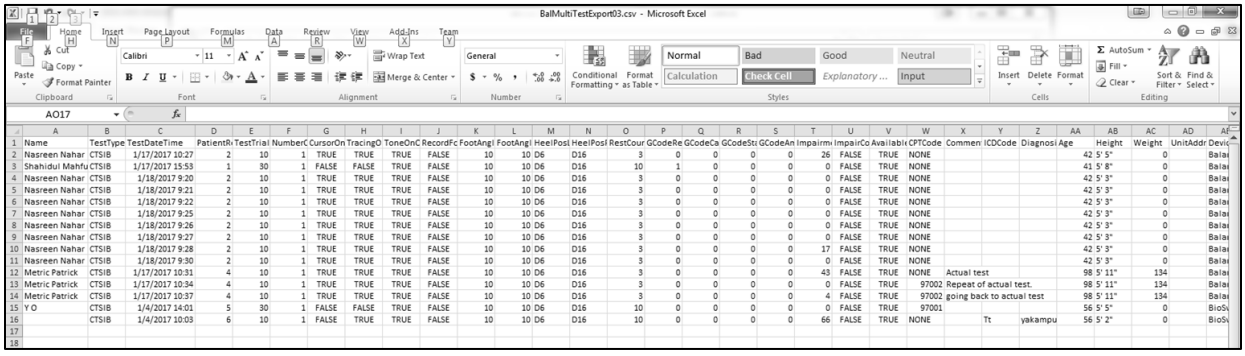


Figure C.26. Display of csv file data opened in Microsoft Excel.

Each row represents an individual test record. There will be more columns for each row than displayed on the sample report. It is suggested that the unnecessary data columns be deleted or hidden. The statistical analysis can easily be performed on this data.

Note: *The data used in the following example may not necessarily represent real data. It is presented to demonstrate how to obtain normative data.*

1. First, remove or hide all unnecessary columns. For the example displayed in this manual, the following columns are displayed: Name, TestDateTime, Age, Height, SwayIndex_1, SwayIndex_2, SwayIndex_3, SwayIndex_4. There are 100 rows of data.
2. Next, insert a blank column after each SwayIndex column for calculation purposes. In this case, columns F, H, J, and L were inserted.
3. Enter the following formula for each row in column F from cell E2 to E100:

   =IF(E2,LN(E2),"")

   Note: *Any erroneous sample that has a value of 0 will be discarded by the use of the IF in the formula.*

4. Repeat step 3 for the other columns: H, J, and L from cell 2 to 100.
   Note: *Remember to change the column name in the formula for each column.*
5. At the end of the Data (row 101 for our example), enter the following formula for each of the following columns: E, G, I, and K:
   =AVERAGE(E2:E100)
   Note: *Remember to change the value in the parentheses (e.g., E2: E100) with the appropriate value for each column.*
6. Enter the following formula on row 102 for each of the following columns F, H, J, and L.
   =STDEV(F2:F100)
   Note: *Remember to change the value in the parentheses (e.g., F2: F100) with the appropriate value for each column.*

	A	B	C	D	E	F	G	H	I	J	K	L
1	Name	TestDateTime	Age	Height	SwayIndex_1	ln(column E)	SwayIndex_2	ln(column G)	SwayIndex_4	ln(column I)	SwayIndex_5	ln(column K)
2	######	5/4/2011 14:39	15	59"-65"	1.82	0.598836501	0.49	-0.713349888	0.51	-0.673344553	0.55	-0.597837001
3	######	5/5/2011 12:04	15	59"-65"	0.78	-0.248461359	0.68	-0.385662481	0.63	-0.46203546	2.43	0.887891257
4	######	5/5/2011 12:08	15	65"-73"	0.28	-1.272965676	0.62	-0.478035801	0.26	-1.347073648	1.45	0.371563556
5	######	5/5/2011 12:15	15	59"-65"	0.44	-0.820980552	0.64	-0.446287103	0.35	-1.049822124	1.33	0.285178942
6	######	5/7/2011 11:39	15	65"-73"	0.49	-0.713349888	0.65	-0.430782916	0.84	-0.174353387	2.19	0.783901544
7	######	5/7/2011 11:42	15	59"-65"	0.47	-0.755022584	0.81	-0.210721031	0.76	-0.274436846	2.47	0.904218151
8	######	5/7/2011 13:08	15	59"-65"	0.8	-0.223143551	1.12	0.113328685	1.68	0.518793793	0.93	-0.072570693
9	######	5/7/2011 12:42	15	59"-65"	0.48	-0.733969175	1.52	0.418710335	0.48	-0.733969175	1.12	0.113328685
10	######	5/7/2011 12:46	15	59"-65"	0.3	-1.203972804	0.74	-0.301105093	0.94	-0.061875404	2.22	0.797507196
90	######	6/4/2011 13:47	16	65"-73"	0.79	-0.235722334	0.8	-0.223143551	0.85	-0.162518929	1.77	0.570979547
91	######	6/4/2011 13:52	14	65"-73"	0.4	-0.916290732	0.55	-0.597837001	0.76	-0.274436846	1.65	0.500775288
92	######	6/4/2011 13:56	15	65"-73"	0.49	-0.713349888	0.55	-0.597837001	0.7	-0.356674944	1.86	0.620576488
93	######	6/4/2011 14:01	16	65"-73"	0.39	-0.94160854	0.52	-0.653926467	0.61	-0.494296322	1.46	0.378436436
94	######	6/4/2011 14:05	15	59"-65"	0.46	-0.776528789	0.55	-0.597837001	0.75	-0.287682072	1.69	0.524728529
95	######	6/4/2011 14:09	18	65"-73"	0.33	-1.108662625	0.38	-0.967584026	0.47	-0.755022584	1.77	0.570979547
96	######	6/4/2011 14:14	16	65"-73"	0.28	-1.272965676	0.74	-0.301105093	0.44	-0.820980552	1.86	0.620576488
97	######	6/4/2011 14:18	16	59"-65"	0.44	-0.820980552	0.46	-0.776528789	0.58	-0.544727175	1.94	0.662687973
98	######	6/4/2011 14:22	15	65"-73"	0.5	-0.693147181	0.8	-0.223143551	0.75	-0.287682072	1.87	0.625938431
99	######	6/4/2011 14:27	15	73+"	0.22	-1.514127733	0.42	-0.867500568	0.42	-0.867500568	1.46	0.378436436
100	######	6/4/2011 14:31	16	59"-65"	0.46	-0.776528789	0.56	-0.579818495	0.66	-0.415515444	2.59	0.951657876
101		Average			0.578989899		0.769191919		0.791919192		1.809494949	
102		SD				0.463771078		0.423821469		0.385981772		0.346537331
103												

Figure C.27. Display of CTSIB Data Columns with those that are not of Interest Deleted.

7. The example in Figure C.27 illustrates the final format after the necessary modification has been made to the original CSV file. The Average and the Standard Deviation was calculated from Sway indexes (with Natural Logarithm applied on each score). This can be used as the normative value and can be entered into the Balance product software (BioSway and/or SD).

   Tips for Excel users: A .CSV file that has been opened using Excel and modified using cell formatting will not retain any of the original formatting when saved. If it is necessary to retain the original formatting, the file can be saved as an Excel file (.xls file).

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