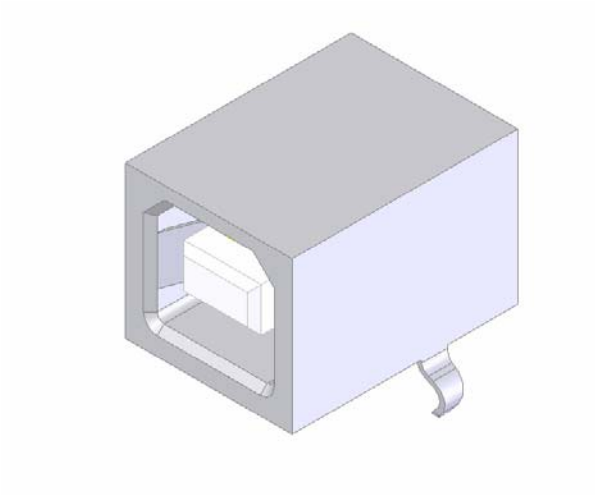
Project Number:	Tracking Code: TC068--0952		
Requested by: Brandon Harpenau	Date: 2/24/2006	Product Rev: N/A	
Part #: USB-B-S-X-X-TH & USBR-B-X-O-TH-R	Lot #: N/A	Tech: Troy Cook	Eng: Brandon Harpenau
Part description: I/O Connector			Qty to test: 10
Test Start: 02/27/2006	Test Completed: 2/27/2006		



Mating/Unmating Comparison of

USB-B-S-X-X-TH & USBR-B-X-O-TH-R

Tracking Code: TC068--0952	Part #: USB-B-S-X-X-TH & USBR-B-X-O-TH-R
Part description: I/O Connector	

CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to IS0 10012-l and ANSI/NCSL 2540-1, as applicable.

SCOPE

To perform the following tests: Prepare a report comparing the mating/unmating forces of the USBR-B vs the USB-B connectors. Reference tracking codes TC054-Rugged-USB-B-603 and TC057-Rugged USB-B-0617.

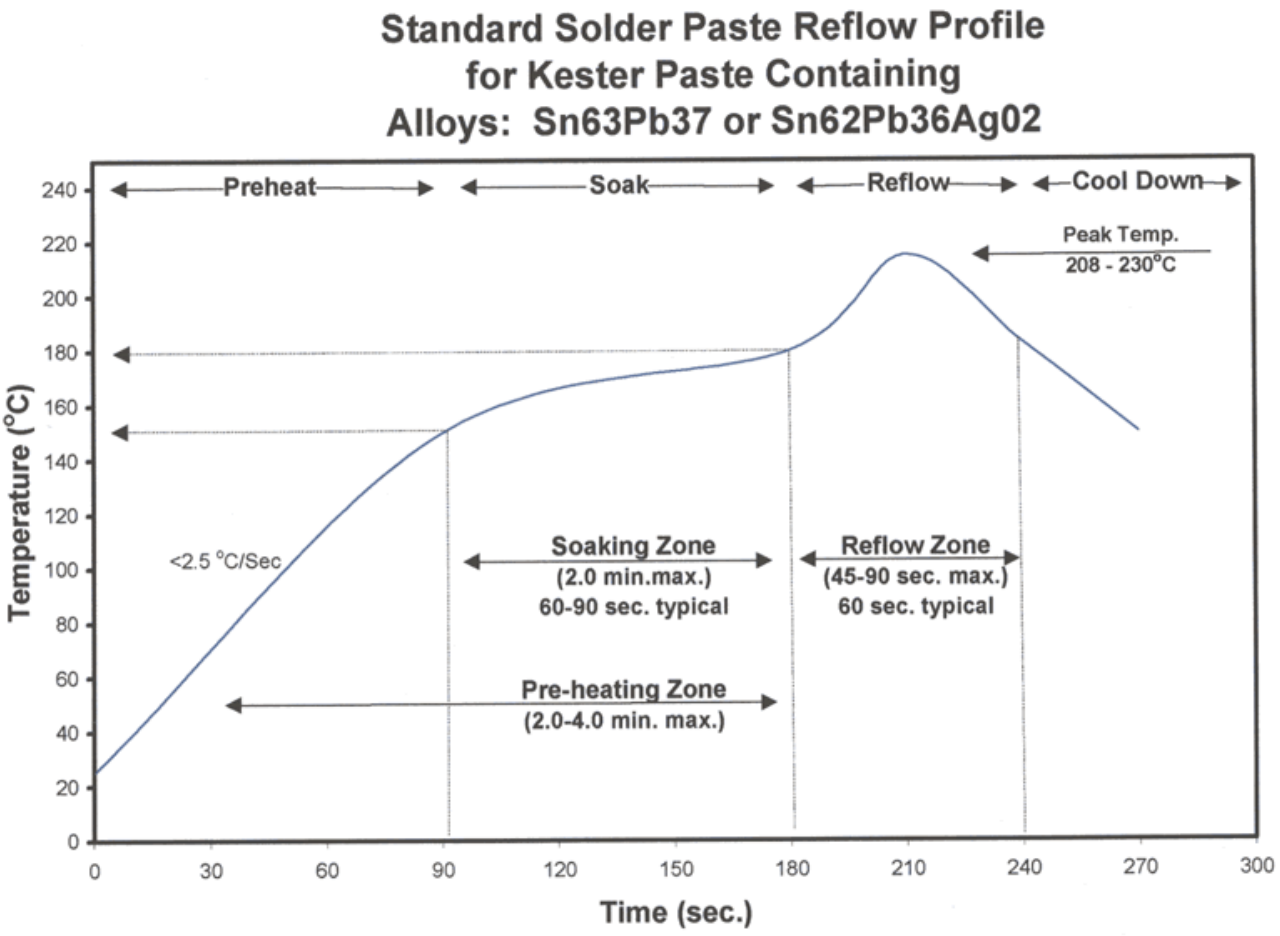
APPLICABLE DOCUMENTS

Standards: EIA Publication 364

TEST SAMPLES AND PREPARATION

1) All materials were manufactured in accordance with the applicable product specification.
2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
3) After soldering, the parts to be used for LLCR and DWV/IR testing were cleaned according to TLWI-0001.
4) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
5) The automated procedure is used with aqueous compatible soldering materials.
6) The ultrasonic procedure can be used with either aqueous or non-aqueous soldering components and follows:
    a. Sample test boards are to be ultrasonically cleaned after test lead attachment, preparation and/or soldering.
    b. Sample test boards are immersed into Branson 3510 cleaner containing Kyzen Ionox HC1 (or equivalent) with the following conditions:
        i. Temperature: -------55° C+/- 5° C
        ii. Frequency:----------40 KHz
        iii. Immersion Time: ---5 to 10 Minutes
    c. Sample test boards are removed and placed into the Branson 3510 cleaner containing deionized water with the following conditions:
        i. Temperature: --------55° C +/- 5° C
        ii. Frequency:----------40 KHz
        iii. Immersion Time: ---5 to 10 Minutes
    d. Sample test boards are removed and placed in a beaker positioned on a hot plate with a magnetic stirrer containing deionized water warmed to 55° C +/- 5° C for 1/2 to 1 minute.
    e. Upon removal, the sample boards are rinsed for ½ to 1 minute at room temperature with free flowing deionized water.
    f. After the final rinse, the sample test boards are dried in an air-circulating oven for 10 to 15 minutes at 50° C +/- 5° C.
    g. Sample test boards are then allowed to set and recover to room ambient condition prior to testing.
7) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
8) Any additional preparation will be noted in the individual test sequences.
9) Solder Information: None soldered
10) Re-Flow Time/Temp: See accompanying profile.
11) Internal Test PCBs used: None Used

OVEN PROFILE (Soldering Parts to Test Boards)



FLOWCHARTS

Mating/Unmating

	USB-B-S-X-X-X-XX	USBR-B-X-O-TH-R
TEST STEP	**GROUP A** **10 Connectors** **100 Cycles**	**GROUP B** **10 Connectors** **100 Cycles**
01	Mating / Unmating	Mating / Unmating
02	10 Cycles	10 Cycles
03	Mating / Unmating	Mating / Unmating
04	Data Review	Data Review
05	25 Cycles (+15)	25 Cycles (+15)
06	Mating / Unmating	Mating / Unmating
07	Data Review	Data Review
08	50 Cycles (+25)	50 Cycles (+25)
09	Mating / Unmating	Mating / Unmating
10	Data Review	Data Review
11	Data Review	Data Review
12	100 Cycles (+50)	100 Cycles (+50)
13	Mating / Unmating	Mating / Unmating
14	Data Review	Data Review

Mating/Un-Mating Forces = EIA-364-13

Functional Weight Testing

	USBR-B-X-O-TH-R Only	
TEST STEP	**GROUP A** **10 Connectors** **5 Cycles with 3.5 Lb. Wt. attached**	
01	Sample lifted up 1.0 in.	**Cycle#1**
02	Suspend for 60 secs.	
03	Lower sample down to relieve wt.	
04	Sample lifted up 1.0 in.	**Cycle#2**
05	Suspend for 60 secs.	
06	Lower sample down to relieve wt.	
07	Sample lifted up 1.0 in.	**Cycle#3**
08	Suspend for 60 secs.	
09	Lower sample down to relieve wt.	
10	Sample lifted up 1.0 in.	**Cycle#4**
11	Suspend for 60 secs.	
12	Lower sample down to relieve wt.	
13	Sample lifted up 1.0 in.	**Cycle#5**
14	Suspend for 60 secs.	
15	Lower sample down to relieve wt.	

Tracking Code: TC068--0952	Part #: USB-B-S-X-X-TH & USBR-B-X-O-TH-R
Part description: I/O Connector	

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

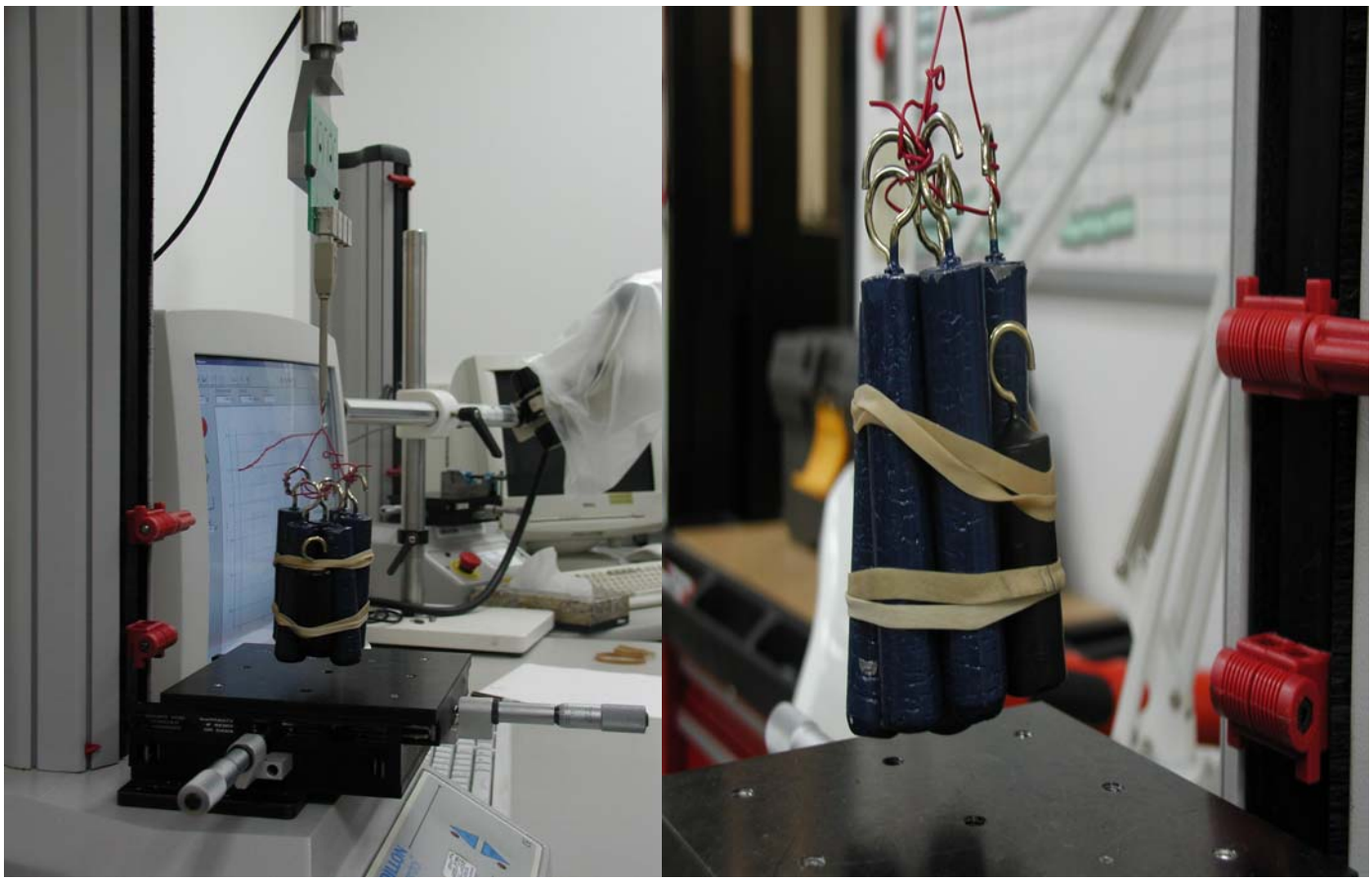
MATING/UNMATING:

1) Reference document: EIA-364-13, *Mating and Unmating Forces Test Procedure for Electrical Connectors.*
2) The full insertion position was to within 0.003” to 0.004” of the plug bottoming out in the receptacle to prevent damage to the system under test.
3) One of the mating parts is secured to a floating X-Y table to prevent damage during cycling.

SUPPLEMENTAL TEST

Functional Cable Weight Test

A. Mating male connector attached to a 3.5 Lb. test weight.
B. Mating male connector then mated with female USB-B connector**.**
C. The Dillon test stand then raised the mated pair at a rate of 1.0” / minute to a height approximately 1.0” off of the table.
D. The mated pair remained suspended for 60 seconds and then lowered back down at the same rate to the table.
E. The connectors remain mated.
F. This is repeated 5 times or until the mating connector become unseated.



Tracking Code: TC068--0952	Part #: USB-B-S-X-X-TH & USBR-B-X-O-TH-R
Part description: I/O Connector	

RESULTS

Mating – Unmating Forces

	USBR-B	USB-B
• **Initial**		
o **Mating**		
▪ **Min** ----------	**3.8 Lb.**	**4.0 Lb.**
▪ **Max**----------	**5.9 Lb.**	**4.8 Lb.**
o **Unmating**		
▪ **Min** ----------	**3.8 Lb.**	**3.2 Lb.**
▪ **Max**----------	**7.7 Lb.**	**4.3 Lb.**
• **After 10 Cycles**		
o **Mating**		
▪ **Min** ----------	**4.2 Lb.**	**3.3 Lb.**
▪ **Max**----------	**9.2 Lb.**	**5.7 Lb.**
o **Unmating**		
▪ **Min** ----------	**4.1 Lb.**	**3.1 Lb.**
▪ **Max**----------	**10.5 Lb.**	**5.7 Lb.**
• **After 25 Cycles**		
o **Mating**		
▪ **Min** ----------	**7.1 Lb.**	**3.8 Lb.**
▪ **Max**----------	**10.6 Lb.**	**6.2 Lb.**
o **Unmating**		
▪ **Min** ----------	**5.6 Lb.**	**3.1 Lb.**
▪ **Max**----------	**11.4 Lb.**	**6.3 Lb.**
• **After 50 Cycles**		
o **Mating**		
▪ **Min** ----------	**8.1 Lb.**	**3.9 Lb.**
▪ **Max**----------	**14.0 Lb.**	**6.5 Lb.**
o **Unmating**		
▪ **Min** ----------	**8.8 Lb.**	**4.6 Lb.**
▪ **Max**----------	**13.0 Lb.**	**7.2 Lb.**
• **After 100 Cycles**		
o **Mating**		
▪ **Min** ----------	**9.3 Lb.**	**5.0 Lb.**
▪ **Max**----------	**13.4 Lb.**	**6.3 Lb.**
o **Unmating**		
▪ **Min** ----------	**9.0 Lb.**	**5.3 Lb.**
▪ **Max**----------	**13.0 Lb.**	**7.2 Lb.**

SUPPLEMENTAL TESTING

Functional Cable Weight Test

- **Cycle#1**---------- **All 5 samples supported the 3.5 Lb. weight.**
- **Cycle#2**---------- **All 5 samples supported the 3.5 Lb. weight.**
- **Cycle#3**---------- **All 5 samples supported the 3.5 Lb. weight.**
- **Cycle#4**---------- **All 5 samples supported the 3.5 Lb. weight.**
- **Cycle#5**---------- **All 5 samples supported the 3.5 Lb. weight.**

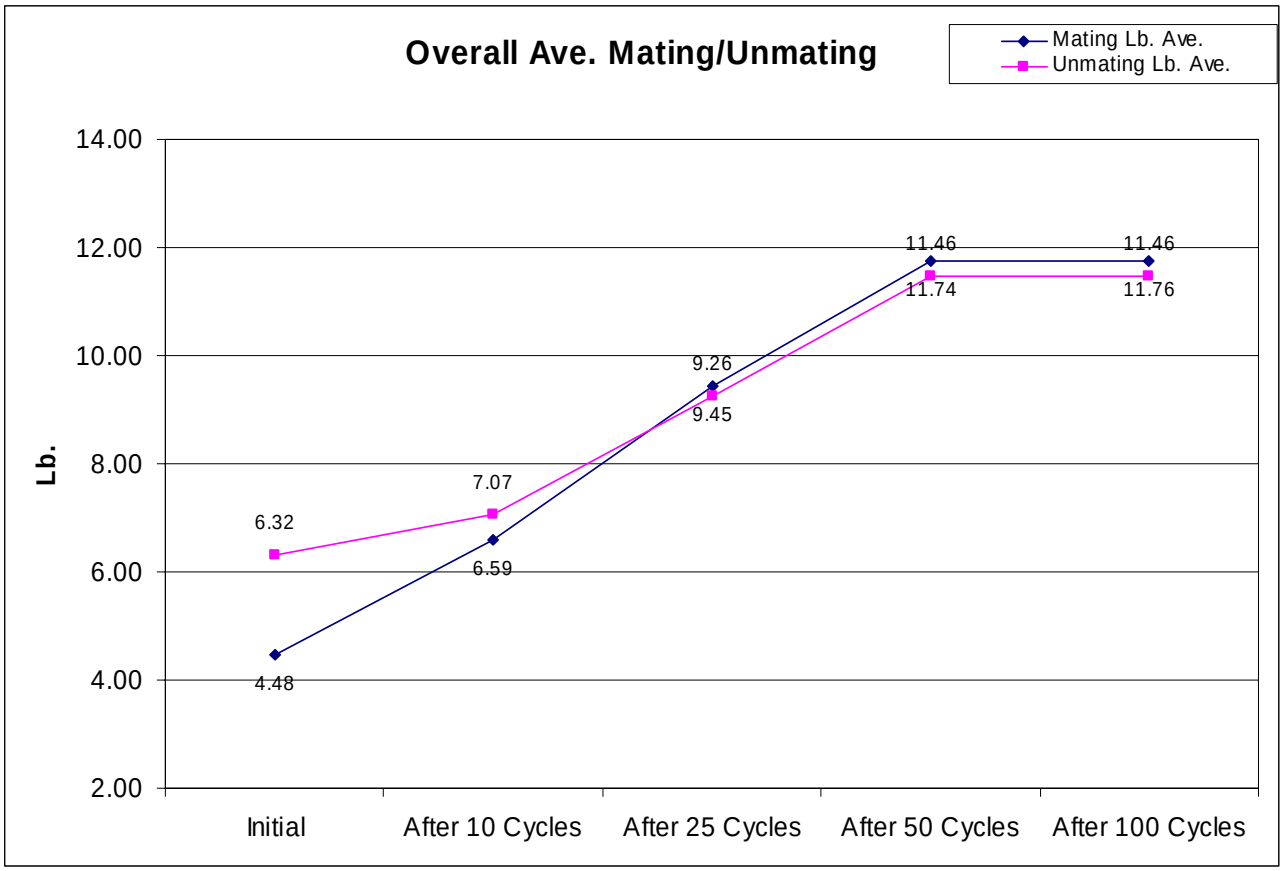
Tracking Code: TC068--0952	Part #: USB-B-S-X-X-TH & USBR-B-X-O-TH-R
Part description: I/O Connector	

DATA SUMMARIES

MATING/UNMATING:

USBR-B

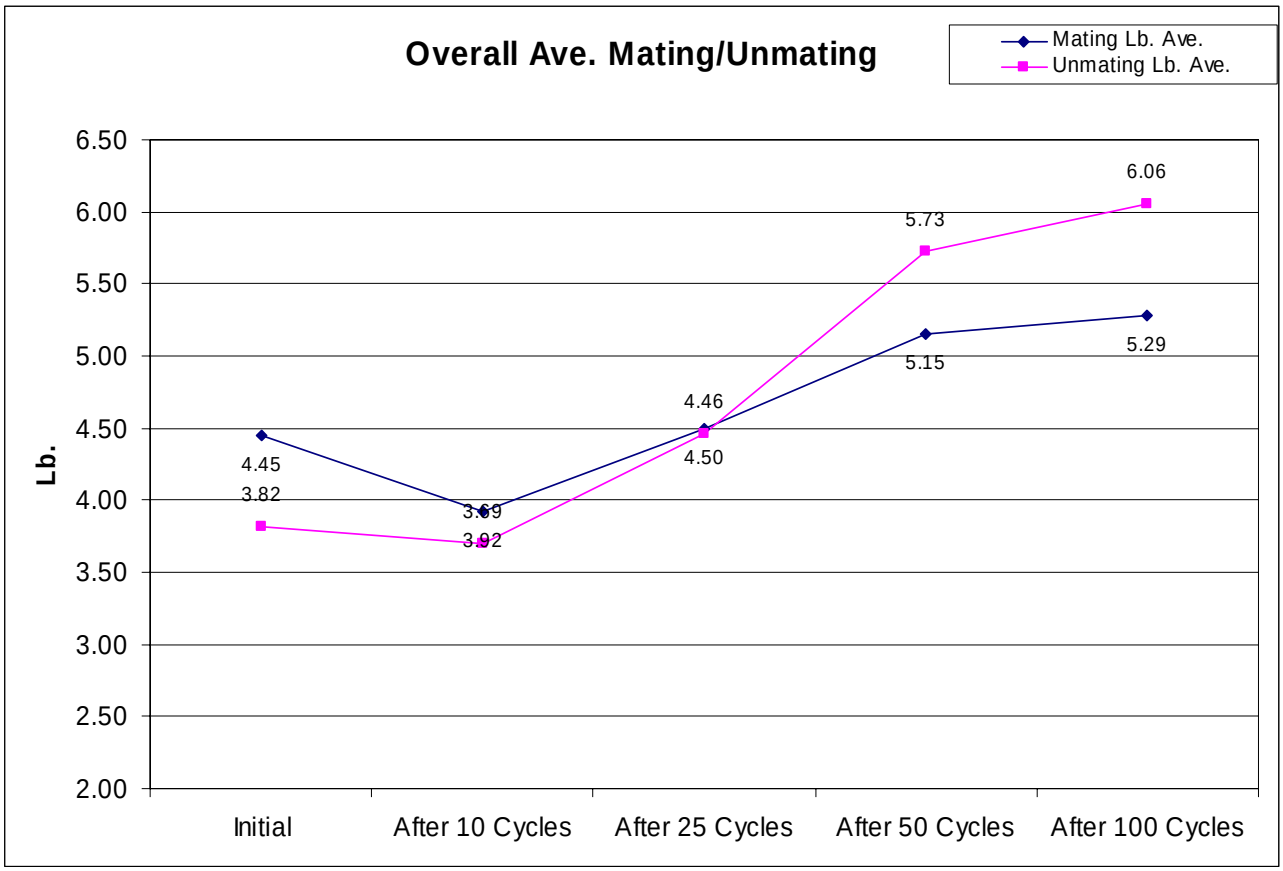
	Test Stresses		Mating Lb. Ave.	Unmating Lb. Ave.
1	**Initial**	Initial	4.48	6.32
2	**After 10 Cycles**	After 10 Cycles	6.59	7.07
3	**After 25 Cycles**	After 25 Cycles	9.45	9.26
4	**After 50 Cycles**	After 50 Cycles	11.74	11.46
5	**After 100 Cycles**	After 100 Cycles	11.76	11.46



DATA SUMMARIES Continued

USB-B

	Test Stresses		Mating Lb. Ave.	Unmating Lb. Ave.
1	**Initial**	Initial	4.45	3.82
2	**After 10 Cycles**	After 10 Cycles	3.92	3.69
3	**After 25 Cycles**	After 25 Cycles	4.50	4.46
4	**After 50 Cycles**	After 50 Cycles	5.15	5.73
5	**After 100 Cycles**	After 100 Cycles	5.29	6.06



DATA SUMMARIES Continued

Functional Cable Weight Test

Sample#	***Cycle#1*** (Pass/Fail)	***Cycle#2*** (Pass/Fail)	***Cycle#3*** (Pass/Fail)	***Cycle#4*** (Pass/Fail)	***Cycle#5*** (Pass/Fail)
1	Pass	Pass	Pass	Pass	Pass
2	Pass	Pass	Pass	Pass	Pass
3	Pass	Pass	Pass	Pass	Pass
4	Pass	Pass	Pass	Pass	Pass
5	Pass	Pass	Pass	Pass	Pass

Tracking Code: TC068--0952	Part #: USB-B-S-X-X-TH & USBR-B-X-O-TH-R
Part description: I/O Connector	

DATA

MATING/UNMATING:

USBR-B

	Initial				After 10 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
Sample#	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)
1	1.9	4.24	2.9	6.43	2.9	6.38	3.4	7.51
2	2.7	5.93	1.7	3.84	2.6	5.75	2.7	5.87
3	2.1	4.54	3.2	7.05	4.2	9.24	4.8	10.52
4	1.7	3.76	2.0	4.32	1.9	4.19	1.8	4.07
5	2.1	4.57	3.3	7.34	4.1	9.07	3.7	8.06
6	1.9	4.12	3.1	6.88	2.3	5.05	3.0	6.64
7	2.1	4.66	3.5	7.74	2.3	5.04	3.2	7.01
8	1.9	4.13	2.4	5.24	3.0	6.57	2.5	5.60
9	1.9	4.09	3.1	6.84	3.2	6.95	3.6	7.92
10	2.2	4.79	3.4	7.50	3.5	7.61	3.4	7.49

	After 25 Cycles				After 50 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
Sample#	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)
1	4.7	10.29	4.6	10.22	6.2	13.59	5.5	12.13
2	4.4	9.77	4.3	9.55	5.4	11.81	4.7	10.33
3	4.6	10.17	4.6	10.18	5.8	12.71	5.6	12.24
4	3.2	7.12	2.5	5.60	4.3	9.51	4.0	8.84
5	4.8	10.55	5.1	11.35	5.8	12.79	5.5	12.14
6	3.7	8.07	3.4	7.45	3.7	8.14	5.9	13.03
7	4.6	10.09	4.6	10.19	6.4	14.01	5.9	12.90
8	4.4	9.71	4.3	9.43	4.7	10.31	4.2	9.34
9	4.1	8.96	4.1	9.03	5.3	11.78	5.2	11.40
10	4.4	9.72	4.3	9.59	5.8	12.77	5.6	12.28

	After 100 Cycles			
	Mating		**Unmating**	
Sample#	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)
1	5.0	11.06	4.7	10.31
2	6.1	13.42	4.9	10.73
3	5.5	12.16	5.8	12.75
4	4.2	9.26	4.4	9.67
5	5.7	12.66	5.5	12.04
6	5.6	12.33	5.6	12.45
7	5.5	12.22	5.6	12.43
8	4.5	9.93	4.1	8.96
9	5.5	12.21	5.5	12.20
10	5.6	12.36	5.9	13.04

Tracking Code: TC068--0952	Part #: USB-B-S-X-X-TH & USBR-B-X-O-TH-R
Part description: I/O Connector	

DATA Continued

USB-B

	Initial				After 10 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
Sample#	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)
1	1.8	3.91	1.9	4.26	1.8	4.00	1.7	3.74
2	2.0	4.42	1.9	4.08	1.8	4.00	1.5	3.29
3	2.0	4.37	1.9	4.12	1.5	3.27	1.4	3.06
4	2.2	4.80	1.5	3.35	1.8	3.97	1.4	3.09
5	2.0	4.33	1.5	3.21	1.5	3.40	1.6	3.55
6	2.2	4.78	1.7	3.64	1.8	3.89	1.4	3.05
7	2.0	4.48	1.6	3.46	1.9	4.20	1.5	3.34
8	2.0	4.48	1.9	4.23	2.6	5.66	2.6	5.73
9	2.1	4.71	1.7	3.73	1.5	3.39	1.7	3.75
10	1.9	4.19	1.9	4.13	1.6	3.43	2.0	4.34

	After 25 Cycles				After 50 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
Sample#	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)
1	2.1	4.59	2.5	5.56	2.4	5.30	2.9	6.47
2	1.8	3.97	1.9	4.09	2.2	4.95	2.4	5.25
3	1.8	3.98	1.4	3.05	2.7	5.97	2.4	5.29
4	2.1	4.63	1.8	3.91	2.5	5.51	2.8	6.24
5	1.9	4.17	1.9	4.17	2.3	5.12	2.7	6.02
6	1.9	4.17	1.6	3.51	1.8	4.06	2.3	5.02
7	2.2	4.77	2.1	4.68	2.4	5.25	2.5	5.55
8	2.8	6.23	2.9	6.33	3.0	6.51	3.2	7.16
9	1.7	3.83	1.8	3.88	1.8	3.93	2.1	4.60
10	2.1	4.62	2.5	5.45	2.2	4.92	2.6	5.68

	After 100 Cycles			
	Mating		**Unmating**	
Sample#	Force (Kg)	Force (Lbs)	Force (Kg)	Force (Lbs)
1	2.4	5.36	3.3	7.18
2	2.4	5.30	2.6	5.71
3	2.4	5.22	2.4	5.29
4	2.6	5.67	3.0	6.69
5	2.3	5.12	2.7	5.98
6	2.3	5.14	2.5	5.48
7	2.3	5.01	2.6	5.68
8	2.9	6.29	3.2	6.96
9	2.1	4.63	2.5	5.52
10	2.3	5.12	2.8	6.07

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: THL-02
Description: Temperature/Humidity Chart Recorder
Manufacturer: Dickson
Model: THDX
Serial #: 00120351
Accuracy: Temp: +/- 1C; Humidity: +/-2% RH (0 - 60%) +/- 3% RH (61 - 95%).
… Last Cal: 06/16/05, Next Cal: 06/16/06

Equipment #: TCT-03
Description: Dillon Quantrol TC2 Test Stand
Manufacturer: Dillon Quantrol
Model: TC2
Serial #: 02-1033-03
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.
… Last Cal: 5/12/05, Next Cal: 5/12/06

Equipment #: LC-250N (icell)
Description: 250 Newton load cell for Dillon Quantrol test stand
Manufacturer: Dillon Quantrol
Model: icell
Serial #: 04-0020-08
Accuracy: .10 % of Capacity
… Last Cal: 4/19/2005, Next Cal: 4/19/2006