JUNE 21, 2000

TEST REPORT #99709, REV.1.1

VERIFICATION TEST
COMPLIANT PIN CONNECTOR

PART NUMBER: PTHF-130-02-G-Q

SAMTEC

APPROVED BY: MAX PEEL
PRESIDENT
CONTECH RESEARCH, INC.

ACCREDITED

Contech Research

REVISION HISTORY

DATE	REV. NO.	DESCRIPTION	ENG.
6/210/2000	1.0	Initial Issue	MP
12/9/2000	1.1	Changed P/N: ASP-64075-01 to PTHF-130-02-G-Q on all applicable pages.	MP

CERTIFICATION

This is to certify that the evaluation described herein was designed and executed by personnel of Contech Research, Inc. It was performed in concurrence of Samtec, of New Albany, IN who was the test sponsor.

All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1 and ANSI/NCSL Z540-1, as applicable.

All data, raw and summarized, analysis and conclusions presented herein are the property of the test sponsor. No copy of this report, except in full, shall be forwarded to any agency, customer, etc., without the written approval of the test sponsor and Contech Research.

Max Peel
President
Contech Research, Inc.

MP:js

SCOPE

To perform verification testing on compliant pin connectors as manufactured and submitted by the test sponsor Samtec.

APPLICABLE DOCUMENTS

1. Unless otherwise specified, the following documents of issue in effect at the time of testing performed form a part of this report to the extent as specified herein. The requirements of sub-tier specifications and/or standards apply only when specifically referenced in this report.

2. Standards: EIA Publication 364
   Samtec Test Plan

TEST SAMPLES AND PREPARATION

1. The following test samples were submitted by the test sponsor, Samtec, for the evaluation to be performed by Contech Research, Inc.

Description	Quantity
Compliant Pin Connector P/N: PTHF-130-02-G-Q	16
Mating Connector	10

2. Unless otherwise indicated, all materials were certified by the manufacturer to be in accordance with the applicable product specification.

3. The test samples as submitted were certified by the manufacturer as being fabricated and assembled utilizing normal production techniques common for this type of product and inspected in accordance with the quality criteria as established for the product involved.

4. Test samples were supplied assembled and terminated to test boards by the test sponsor.

5. Applicable qualified mating leaders were supplied by the test sponsor.

6. All test samples were coded and identified by Contech Research to maintain continuity throughout the test sequences. Upon initiating testing, mated test samples remained with each other throughout the test sequences for which they were designated.

TEST SAMPLES AND PREPARATION - Continued

7. The test samples were tested in their 'as received' condition.

8. Unless otherwise specified in the test procedures used, no further preparation was used.

9. All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1 and ANSI/NCSL Z540-1, as applicable.

TEST SELECTION

1. See Test Plan Flow Diagram, Figure #1, for test sequences used.

2. Test set ups and/or procedures which are standard or common are not detailed or documented herein provided they are certified as being performed in accordance with the applicable industry test methods, standards and/or drawings as specified in the detail specification.

SAMPLE SIZE

1. The following number of test samples were tested:

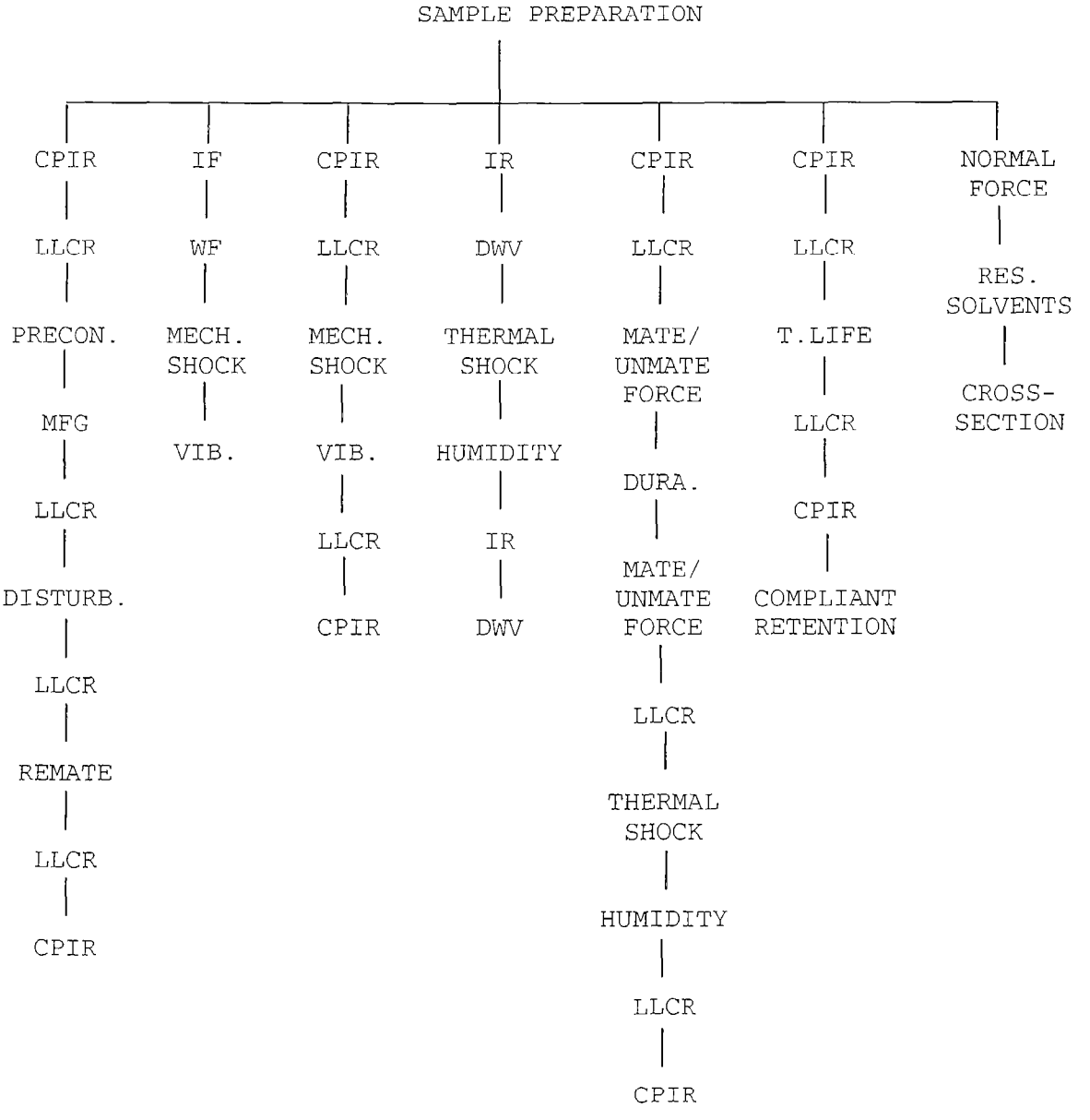
   Groups 1 thru 4 : 2 per group
   Supplemental Group : 4

2. Attribute Monitoring: The following number of data points were monitored during the tests performed:

   a) Low Level Circuit Resistance : 25/Connector
   b) Compliant Pin Resistance (CPIR) : 25/Connector

FIGURE #1

TEST PLAN FLOW DIAGRAM



LLCR = LOW LEVEL CIRCUIT RESISTANCE
CPIR = COMPLIANT COMPONENT RESISTANCE
IR = INSULATION RESISTANCE
DWF = DIELECTRIC WITHSTANDING FORCE
IF = ENGAGEMENT FORCE
WF = SEPARATION FORCE

DATA SUMMARY

TEST	REQUIREMENT	RESULTS
GROUP 1		
CPIR	<1.0 mΩ	<0.89 mΩ
LLCR	RECORD	<6.3 mΩ
PRECONDITION (25X)	NO DAMAGE	PASSED
MFG	NO DAMAGE	PASSED
LLCR,Δ	<+15.0 mΩ	<+0.7 mΩ
DISTURBANCE	UNMATE 0.004"	COMPLETED
LLCR,Δ	<+15.0 mΩ	<+1.5 mΩ
REMATE	REMATE	COMPLETED
LLCR,Δ	<+15.0 mΩ	<+1.5 mΩ
CPIR,Δ	<+1.0 mΩ	<+0.09 mΩ
GROUP 2A		
ENGAGEMENT FORCE	RECORD	<1.1 OUNCE
SEPARATION FORCE	RECORD	>0.5 OUNCE
MECHANICAL SHOCK	NO DAMAGE	PASSED
	<1.0 μSEC DISCONTINUITY	PASSED
RANDOM VIBRATION	NO DAMAGE	PASSED
	<1.0 μSEC DISCONTINUITY	PASSED
GROUP 2B		
CPIR	<1.0 mΩ	<0.94 mΩ
LLCR	RECORD	<6.5 mΩ
MECHANICAL SHOCK	NO DAMAGE	PASSED
RANDOM VIBRATION	NO DAMAGE	PASSED
LLCR,Δ	<+15.0 mΩ	<+0.3 mΩ
CPIR,Δ	<+1.0 mΩ	<+0.07 mΩ
GROUP 3A		
IR	>5000 MEGOHOMS	>50,000 MEGOHOMS
DWV	NO BREAKDOWN	PASSED
CYCLIC HUMIDITY	NO DAMAGE	PASSED
IR	>1000 MEGOHOMS	>50,000 MEGOHOMS
DWV	NO BREAKDOWN	PASSED

DATA SUMMARY - Continued

TEST	REQUIREMENT	RESULTS
GROUP 3B		
CPIR	<1.0 mΩ	<0.93 mΩ
LLCR	RECORD	<5.9 mΩ
MATING FORCE	RECORD	<18.3 LBS.
UNMATING FORCE	RECORD	>14.7 LBS.
DURABILITY	NO DAMAGE	PASSED
UNMATING FORCE	RECORD	>11.7 LBS.
MATING FORCE	RECORD	<13.5 m LBS.
LLCR,Δ	<+15.0 mΩ	<+0.8 mΩ
THERMAL SHOCK	NO DAMAGE	PASSED
CYCLIC HUMIDITY	NO DAMAGE	PASSED
LLCR,Δ	<+15.0 mΩ	<+0.6 mΩ
CPIR,Δ	<1.0 mΩ	<+0.21 mΩ
GROUP 4		
CPIR	<1.0 mΩ	<0.90 mΩ
LLCR	RECORD	<6.4 mΩ
TEMP.LIFE	NO DAMAGE	PASSED
LLCR,Δ	<+15.0 mΩ	<+0.8 mΩ
CPIR,Δ	<+1.0 mΩ	<+0.01 mΩ
SUPPLEMENTAL GROUP		
NORMAL FORCE	RECORD	34 GRAMS PER 0.001"
SOLVENT RESISTANCE	NO DAMAGE	PASSED
CROSS SECTIONING	PERFORMED	COMPLETED

INSERTION FORCE	0.033 DIA	0.036 DIA	0.039 DIA
1ST PIN	<9.3 LBS	<8.2 LBS	<6.9 LBS
3RD PIN	<8.8 LBS	<7.5 LBS	<6.9 LBS
RETENTION FORCE			
1ST PIN	>3.1 LBS	>3.1 LBS	>3.3 LBS
3RD PIN	>3.2 LBS	>3.7 LBS	>3.2 LBS
COMP. RESISTANCE			
1ST PIN	<0.73 mΩ	<0.67 mΩ	<0.79 mΩ
3RD PIN,ΔR	<+0.19 mΩ	<+0.31 mΩ	<+0.11 mΩ
GAS TIGHT,ΔR	<+0.27 mΩ	<+0.40 mΩ	<+0.26 mΩ

ID#	Next Cal	Last Cal	Equipment Name	Manufacturer	Model #	Serial #	Accuracy	Freq.Cal
27	5/2/01	5/2/00	Temp. Humid. Chamber	Blue M Co.	FR-256PC-1	F2-249	See Cal Cert	12mon.
29			Bell Humid. Chamber	Blue M Co.	VP-100AT	A-2280	N/A	Each Test
30	9/21/00	3/21/00	Discontinuity Monitor	Assoc. Test Lab	DM-600-01	382-1	See Cal Cert	6 mon.
33			Vib. Power Amp	Ling Dynamics	MPA4	149	N/A	N/A
34			Shock Machine	Avco	SM110-3	1047	See ID# 14 & 117	Each Test
38	12/1/00	12/1/99	Universal Test Stand	Chatillon	UTSM-SS	1030	±.05 in.	12 mon.
51	N/A	N/A	Air Compressor	Dayton Electric	3Z1900	2145A45747	N/A	OOS
53	6/23/00	3/23/00	Load Cell 10 Pound	Daytronic	152A-10	182	See Cal Cert	6 mon.
86			Shaker Table	MB Elect.	C10E	141	N/A	N/A
92			NF Fixture	BK Tool & MFG	N/A	N/A	±.0005"	N/A
107			Bench Oven	Blue M Co.	POM7-146C	P38-1604	N/A	Each Test
150			Drill Press Stand	Craftsman	25921	N/A	N/A	N/A
192	5/16/01	5/16/00	Vertical Thermal Shock	Cincinnati Sub-Zero	VTS-1-5-3	88-11094	See Cal Cert	12mon
206	9/30/00	3/30/00	Digital Force Gage 10 lb	Chatillon Co.	DFGRS-10	2346	±.25% of full scale	6 mon.
210			MFG Flow System No. 1	Contech Research	N/A	N/A	N/A	N/A
229			Oven 1/2	Blue M Co.	300A	3A118	N/A	Each Test
236	8/1/00	2/1/00	Micro-Ohm Meter	Keithley Instr.	580	462173	See Cal Cert	6 mon.
244	8/29/00	2/29/00	Micro-Ohm Meter	Keithley Instr.	580-1	467496	See Cal Cert	6 mon.
315			X-Y Table	NE Affiliated Tech.	XY-6060	N/A	N/A	N/A
321	1/26/01	1/26/00	AC-DC Hipot/Megometer	Hipotronics Co.	H300B	DS16-201	See Cal Cert	12 mon.
340			X-Y Table	NE Affiliated Tech.	XY-6060	N/A	N/A	N/A
400			Computer	Kandu Co.	286-12	41353	N/A	N/A
455	8/15/00	2/15/00	Digital Multi Meter Unit	Keithley Co.	199	392203	See Cal Cert	6 mon.
476			Computer	Twilight Co.	386-33	N/A	N/A	N/A
478			Computer	Twilight Co.	P111-450	N/A	N/A	N/A
487			Computer	Twilight Co.	386-40	N/A	N/A	N/A
488			X-Y Table	N.E.Affiliated Tech.	N/A	932021	N/A	N/A
521			Sulfur Dioxide Analyzer	Polaroid C.S.I. Co.	SA285E	FE001	See Spec	Each Test
537	11/4/00	5/4/00	Digital Thermometer	Omega Co.	DP116-KC2	4390312	±1.1DegC	6 mon.
543	12/7/00	12/7/99	Analytical Balance	Ohaus Co.	AP250D	MO9198	± .4mg	12 mon.
553	11/12/00	5/12/00	12 channel Power Unit	PCB Co.	483A	1303	See Cal Cert	6mon
562			Programable Test Stand	Chatillon Co.	TCD 1000	25051	N/A	N/A
582	9/27/00	9/28/99	Temp-Humid-Trans	General Eastern	850-232	00445	± 2%RH	12 mon.
585	12/20/00	6/20/00	Digitizing Scope	Hewlett Packard Co.	54200A	2740A-02154	±2%	6 mon.
599			Printer	Brother	HL-630	B66729516	N/A	N/A
604	11/22/00	5/22/00	Sine/Rndm Vib. Control	Universal Dynamics	464-1	421111-150	See Manual	6 mon.
609			Ultrasonic Cleaner	Bransonic	5210	9609010C	N/A	N/A
621			Ultrasonic Cleaner	Branson Co.	8210	PC9610504C	N/A	N/A

ID#	Next Cal	Last Cal	Equipment Name	Manufacturer	Model #	Serial #	Accuracy	Freq.Cal
631	9/23/00	3/23/00	LVDT Condt.Amp.	Daytronics Corp.	3230	S04888	See Cal Cert	6 mon.
666	10/13/00	4/13/00	Digital Thermometer	Omega Eng.	DP116-KC2	7380236	±1.1DegC	6 mon.
681			Computer	ARC Co.	P166	N/A	N/A	N/A
683			Plotter	Hewlett Packard	7470A	2308A85161	N/A	N/A
699			Oxident Monitor	Mast Co.	1724	12732	N/A	Each Test
1037	11/24/00	5/24/00	Accelerometer	PCB	A353B15	52546	See Cal. Cert.	6 mon.
1041	12/6/00	6/6/00	Force Gage	Chatillon	DFIS-50	B34054	± .15%	12 mon.
1047	10/25/00	4/25/00	Microohm Meter	Keithley	580	0705731	See Cal Cert	6 mon.
1115	11/9/00	5/9/00	Digital Multimeter	Radio Shack	Auto Range	22-186A	See Cal. Cert.	6 mon.
1125	7/12/00	1/12/00	Microohm Meter	Keithley	580	451920	See Cal Cert	6 mon.
1126			Microscope	Bauch&Lomb	Stereo Zoom 4	N/A	N/A	N/A
1136	11/11/00	5/11/00	Signal Condt.	PCB	480EO9	23397	See Cal. Cert.	6 mon.
1137	10/7/00	4/7/00	Accelerometer	PCB	353BO4	57874	See Cal. Cert.	6 mon.
1138	10/13/00	10/13/99	Resistance Referance	Contech Resh.	0.1&1.0 ohm	N/A	±1%	12 mon.
1139	11/16/00	11/16/99	Micrometer Barrel	Mitutuyo	152-391	01	±.0001in	12 mon.

TEST RESULTS

GROUP 1

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 400, 1047

PWB TO COMPLIANT COMPONENT RESISTANCE

PURPOSE:

To evaluate the contact resistance characteristics of the compliant component system.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 06

2. The points of application were in accordance Figure #2, page 12.

3. Test Conditions:

    a) Test Current (Amps) : 100 ma maximum
    b) Voltage : 200 mv
    c) No. of Observations : 25 per test sample

4. All subsequent measurements of compliant pin resistance were performed on the same contacts indicated herein.

REQUIREMENTS:

The compliant resistance shall not exceed 1.0 mΩ.

RESULTS: See next page.

RESULTS:

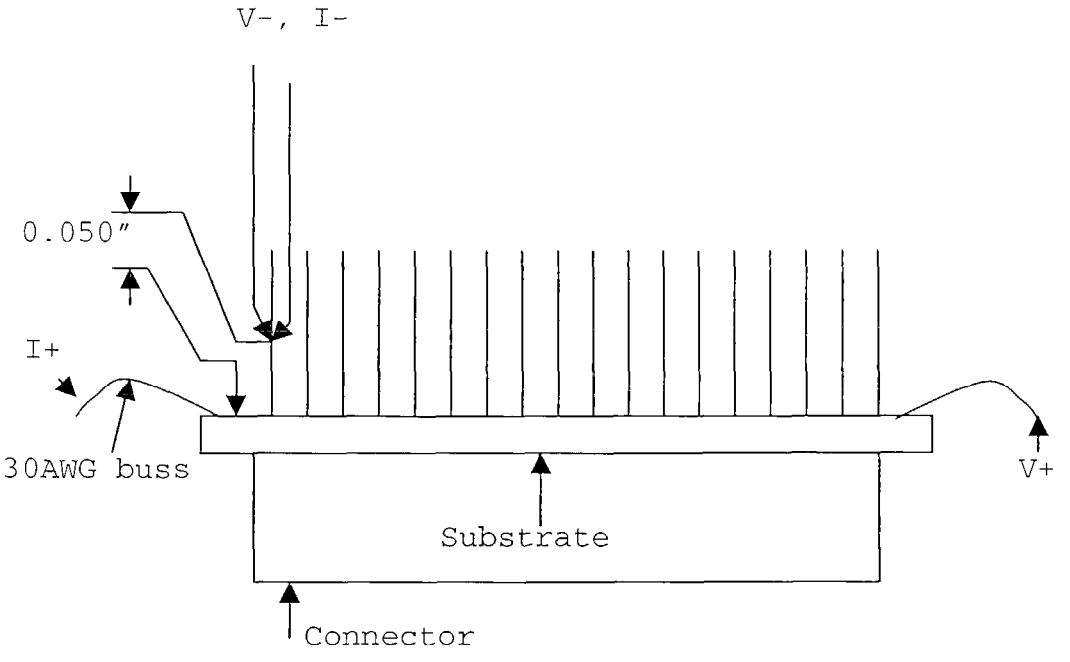
1. The following is a summary of the data observed:

PWB TO COMPLIANT COMPONENT
(Milliohms)

Sample ID#	Avg.	Max.	Min.	Std. Dev.
1-1	0.75	0.81	0.70	0.03
1-2	0.83	0.89	0.78	0.03

2. See data files 9970901 and 9970902 for individual data points.

FIGURE #2



PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 400, 1047

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 23 with the following conditions:

2. Test Conditions:

   a) Test Current : 100 ma maximum
   b) Open Circuit Voltage : 20 mv
   c) No. of Positions Tested : 25 per test sample

3. The points of application are shown in Figure #3, page 15.

REQUIREMENTS: See next page.

REQUIREMENTS:

Low level circuit resistance shall be measured and recorded.

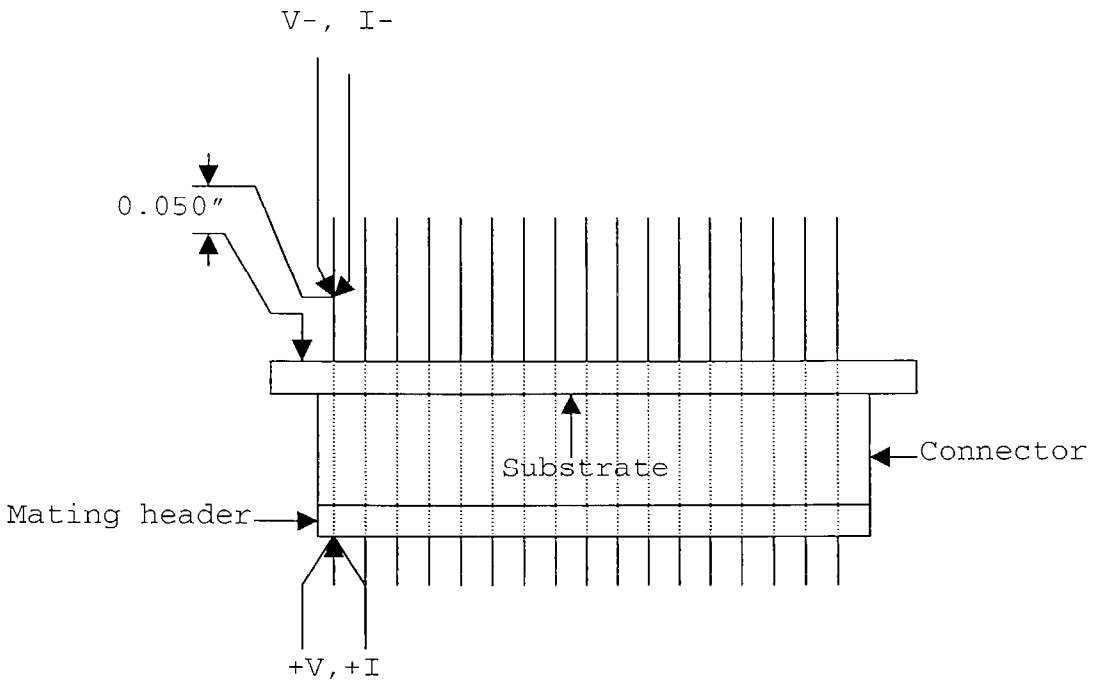
RESULTS:

1. The following is a summary of the data observed:

	LOW LEVEL CIRCUIT RESISTANCE (Milliohms)			
Sample ID#	Avg.	Max.	Min.	Std. Dev.
1-1	5.4	6.2	5.0	0.3
1-2	5.6	6.3	5.2	0.2

2. See data files 9970903 and 9970904 for individual data points.

FIGURE #3



PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 18°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 150, 340

MECHANICAL PRECONDITIONING

PURPOSE:

This is a preconditioning sequence which is used to induce the type of wear on the contacting surfaces which may occur under normal service conditions. The connectors are mated and unmated a predetermined number of cycles. Upon completion, the units being evaluated are exposed to the environments as specified to assess any impact on electrical stability resulting from wear or other wear dependent phenomenon.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 09.

2. Test Conditions:

   a) No. of Cycles : 25
   b) Rate : 500/hr

3. The test samples were axially aligned to accomplish the mating and unmating function allowing for self-centering movement.

4. All subsequent attribute testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS: See next page.

REQUIREMENTS:

There shall be no evidence of physical damage to the test samples so tested.

RESULTS:

There was no evidence of physical damage to the test samples as tested.

PROJECT NO.: 99709	SPECIFICATION: Samtec Test Plan
PART NO.: PTHF-130-02-G-Q	PART DESCRIPTION: 120 Pos. Compliant Pin Conn.
SAMPLE SIZE: 2 Connectors	TECHNICIAN: GP
START DATE: 5/12/00	COMPLETE DATE: 5/22/00
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 42%
EQUIPMENT ID#:	150, 210, 229, 340, 400, 521, 543, 582, 699, 1047, 1115

MIXED FLOWING GAS

PURPOSE:

Mixed flowing gas tests (MFG) are environmental test procedures whose primary purpose is to evaluate product performance under simulated storage or operating (field) conditions. For parts involving plated contact surfaces, such tests are also used to measure the effect of plating degradation (due to the environment) on the electrical and durability properties of a contact or connector system. The specific test conditions are usually chosen so as to simulate, in the test laboratory, the effects of certain representative field environments or environmental severity levels on standard metallic surfaces.

PROCEDURE:

1. The test environment was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 65 with the following conditions.

2. Environmental Conditions:

a) Temperature	:	30°C ± 1°C
b) Relative Humidity	:	70% ± 2%
c) Cl_2	:	10 ± 3 ppb
d) NO_2	:	200 ± 50 ppb
e) H_2S	:	10 ± 5 ppb
f) SO_2	:	100 ± 20 ppb
g) Exposure Time	:	10 days
h) Mating Conditions	:	mated
i) Mounting Conditions	:	mounted

PROCEDURE: Continued

3. The test chamber was allowed to stabilize at the specified conditions indicated.

4. After stabilization, the test samples and control coupons were placed in the chamber such that they were no closer than 2.0" from each other and/or the chamber walls.

5. The test samples were handled in a manner so as not to disturb the contact interface.

6. After placement of the test samples in the chamber, it was allowed to re-stabilize and adjusted as required to maintain the specified concentrations and conditions.

7. The test samples were exposed in the 'as received' condition.

8. The test chamber was monitored periodically during the exposure period to assure the environmental conditions as specified were maintained.

9. After the mixed flowing gas exposure, the connectors were disturbed by unmating the header by 0.004 with low level circuit resistance being performed. After the disturbance test, the mating connector was reseated and final low level circuit resistance performed.

10. Prior to performing attribute measurements, the test samples were allowed to recover to room ambient conditions.

11. All subsequent attribute testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. The change in low level circuit resistance shall not exceed +15.0 mΩ.

2. The change in compliant pin resistance shall not exceed +1.0 mΩ.

RESULTS: See next page.

RESULTS:

1. The following is a summary of the data observed:

CHANGE IN LOW LEVEL CIRCUIT RESISTANCE
(After MFG)
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std. Dev.
1-1	-0.1	+0.7	0.4
1-2	-0.2	+0.6	0.4

2. See data files 9970903 and 9970904 for individual data points.

3. Five copper coupons were placed in the chamber. Upon removal said coupons were evaluated via weight gain technique with the following results:

Coupon No.	WEIGHT GAIN $\mu gm/cm^2/Day$)
1	13+
2	13
3	14+
4	12+
5	14
Requirement:	12 - 16

4. The following is a summary of the observed data:

CHANGE IN LOW LEVEL CIRCUIT RESISTANCE
(After 0.004" Disturbance)
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std. Dev.
1-1	+0.9	+1.5	0.3
1-2	+0.1	+1.3	0.5

5. See data files 9970903 and 9970904 for individual data points.

RESULTS: Continued

6. The following is a summary of the data observed:

CHANGE IN LOW LEVEL CIRCUIT RESISTANCE
(After Remate)
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std. Dev.
1-1	0.0	+0.7	0.3
1-2	+0.2	+1.5	0.5

7. See data files 9970903 and 9970904 for individual data points.

8. The following is a summary of the data observed:

COMPLIANT PIN RESISTANCE
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std. Dev.
1-1	+0.03	+0.09	0.03
1-2	+0.04	+0.08	0.02

9. See data files 9970901 and 9970902 for individual data points.

Compliant Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 1 (ID# 1-1)
File #: 9970901

Current : 100ma

Delta values
units : milliohms

Temp °C	22	22
R.H. %	38	42
Date :	08May00	23May00
Posi ID	Initial	Final
1-1-1	0.80	0.06
1-1-3	0.78	0.02
1-1-5	0.77	0.01
1-1-7	0.77	0.03
1-1-9	0.72	0.07
1-1-11	0.80	0.09
1-1-13	0.74	0.01
1-1-15	0.76	0.04
1-1-17	0.78	0.07
1-1-19	0.74	0.02
1-1-20	0.72	0.03
1-1-25	0.71	0.04
1-1-30	0.76	0.04
1-1-92	0.73	0.02
1-1-94	0.70	0.01
1-1-96	0.76	0.03
1-1-98	0.73	0.07
1-1-100	0.7	0.02
1-1-102	0.78	0.02
1-1-104	0.81	0.07
1-1-106	0.74	-0.02
1-1-108	0.72	0.01
1-1-110	0.77	0.02
1-1-112	0.80	0.04
1-1-114	0.78	0.01
MAX	0.81	0.09
MIN	0.70	-0.02
AVG	0.75	0.03
STD	0.03	0.03
Open	0	0
Tech	G.P	G.P
Equip ID	400	400
	1047	1047

Compliant Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 1 (ID# 1-2)
File #: 9970902
Current : 100ma

Delta Values
units : milliohms

Temp °C	22	22
R.H. %	38	42
Date :	08May00	23May00
Posi ID	Initial	Final
1-2-1	0.87	0.00
1-2-3	0.84	0.04
1-2-5	0.81	0.08
1-2-7	0.87	0.01
1-2-9	0.79	0.01
1-2-11	0.78	0.06
1-2-13	0.82	0.05
1-2-15	0.85	0.05
1-2-17	0.80	0.02
1-2-19	0.84	0.03
1-2-20	0.80	0.06
1-2-25	0.82	0.05
1-2-30	0.81	0.03
1-2-92	0.83	0.05
1-2-94	0.86	0.04
1-2-96	0.89	0.02
1-2-98	0.83	0.04
1-2-100	0.87	0.05
1-2-102	0.89	0.02
1-2-104	0.84	0.03
1-2-106	0.83	0.03
1-2-108	0.79	0.02
1-2-110	0.83	0.03
1-2-112	0.86	0.03
1-2-114	0.79	0.03
MAX	0.89	0.08
MIN	0.78	0.00
AVG	0.83	0.04
STD	0.03	0.02
Open	0	0
Tech	G.P.	G.P.
Equip ID	400	400
	1047	1047

Low Level Contact Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 1 (ID# 1-1)
File #: 9970903

Current : 100ma

Delta Values
units : milliohms

Temp °C	22	22	22	22
R.H. %	38	44	44	44
Date :	08May00	22May00	22May00	22May00
Posi ID	Initial	MFG	Disturb	Remate
1-1-1	5.9	0.0	0.7	-0.3
1-1-3	5.4	-0.1	0.8	-0.1
1-1-5	6.2	-1.0	0.0	-0.8
1-1-7	5.4	-0.3	0.8	0.1
1-1-9	5.5	-0.4	0.8	-0.1
1-1-11	5.2	0.7	0.9	0.0
1-1-13	5.1	0.1	1.1	0.1
1-1-15	5.3	-0.2	0.8	-0.1
1-1-17	5.7	-0.5	0.7	-0.2
1-1-19	5.1	0.1	1.1	0.5
1-1-20	5.3	0.7	0.9	0.1
1-1-25	5.4	-0.4	0.9	-0.1
1-1-30	5.2	0.2	1.1	0.2
1-1-92	5.2	0.3	1.4	0.4
1-1-94	5.0	0.5	1.5	0.7
1-1-96	5.3	-0.1	1.0	0.1
1-1-98	5.2	0.0	0.9	0.1
1-1-100	5.1	0.0	0.9	0.1
1-1-102	5.4	-0.3	0.8	-0.2
1-1-104	5.7	-0.5	0.6	-0.3
1-1-106	5.2	-0.1	1.2	0.2
1-1-108	5.3	0.1	1.2	0.3
1-1-110	5.6	-0.3	0.7	-0.1
1-1-112	5.6	-0.3	0.7	-0.2
1-1-114	5.4	0.0	1.0	-0.1
MAX	6.2	0.7	1.5	0.7
MIN	5.0	-1.0	0.0	-0.8
AVG	5.4	-0.1	0.9	0.0
STD	0.3	0.4	0.3	0.3
Open	0	0	0	0
Tech	G.P.	G.P.	G.P.	G.P.
Equip ID	400	400	400	400
	1047	1047	1047	1047

Low Level Contact Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 1 (ID# 1-2)
File #: 9970904

Current : 100ma

Delta Values
units : milliohms

Temp °C	22	22	22	22
R.H. %	38	44	44	44
Date :	08May00	22May00	22May00	22May00
Posi ID	Initial	MFG	Disturb	Remate
1-2-1	5.2	0.1	1.3	1.5
1-2-3	5.3	-0.2	0.2	0.4
1-1-5	5.8	0.1	-0.2	-0.1
1-2-7	5.6	0.4	0.1	0.1
1-2-9	5.8	0.1	0.0	0.1
1-2-11	5.8	-0.6	0.0	0.2
1-2-13	5.4	0.5	0.3	0.4
1-2-15	5.5	0.5	0.5	0.5
1-2-17	5.7	-0.7	0.0	0.2
1-2-19	5.3	0.6	0.2	0.5
1-2-20	5.6	-0.6	0.0	0.0
1-2-25	5.7	-0.6	0.1	0.3
1-2-30	5.5	-0.3	1.2	1.3
1-2-92	6.3	-0.8	-0.7	-0.7
1-2-94	5.6	0.3	-0.1	0.1
1-2-96	5.5	-0.1	0.3	0.4
1-2-98	5.9	-0.7	-0.3	-0.2
1-2-100	5.5	-0.3	0.1	0.2

TEST RESULTS

GROUP 2A

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/23/00 COMPLETE DATE: 5/23/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 42%

EQUIPMENT ID#: 206, 315, 400

ENGAGEMENT FORCE

PURPOSE:

To determine the magnitude of mechanical forces required to insert an individual pin into a socket contact.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 37.

2. Test Conditions:

   a) Test Blade : 0.0195" square test pin
   b) No. of Observations : 25 per test samples
   c) Rate : 1.0"/min.

3. The test pin was cleaned with isopropyl alcohol after every 5th measurement.

4. The specified test pin was attached to a force gage and test stand and axially aligned to the socket contacts.

5. Care was taken so as not to bottom the test pin in the socket contact.

6. The test samples were fixtured in a manner to minimize eccentric loading and to allow self centering.

7. All measurements were performed with the contacts in a terminated state.

REQUIREMENTS: See next page.

REQUIREMENTS:

The force required to insert the test pin shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

	ENGAGEMENT FORCE (Ounces)			
Sample ID#	Avg.	Max.	Min.	Std. Dev.
2A-1	0.9	1.1	0.8	0.1
2A-2	1.0	1.1	0.8	0.1

2. See data files 9970917 thru 9970918 for individual data points.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/24/00 COMPLETE DATE: 5/24/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 42%

EQUIPMENT ID#: 206, 315, 400

SEPARATION FORCE

PURPOSE:

To determine the magnitude of mechanical forces required to withdraw an individual pin from a socket contact.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 37.

2. Test Conditions:

   a) Test Blade : 0.0195" square test pin
   b) No. of Observations : 25 per test samples
   c) Rate : 1.0"/min

3. The test pin was cleaned with isopropyl alcohol after every 5th measurement.

4. The specified test pin was attached to a force gage and test stand as indicated in Figure #1 of MIL-STD-1344, Method 2014 and axially aligned to the socket contacts.

5. The test samples were fixtured in a manner to minimize eccentric loading and to allow self centering.

6. All measurements were performed with the contacts in a terminated state.

REQUIREMENTS: See next page.

REQUIREMENTS:

The force required to withdraw the test pin shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

	SEPARATION FORCE (Ounces)			
Sample ID#	Avg.	Max.	Min.	Std. Dev.
2A-1	0.7	1.0	0.5	0.1
2A-2	0.7	1.0	0.5	0.2

2. See data files 9970917 thru 9970918 for individual data points.

Engagement & Separation Force

Project :	99709	Spec:	Samtec Test Plan
Customer :	Samtec	Subgroup :	Gr.2A(ID#2A-2)
Product :	PTHF-130-02-G-Q	File #:	9970917
Description:	120 Position compliant pin connector	Tech:	G.P.

Actual values
Ounces

Temp °C	22	22
R.H. %	42	42
Date :	23May00	24May00
Posi ID	Eng. Force	Sep. Force
2A-2-2	0.8	0.6
2A-2-6	1.0	0.8
2A-2-12	1.0	0.8
2A-2-18	1.0	1.0
2A-2-24	1.0	0.6
2A-2-30	1.0	0.6
2A-2-32	1.0	0.8
2A-2-34	0.8	0.5
2A-2-36	0.8	0.6
2A-2-42	1.0	0.6
2A-2-48	0.8	0.5
2A-2-54	1.0	1.0
2A-2-60	1.0	0.6
2A-2-61	1.0	0.8
2A-2-67	0.8	0.5
2A-2-73	1.0	0.6
2A-2-79	1.0	0.5
2A-2-85	1.0	0.8
2A-2-90	1.0	0.5
2A-2-92	0.8	0.5
2A-2-94	1.0	1.0
2A-2-98	1.0	0.6
2A-2-104	1.0	0.8
2A-2-110	1.0	1.0
2A-2-120	1.1	0.6
MAX	1.1	1.0
MIN	0.8	0.5
AVG	1.0	0.7
STD	0.1	0.2
Tech.	G.P.	G.P.
Equip.	400	400
	315	315
	206	206

Engagement & Separation Force

Project :	99709	Spec:	Samtec Test Plan
Customer :	Samtec	Subgroup :	Gr.2A(ID#2A-1)
Product :	PTHF-130-02-G-Q	File #:	9970918
Description:	120 Position compliant pin connector	Tech:	G.P.

Actual values
Ounces

Temp °C	22	22
R.H. %	42	42
Date :	23May00	24May00
Posi ID	Eng. Force	Sep. Force
2A-1-2	0.8	1.0
2A-1-6	1.1	0.8
2A-1-12	1.0	0.8
2A-1-18	0.8	0.8
2A-1-24	0.8	0.6
2A-1-30	1.0	0.6
2A-1-32	1.0	0.8
2A-1-34	1.0	0.6
2A-1-36	1.1	0.8
2A-1-42	1.0	0.6
2A-1-48	1.0	0.8
2A1--54	1.1	0.8
2A-1-60	1.0	0.6
2A-1-61	1.0	0.6
2A-1-67	0.8	0.6
2A-1-73	1.0	0.8
2A-1-79	0.8	0.6
2A-1-85	0.8	0.6
2A1--90	1.0	0.6
2A-1-92	1.0	0.8
2A-1-94	0.8	0.6
2A-1-98	0.8	0.5
2A-1-104	0.8	0.6
2A-1-110	1.0	0.8
2A-1-120	1.0	0.6
MAX	1.1	1.0
MIN	0.8	0.5
AVG	0.9	0.7
STD	0.1	0.1
Tech.	G.P.	G.P.
Equip.	400	400
	315	315
	206	206

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/25/00 COMPLETE DATE: 5/25/00

ROOM AMBIENT: 21°C RELATIVE HUMIDITY: 43%

EQUIPMENT ID#: 30, 34, 478, 585, 1136, 1137

MECHANICAL SHOCK (SPECIFIED PULSE)

PURPOSE:

To determine the mechanical and electrical integrity of connectors for use with electronic equipment subjected to shocks such as those expected from handling, transportation, etc.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 27.

2. Test Conditions:

   a) Peak Value : 50 G
   b) Duration : 11 Milliseconds
   c) Wave Form : Half-sine
   d) Velocity : 11.3 feet per second
   e) No. of Shocks : 3 Shocks/Direction, 3 Axis (18 Total)

3. All subsequent attribute testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of axial movement of the test samples relative to each other.

2. There shall be no evidence of physical damage to the test samples as tested.

REQUIREMENTS: Continued

3. There shall be no contact interruption greater than 1.0 microsecond.

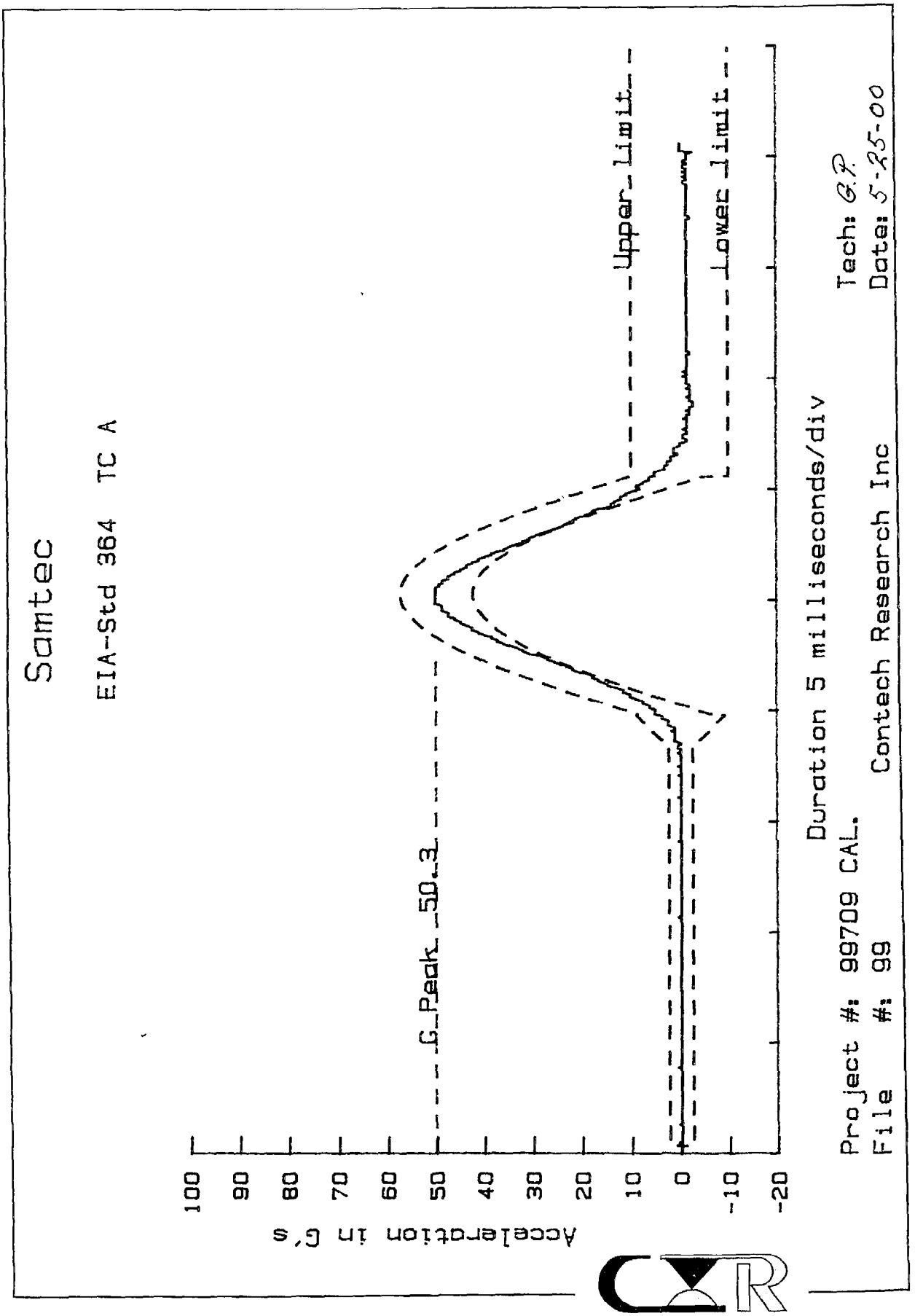
RESULTS:

1. There was no contact interruption greater than 1.0 microsecond.

2. There was no evidence of axial movement or physical damage to the test samples as tested.

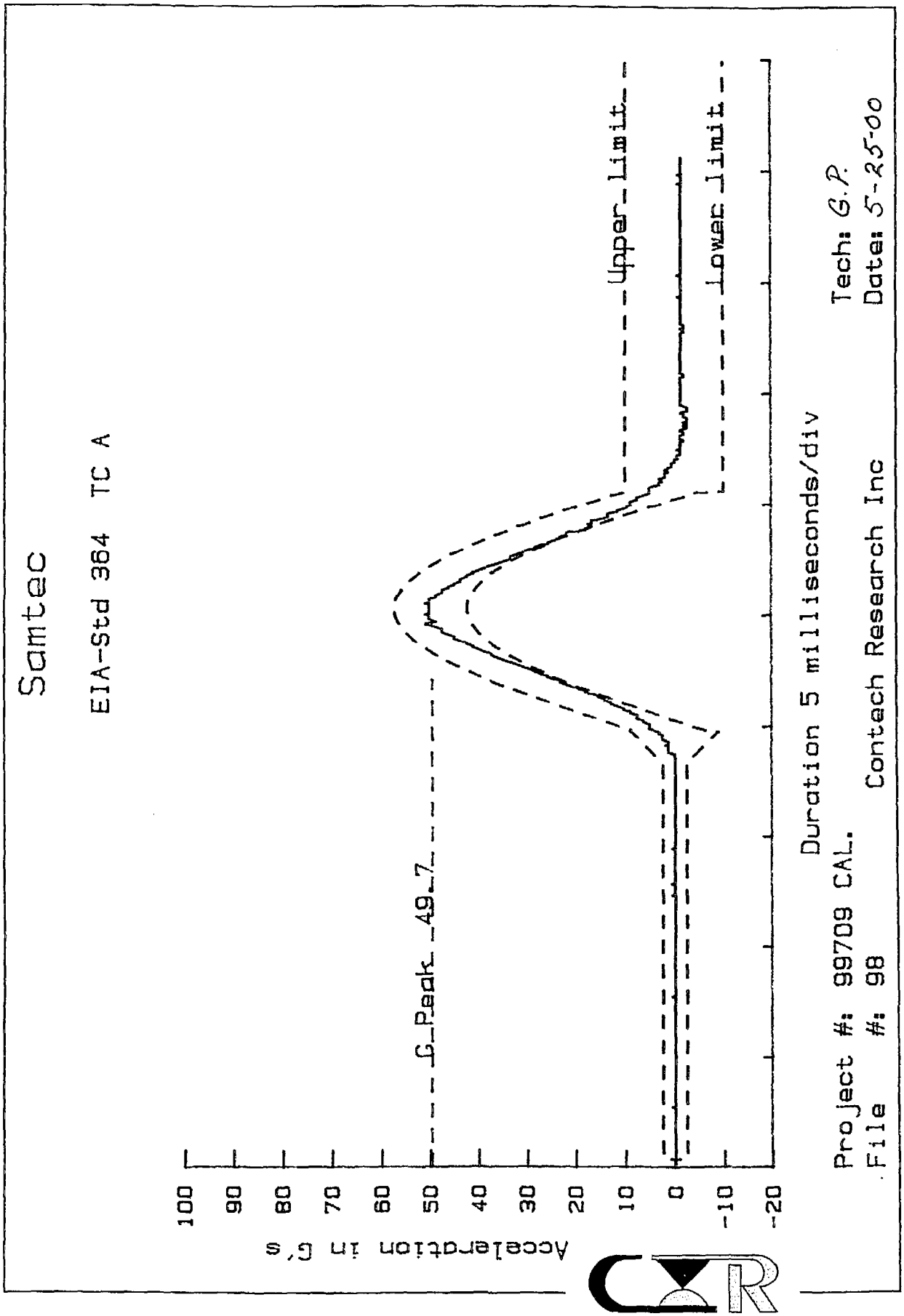
3. The Mechanical Shock characteristics are shown in Figures #4 and 5 (Calibration Pulse) and #6 (Test Pulse). Each figure displays the shock pulse contained within the upper and lower limits as defined by the appropriate test specification.

FIGURE #4



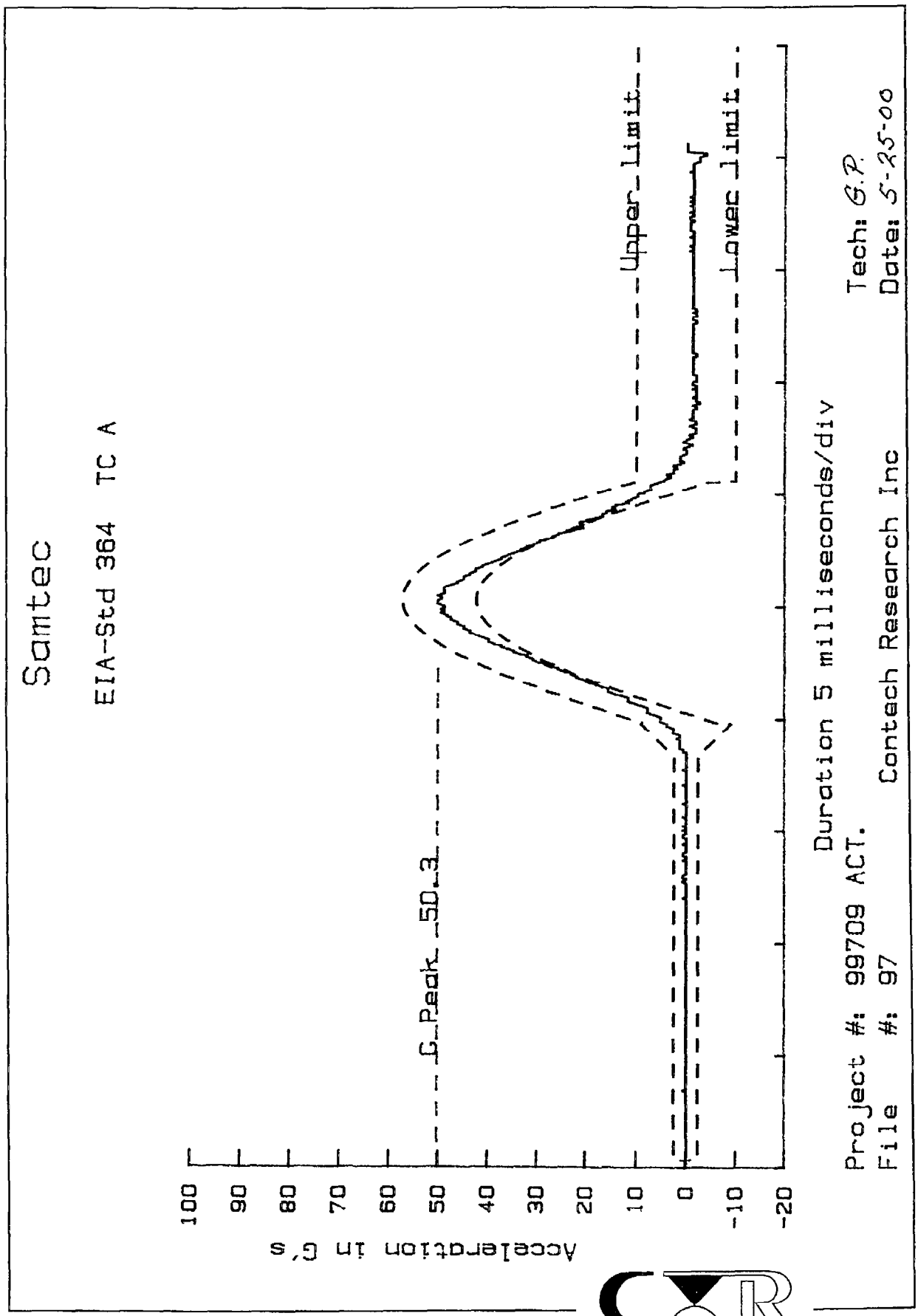
Contech Research

FIGURE #5



Contech Research

FIGURE #6



Contech Research

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/26/00 COMPLETE DATE: 5/26/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 40%

EQUIPMENT ID#: 33, 86, 553, 599, 604, 1137

VIBRATION, RANDOM

PURPOSE:

1. To evaluate the integrity of the test samples relative to a severe mechanical environment.

2. To determine if electrical discontinuities at the level specified exist.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 28.

2. Test Conditions:

   a) Power Spectral Density : 0.02
   b) G 'RMS' : 5.3
   c) Frequency : 50-2000 Hz
   d) Duration : 1 hr/axis

3. A total of 25 contact positions per test sample were selected for monitoring randomly chosen throughout the test samples.

4. A 'daisy chain' circuit was created throughout the test sample and mating header, utilizing 30 AWG buss wire soldered to the contact terminations.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.

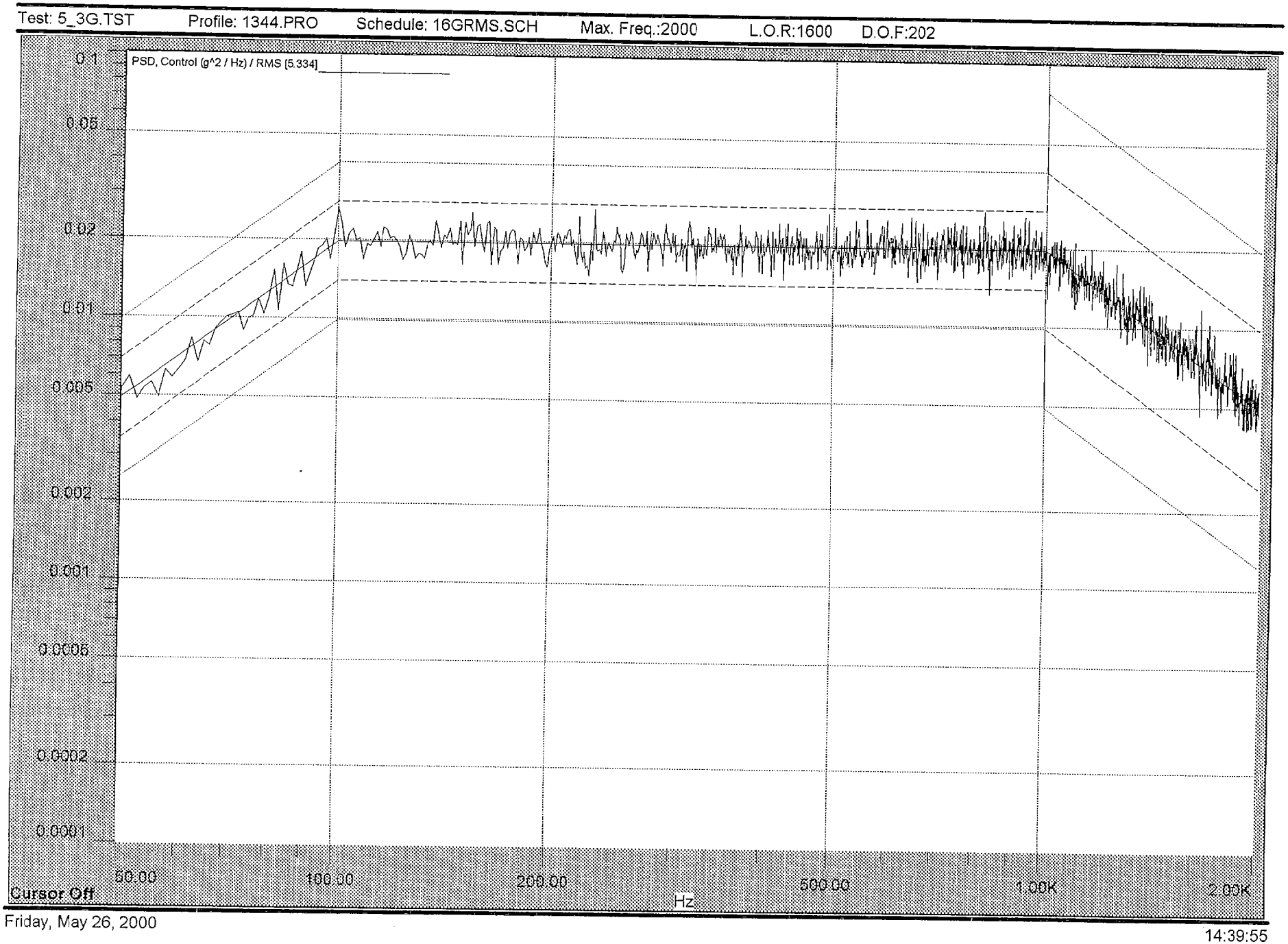
REQUIREMENTS: Continued

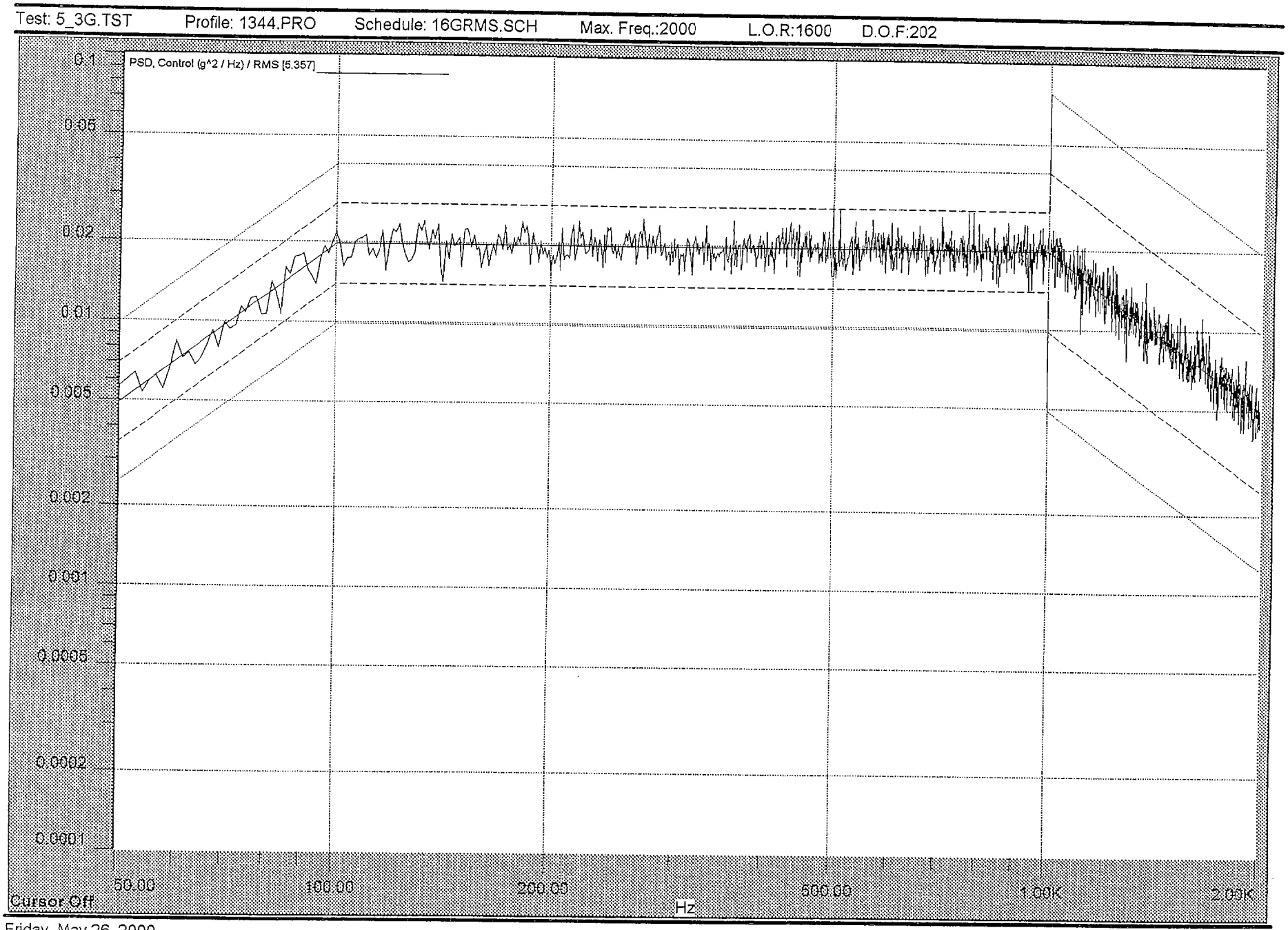
2. There shall be no contact interruption greater than 1.0 microsecond.

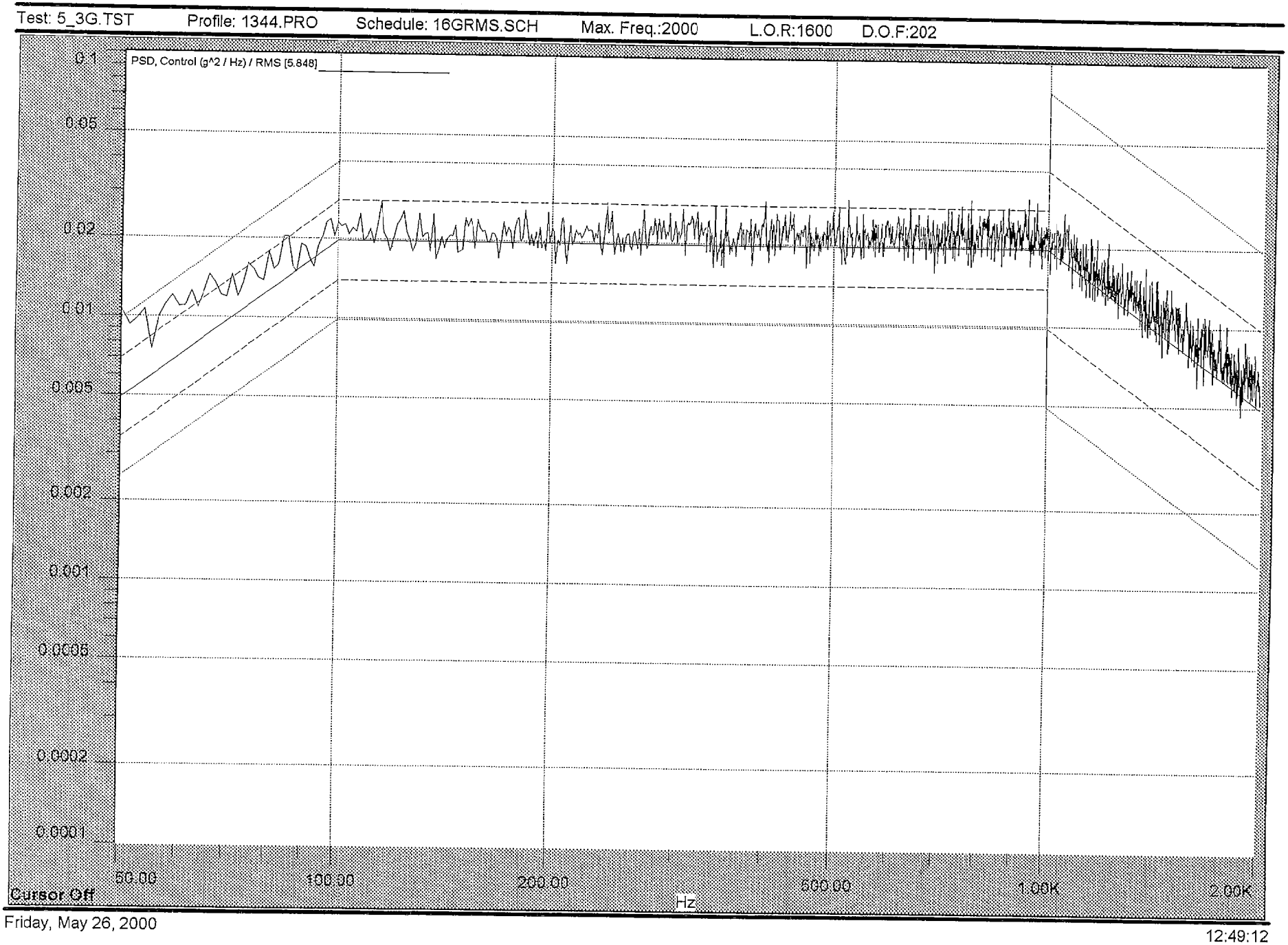
RESULTS:

1. There was no evidence of physical damage to the test samples as tested.

2. There was no interruption greater than 1.0 microsecond.


Test: 5_3G.TST
Profile: 1344.PRO
Schedule: 16GRMS.SCH
Max. Freq.:2000
L.O.R:1600
D.O.F:202
PSD, Control (g^2 / Hz) / RMS [5.334]
0.1
0.05
0.02
0.01
0.005
0.002
0.001
0.0005
0.0002
0.0001
50.00
100.00
200.00
500.00
1.00K
2.00K
Hz
Cursor Off
Friday, May 26, 2000
14:39:55


Test: 5_3G.TST
Profile: 1344.PRO
Schedule: 16GRMS.SCH
Max. Freq.:2000
L.O.R:1600
D.O.F:202
PSD, Control (g^2 / Hz) / RMS [5.357]
0.1
0.05
0.02
0.01
0.005
0.002
0.001
0.0005
0.0002
0.0001
50.00
100.00
200.00
500.00
1.00K
2.00K
Hz
Cursor Off
Friday, May 26, 2000
11:33:55


Test: 5_3G.TST
Profile: 1344.PRO
Schedule: 16GRMS.SCH
Max. Freq.:2000
L.O.R:1600
D.O.F:202
PSD, Control (g^2 / Hz) / RMS [5.848]
0.1
0.05
0.02
0.01
0.005
0.002
0.001
0.0005
0.0002
0.0001
50.00
100.00
200.00
500.00
1.00K
2.00K
Hz
Cursor Off
Friday, May 26, 2000
12:49:12

TEST RESULTS

GROUP 2B

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 400, 1047

PWB TO COMPLIANT COMPONENT RESISTANCE

PURPOSE:

To evaluate the contact resistance characteristics of the compliant component system.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 06.

2. The points of application were in accordance with Figure #2.

3. Test Conditions:

    a) Test Current (Amps) : 100 ma maximum
    b) Voltage : 20 mv
    c) No. of Observations : 25 per test sample

4. All subsequent measurements of compliant pin resistance were performed on the same contacts indicated herein.

REQUIREMENTS:

The compliant resistance shall not exceed 1.0 mΩ.

RESULTS: See next page.

RESULTS:

1. The following is a summary of the data observed:

PWB TO COMPLIANT COMPONENT RESISTANCE
(Milliohms)

Sample ID#	Avg.	Max.	Min.	Std. Dev.
2B-1	0.82	0.86	0.77	0.03
2B-2	0.84	0.94	0.73	0.06

2. See data files 9970905 and 9970906 for individual data points.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 400, 1047

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 23 with the following conditions:

2. Test Conditions:

   a) Test Current : 100 ma maximum
   b) Open Circuit Voltage : 20 mv
   c) No. of Positions Tested : 25 per test sample

3. The points of application are shown in Figure #3, page 15.

REQUIREMENTS: See next page.

REQUIREMENTS:

Low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

	LOW LEVEL CIRCUIT RESISTANCE (Milliohms)			
Sample ID#	Avg.	Max.	Min.	Std. Dev.
2B-1	5.6	6.5	4.7	0.4
2B-2	5.4	5.9	5.1	0.2

2. See data files 9970907 and 9970908 for individual data points.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/25/00 COMPLETE DATE: 5/25/00

ROOM AMBIENT: 21°C RELATIVE HUMIDITY: 43%

EQUIPMENT ID#: 34, 478, 585, 1136, 1137

MECHANICAL SHOCK (SPECIFIED PULSE)

PURPOSE:

To determine the mechanical and electrical integrity of connectors for use with electronic equipment subjected to shocks such as those expected from handling, transportation, etc.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 27.

2. Test Conditions:

   a) Peak Value : 50 G
   b) Duration : 11 Milliseconds
   c) Wave Form : Half-sine
   d) Velocity : 11.3 feet per second
   e) No. of Shocks : 3 Shocks/Direction, 3 Axis (18 Total)

3. All subsequent attribute testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS: See next page.

REQUIREMENTS:

1. There shall be no evidence of axial movement of the test samples relative to each other.

2. There shall be no evidence of physical damage to the test samples as tested.

RESULTS:

1. There was no evidence of axial movement or physical damage to the test samples as tested.

2. The Mechanical Shock characteristics are shown in Figures #4 and 5 (Calibration Pulse) and #6 (Test Pulse). Each figure displays the shock pulse contained within the upper and lower limits as defined by the appropriate test specification.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/26/00 COMPLETE DATE: 5/26/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 40%

EQUIPMENT ID#: 33, 86, 236, 400, 553, 595, 599, 604, 1037, 1047

VIBRATION, RANDOM

PURPOSE:

To evaluate the test samples to determine if fretting corrosion occurs due to mechanical motion and to evaluate the integrity of the test samples relative to a severe mechanical environment.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 28.

2. Test Conditions:

   a) Power Spectral Density : .02
   b) G 'RMS' : 5.3
   c) Frequency : 50-2000 Hz
   d) Duration : 1 hr/axis

3. A total of 25 contact positions per test sample were selected for monitoring randomly chosen throughout the test samples.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.

2. The change in low level circuit resistance shall not exceed +15.0 mΩ.

REQUIREMENTS: Continued

3. The change in compliant pin resistance shall not exceed +1.0 mΩ.

RESULTS:

1. There was no evidence of physical damage to the test samples as tested.

2. The following is a summary of the observed data:

LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std. Dev.
2B-1	-0.5	+0.3	0.4
2B-2	-0.2	+0.3	0.2

3. See data files 9970905 and 9970906 for individual data points.

4. The following is a summary of the observed data:

PWB TO COMPLIANT COMPONENT RESISTANCE
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std. Dev.
2B-1	0.00	+0.07	0.03
2B-2	+0.01	+0.07	0.03

5. See data files 9970907 and 9970908 for individual data points.

Compliant Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 2B (ID# 2B-1)
File #: 9970905
Current : 100ma

Delta Values
units : milliohms

Temp °C	22	22
R.H. %	38	38
Date :	08May00	30May00
Posi ID	Initial	Vibration
2B-1-1	0.85	0.07
2B-1-3	0.86	0.02
2B-1-5	0.82	0.00
2B-1-7	0.83	-0.01
2B-1-9	0.82	-0.03
2B-111	0.85	0.04
2B-1-13	0.83	0.01
2B-1-15	0.83	0.04
2B-1-17	0.86	-0.05
2B-1-19	0.85	0.02
2B-1-20	0.82	0.04
2B-1-25	0.82	0.06
2B-1-30	0.80	0.03
2B-1-92	0.81	-0.02
2B-1-94	0.83	0.03
2B-1-96	0.84	-0.03
2B-1-98	0.78	-0.02
2B-1-100	0.77	-0.03
2B-1-102	0.80	-0.02
2B-1-104	0.80	-0.04
2B-1-106	0.78	0.01
2B-1-108	0.82	0.03
2B-1-110	0.79	0.00
2B-1-112	0.85	0.03
2B-1-114	0.82	-0.05
MAX	0.86	0.07
MIN	0.77	-0.05
AVG	0.82	0.00
STD	0.03	0.03
Open	0	0
Tech	G.P.	LMW
Equip ID	400	236
	1047	595

Compliant Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 2B (ID# 2B-2)
File #: 9970906

Current : 100ma

Delta Values
units : milliohms

Temp °C	22	22
R.H. %	38	38
Date :	08May00	30May00
Posi ID	Initial	Vibration
2B-2-1	0.94	0.02
2B-2-3	0.86	-0.01
2B-2-5	0.93	-0.01
2B-2-7	0.83	0.01
2B-2-9	0.86	-0.02
2B-2-11	0.89	-0.05
2B-2-13	0.84	-0.01
2B-215	0.88	0.02
2B-2-17	0.89	-0.02
2B-2-19	0.91	0.03
2B-2-20	0.83	0.04
2B-2-25	0.88	-0.01
2B-2-30	0.81	0.06
2B-2-92	0.87	-0.05
2B-2-94	0.76	0.00
2B-2-96	0.79	-0.06
2B-2-98	0.84	0.06
2B-2-100	0.87	0.01
2B-2-102	0.76	0.07
2B-2-104	0.83	0.03
2B-2-106	0.77	-0.02
2B-2-108	0.90	0.05
2B-2-110	0.76	0.00
2B-2-112	0.73	0.03
2B-2-114	0.73	-0.01
MAX	0.94	0.07
MIN	0.73	-0.06
AVG	0.84	0.01
STD	0.06	0.03
Open	0	0
Tech	G.P.	LMW
Equip ID	400	236
	1047	595

Low Level Contact Resistance

Project :	99709	Spec:	Samtec test plan
Customer:	Samtec	Subgroup :	Gr. 2B (ID# 2B-1)
Product:	PTHF-130-02-G-Q	File #:	9970907
Description:	120 Position compliant pin connector		
Open circuit voltage :	20mv	Current :	100ma

Delta Values
units : milliohms

Temp °C	22	22
R.H. %	38	38
Date :	08May00	30May00
Posi ID	Initial	Vibration
2B-1-1	6.4	-0.6
2B-1-3	5.1	0.3
2B-1-5	5.3	0.2
2B-1-7	5.7	-0.5
2B-1-9	5.3	-0.7
2B-1-11	4.7	-0.3
2B-1-13	5.4	-0.4
2B-1-15	5.3	-1.0
2B-1-17	5.7	-1.3
2B-1-19	5.6	-1.1
28-1-20	5.5	-0.2
2B-1-25	5.5	-0.3
2B-1-30	5.6	-0.4
2B-1-92	5.3	-0.3
2B-1-94	5.8	-0.6
2B-1-96	5.8	-0.6
2B-1-98	5.8	-0.8
2B-1-100	5.7	-0.8
2B-1-102	5.5	-0.2
2B-1-104	6.5	-1.5
2B-1-106	5.3	-0.3
2B-1-108	5.5	-0.7
2B-1-110	5.2	-0.1
2B-1-112	5.9	-1.0
2B-1-114	5.6	-0.3
MAX	6.5	0.3
MIN	4.7	-1.5
AVG	5.6	-0.5
STD	0.4	0.4
Open	0	0
Tech	G.P.	LMW
Equip ID	400	236
	1047	595

Low Level Contact Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 2B (ID# 2B-2)
File #: 9970908
Current : 100ma

Delta Values
units : milliohms

Temp °C	22	22
R.H. %	38	38
Date :	08May00	30May00
Posi ID	Initial	Vibration
2B-2-1	5.4	-0.4
2B-2-3	5.5	-0.4
2B-2-5	5.5	-0.2
2B-2-7	5.2	-0.4
2B-2-9	5.9	-0.5
2B-2-11	5.6	0.0
2B-2-13	5.2	0.1
2B-2-15	5.2	0.3
2B-2-17	5.8	0.0
2B-2-19	5.5	-0.4
2B-2-20	5.3	0.0
2B-2-25	5.4	0.0
2B-2-30	5.5	-0.3
2B-2-92	5.3	0.1
2B-2-94	5.5	0.1
2B-2-96	5.4	-0.4
2B-2-98	5.7	-0.6
2B-2-100	5.5	-0.4
2B-2-102	5.5	-0.3
2B-2-104	5.6	0.1
2B-2-106	5.2	-0.2
2B-2-108	5.1	0.0
2B-2-110	5.4	-0.3
2B-2-112	5.1	0.1
2B-2-114	5.2	0.1
MAX	5.9	0.3
MIN	5.1	-0.6
AVG	5.4	-0.2
STD	0.2	0.2
Open	0	0
Tech	G.P.	LMW
Equip ID	400	236
	1047	595

TEST RESULTS

GROUP 3A

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 18°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 321

INSULATION RESISTANCE(IR)

PURPOSE:

To determine the resistance of insulation materials to leakage of current through or on the surface of these materials when a DC potential is applied.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 21.

2. Test Conditions:

a) Between Adjacent Contacts	:	Yes
b) Mated Condition	:	Unmated
c) Mounting Condition	:	Unmounted
d) Electrification Time	:	2 minutes
e) Test Voltage	:	500 VDC

REQUIREMENTS:

When the specified test voltage is applied, the insulation resistance shall not be less than 5000 megohms.

RESULTS:

The insulation resistance exceeded 50,000 megohms.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 18°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 321

DIELECTRIC WITHSTANDING VOLTAGE (SEA LEVEL)

PURPOSE:

To determine if the connector can operate at its rated voltage and withstand momentary overpotentials due to switching, surges and other similar phenomenon.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 20.

2. Test Conditions:

a)	Between Adjacent Contacts	: Yes
b)	Mated Condition	: Mated
c)	Mounting Condition	: Unmounted
d)	Hold Time	: 60 Seconds
e)	Rate of Application	: 500 volts/sec.
f)	Test Voltage	: 900 VAC

REQUIREMENTS:

When the specified test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

RESULTS:

1. All test samples as tested met the requirements as specified.

RESULTS: Continued

2. The dielectric withstanding voltage was determined in the following manner:

   a) Ten adjacent positions were tested until breakdown occurred.

   b) The lowest breakdown voltage was multiplied by 0.75. This value establishes the dielectric withstanding voltage.

   c) The dielectric withstanding voltage level was multiplied by 1/3. This established the working voltage.

3. Lowest Breakdown Voltage observed : 1200 VAC
   Dielectric Withstanding Voltage : 900 VAC
   Working Voltage : 300 VAC

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/10/00 COMPLETE DATE: 5/10/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 40%

EQUIPMENT ID#: 192

THERMAL SHOCK

PURPOSE:

To determine the resistance of a given electrical connector to exposure at extremes of high and low temperatures and the shock of alternate exposures to these extremes, simulating the worst probable conditions of storage, transportation and application.

PROCEDURE:

1. The test environment was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 32, with the following conditions:

2. Test Conditions:

   a) Number of Cycles : 5 Cycles
   b) Hot Extreme : +105 +3°C/-0°C
   c) Cold Extreme : -55 +0°C/-3°C
   d) Time at Temperature : 30 Minutes
   e) Mating Conditions : Unmated
   f) Mounting Conditions : Unmounted
   g) Transfer Time : Instantaneous

3. The total number of cycles were performed continuously.

REQUIREMENTS: See next page.

REQUIREMENTS:

There shall be no evidence of physical damage to the test samples as tested.

RESULTS:

There was no evidence of physical damage to the test samples as tested.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/11/00 COMPLETE DATE: 5/22/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 42%

EQUIPMENT ID#: 27, 29, 51

HUMIDITY (THERMAL CYCLING)

PURPOSE:

To evaluate the impact on electrical stability of the contact system when exposed to any environment which may generate thermal/moisture type failure mechanisms such as:

a) Fretting corrosion due to wear resulting from micromotion, induced by thermal cycling. Humidity accelerates the oxidation process.

b) Oxidation of wear debris or from particulates from the surrounding atmosphere which may have become entrapped between the contacting surfaces.

c) Failure mechanisms resulting from a wet oxidation process.

2. This test obtains added effectiveness in employment of temperature cycling that provides a breathing action, inducing corrosion processes, and the introduction of moisture into partially sealed test samples. This condition imposes a vapor pressure on the samples which constitutes the major force behind the moisture migration and penetration.

PROCEDURE: See next page.

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 31, Procedure III, with the following conditions:

2. Test Conditions:

a)	Relative Humidity	: 90% to 95%
b)	Temperature Conditions	: +25°C to +65°C
c)	Number of Cycles	: no
d)	Duration	: 240 hours
e)	Mating Conditions	: Unmated
f)	Mounting Conditions	: Unmounted
g)	Polarizing Voltage	: No

3. Prior to performing attribute measurements, the test samples were allowed to recover to room ambient conditions.

4. Insulation resistance was measured and recorded in accordance with EIA 364, Test Procedure 21, with a test potential of 500 VDC.

5. Dielectric withstanding voltage test was performed in accordance with EIA 364, Test Procedure 20.

REQUIREMENTS:

1. There shall be no evidence of physical deterioration of the test samples as tested.

2. The final insulation resistance shall not be less than 1000 megohms.

3. There shall be no evidence of arcing or breakdown when a 900 VAC test voltage is applied.

RESULTS: See next page.

RESULTS:

1. The test samples as tested showed no evidence of physical deterioration.

2. The final insulation resistance exceeded 50,000 megohms.

3. There was no evidence of breakdown, arcing, etc., when a 900 VAC test voltage was applied.

TEST RESULTS

GROUP 3B

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 400, 1047

PWB TO COMPLIANT COMPONENT RESISTANCE

PURPOSE:

1. To evaluate the contact resistance characteristics of the compliant component systems.

2. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 06.

2. The points of application were in accordance with Figure #2.

3. Test Conditions:

   a) Test Current (Amps) : 100 ma maximum
   b) Voltage : 20 mv
   c) No. of Observations : 25 per test sample

4. All subsequent measurements of compliant pin resistance were performed on the same contacts indicated herein.

REQUIREMENTS: See next page.

REQUIREMENTS:

The compliant resistance shall not exceed 1.0 mΩ

RESULTS:

1. The following is a summary of the data observed:

PWB TO COMPLIANT COMPONENT RESISTANCE
(Milliohms)

Sample ID#	Avg.	Max.	Min.	Std. Dev.
3B-1	0.83	0.89	0.73	0.03
3B-2	0.85	0.93	0.75	0.04

2. See data files 9970909 and 9970910 for individual data points.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/9/00 COMPLETE DATE: 5/9/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 400, 1047

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 23 with the following conditions:

2. Test Conditions:

   a) Test Current : 100 ma maximum
   b) Open Circuit Voltage : 20 mv
   c) No. of Positions Tested : 25 per test sample

3. The points of application are shown in Figure #3, page 15.

REQUIREMENTS: See next page.

REQUIREMENTS:

Low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

	LOW LEVEL CIRCUIT RESISTANCE (Milliohms)			
Sample ID#	Avg.	Max.	Min.	Std. Dev.
3B-1	5.5	5.9	5.2	0.1
3B-2	5.5	5.9	5.3	0.2

2. See data files 9970911 and 9970912 for individual data points.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/10/00 COMPLETE DATE: 5/10/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 40%

EQUIPMENT ID#: 150, 315, 1041

MATING AND UNMATING FORCE

PURPOSE:

To determine the mechanical forces required to mate and unmate the connector.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 13.

2. The test samples were fixtured to the base plate of the test stand and applicable force gauge.

3. The fixturing was accomplished in a manner to prevent "bowing" of the test samples during the performance of the test.

4. The fixturing was accomplished to assure axial alignment and allowed self centering movement to exist.

5. The test rate was 1.0"/min.

REQUIREMENTS:

The force required to mate and unmate the test samples shall be measured and recorded.

RESULTS: See next page.

RESULTS:

The following is a summary of the observed data:

Sample ID#	MATING FORCE (Pounds)	UNMATING FORCE (Pounds)
3B-1	18.1	15.8
3B-2	18.3	14.7

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/10/00 COMPLETE DATE: 5/10/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 40%

EQUIPMENT ID#: 150, 315, 1041

DURABILITY

PURPOSE:

1. To determine the effects of subjecting compliant pin connectors to a predetermined number of mating and unmating cycles simulating the expected mechanical life of the connector.

2. This type or preconditioning sequence is also used to mechanically stress the connector system as would normally occur in actual service. This sequence in conjunction with other tests is used to determine if a significant loss of contact pressure occurs from said stresses which in turn, may result in an unstable electrical condition to exist.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 09.

2. Test Conditions:

   a) No. of Cycles : 100
   b) Rate : 500/hr

3. The test samples were axially aligned to accomplish the mating and unmating function allowing for self-centering movement.

4. All subsequent attribute testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS: See next page.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.

2. The mating and unmating forces shall be measured and recorded.

3. The change in low level circuit resistance shall not exceed +15.0 mΩ.

RESULTS:

1. There was no evidence of physical damage to the test samples as tested.

2. The following is a summary of the data observed:

Sample ID#	MATING FORCE (Pounds)	UNMATING FORCE (Pounds)
3B-1	12.3	12.0
3B-2	13.5	11.7

LOW LEVEL CIRCUIT RESISTANCE (Milliohms)

Sample ID#	Avg. Change	Max. Change	Std Dev.
3B-1	+0.2	+0.8	0.2
3B-2	+0.2	+0.5	0.1

3. See data files 9970911 and 9970912 for individual data points.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/10/00 COMPLETE DATE: 5/10/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 40%

EQUIPMENT ID#: 192

THERMAL SHOCK

PURPOSE:

To determine the resistance of a given electrical connector to exposure at extremes of high and low temperatures and the shock of alternate exposures to these extremes, simulating the worst probable conditions of storage, transportation and application.

PROCEDURE:

1. The test environment was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 32, with the following conditions:

2. Test Conditions:

a)	Number of Cycles	: 5 Cycles
b)	Hot Extreme	: +105 +3°C/-0°C
c)	Cold Extreme	: -55 +0°C/-3°C
d)	Time at Temperature	: 30 Minutes
e)	Mating Conditions	: Mated
f)	Mounting Conditions	: Mounted
g)	Transfer Time	: Instantaneous

3. The total number of cycles were performed continuously.

4. Prior to performing attribute measurements, the test samples were allowed to recover to room ambient conditions.

PROCEDURE: Continued

5. All subsequent attribute testing was performed in accordance with the procedures as previously indicated.

REQUIREMENTS:

There shall be no evidence of physical damage to the test samples as tested.

RESULTS:

There was no evidence of physical damage to the test samples as tested.

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/11/00 COMPLETE DATE: 5/22/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 42%

EQUIPMENT ID#: 27, 29, 400, 537, 1047

HUMIDITY (THERMAL CYCLING)

PURPOSE:

1. To evaluate the impact on electrical stability of the contact system when exposed to any environment which may generate thermal/moisture type failure mechanisms such as:

   a) Fretting corrosion due to wear resulting from micromotion, induced by thermal cycling. Humidity accelerates the oxidation process.

   b) Oxidation of wear debris or from particulates from the surrounding atmosphere which may have become entrapped between the contacting surfaces.

   c) Failure mechanisms resulting from a wet oxidation process.

2. This test obtains added effectiveness in employment of temperature cycling that provides a breathing action, inducing corrosion processes, and the introduction of moisture into partially sealed test samples. This condition imposes a vapor pressure on the samples which constitutes the major force behind the moisture migration and penetration.

PROCEDURE: See next page.

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 31, Procedure III, with the following conditions:

2. Test Conditions:

a) Relative Humidity	:	90% to 95%
b) Temperature Conditions	:	25°C to 65°C
c) Cold Cycle	:	No
d) Polarizing Voltage	:	No
e) Mating Conditions	:	Mated
f) Mounting Conditions	:	Mounted
g) Duration	:	240 hours

3. Prior to performing attribute measurements, the test samples were allowed to recover to room ambient conditions.

4. All subsequent attribute testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical deterioration of the test samples as tested.

2. The change in low level circuit resistance shall not exceed +15.0 mΩ.

3. The change in compliant component resistance shall not exceed +1.0 mΩ.

RESULTS: See next page.

RESULTS:

1. The test samples as tested showed no evidence of physical deterioration.

2. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std Dev.
3B-1	+0.1	+0.4	0.2
3B-2	+0.3	+0.6	0.1

3. See data files 9970911 and 9970912 for individual data points.

4. The following is a summary of the data observed:

PWB TO COMPLIANT COMPONENT RESISTANCE
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std Dev.
3B-1	+0.06	+0.21	0.06
3B-2	+0.02	+0.07	0.02

5. See data files 9970909 and 9970910 for individual data points.

Compliant Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 3B (ID# 3B-1)
File #: 9970909
Current : 100ma

Delta values
units : milliohms

Temp °C	22	22
R.H. %	38	44
Date :	08May00	22May00
Posi ID	Initial	Humid.
3B-1-1	0.83	0.13
3B-1-3	0.88	0.04
3B-1-5	0.85	0.09
3B-1-7	0.85	0.02
3B-1-9	0.81	0.05
3B-1-11	0.83	0.01
3B-1-13	0.81	0.05
3B-1-15	0.86	0.05
3B-1-17	0.86	0.00
3B-1-19	0.89	0.00
3B-1-20	0.80	0.03
3B-1-25	0.82	-0.01
3B-1-30	0.88	0.11
3B-1-92	0.82	0.17
3B-1-94	0.81	0.15
3B-1-96	0.80	0.06
3B-1-98	0.81	0.09
3B-1-100	0.82	0.01
3B-1-102	0.84	0.01
3B-1-104	0.83	0.04
3B-1-106	0.86	0.01
3B-1-108	0.80	0.03
3B-1-110	0.81	0.07
3B-1-112	0.84	0.04
3B-1-114	0.73	0.21
MAX	0.89	0.21
MIN	0.73	-0.01
AVG	0.83	0.06
STD	0.03	0.06
Open	0	0
Tech	G.P.	G.P.
Equip ID	400	400
	1047	1047

Compliant Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 3B (ID# 3B-2)
File #: 9970910

Current : 100ma

Delta Values
units : milliohms

Temp °C	22	22
R.H. %	38	44
Date :	08May00	22May00
Posi ID	Initial	Humid.
3B-2-1	0.82	0.07
3B-2-3	0.86	0.01
3B-2-5	0.85	0.02
3B-2-7	0.83	0.02
3B-2-9	0.86	0.04
3B-2-11	0.90	-0.02
3B-2-13	0.82	0.03
3B-2-15	0.83	-0.01
3B-2-17	0.88	0.04
3b-2-19	0.81	0.04
3B-2-20	0.82	0.04
3B-2-25	0.85	-0.02
3B-2-30	0.84	0.04
3B-2-92	0.83	-0.01
3B-2-94	0.90	0.02
3B-2-96	0.84	0.03
3B-2-98	0.89	0.02
3B-2-100	0.93	-0.03
3B-2-102	0.81	0.03
3B-2-104	0.88	-0.01
3B-2-106	0.86	0.00
3B-2-108	0.87	0.02
3B-2-110	0.86	0.03
3B-2-112	0.87	0.03
3B-2-114	0.75	0.04
MAX	0.93	0.07
MIN	0.75	-0.03
AVG	0.85	0.02
STD	0.04	0.02
Open	0	0
Tech	G.P.	G.P.
Equip ID	400	400
	1047	1047

Low Level Contact Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 3B (ID# 3B-1)
File #: 9970911

Current : 100ma

Delta values
units : milliohms

Temp °C	22	22	22
R.H. %	38	40	44
Date :	09May00	10May00	22May00
Posi ID	Initial	Dura.(100x)	Humidity
3B-1-1	5.9	-0.1	-0.1
3B-1-3	5.5	0.5	0.4
3B-1-5	5.5	0.6	0.1
3B-1-7	5.6	0.1	0.0
3B-1-9	5.3	0.2	0.0
3B-1-11	5.4	0.1	0.4
3B-1-13	5.5	0.2	0.0
3B-1-15	5.3	0.1	0.0
3B-1-17	5.4	0.3	0.1
3B-1-19	5.4	0.5	0.1
3B-1-20	5.4	0.1	0.2
3B-1-25	5.5	0.0	0.2
3B-1-30	5.5	0.2	0.2
3B-1-92	5.6	0.1	0.3
3B-1-94	5.5	0.4	0.0
3B-1-96	5.5	0.0	0.1
3B-1-98	5.7	0.3	0.1
3B-1-100	5.5	0.6	0.0
3B-1-102	5.5	0.0	0.2
3B-1-104	5.2	0.3	0.3
3B-1-106	5.3	0.8	0.4
3B-1-108	5.3	0.1	0.1
3B-1-110	5.4	-0.1	0.0
3B-1-112	5.5	0.1	0.3
3B-1-114	5.4	0.0	0.1
MAX	5.9	0.8	0.4
MIN	5.2	-0.1	-0.1
AVG	5.5	0.2	0.1
STD	0.1	0.2	0.2
Open	0	0	0
Tech	G.P.	G.P.	G.P.
Equip ID	400	400	400
	1047	1047	1047

Low Level Contact Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 3B (ID# 3B-2)
File #: 9970912

Current : 100ma

Delta Values
units : milliohms

Temp °C	22	22	22
R.H. %	38	40	44
Date :	09May00	10May00	22May00
Posi ID	Initial	Dura.(100x)	Humidity
3B-2-1	5.5	0.2	0.2
3B-2-3	5.4	0.2	0.2
3B-2-5	5.4	0.3	0.4
3B-2-7	5.5	0.2	0.2
3B-2-9	5.3	0.3	0.3
3B-2-11	5.3	0.4	0.4
3B-2-13	5.3	0.2	0.2
3B-2-15	5.8	0.2	0.1
3B-2-17	5.7	0.2	0.1
3B-2-19	5.4	0.1	0.2
3B-2-20	5.4	0.1	0.2
3B-2-25	5.6	0.1	0.2
3B-2-30	5.4	0.2	0.4
3B-2-92	5.4	0.2	0.4
3B-2-94	5.6	0.1	0.1
3B-2-96	5.6	0.3	0.4
3B-2-98	5.3	0.2	0.3
3B-2-100	5.4	0.4	0.5
3B-2-102	5.8	0.1	0.0
3B-2-104	5.7	0.2	0.3
3B-2-106	5.4	0.5	0.6
3B-2-108	5.3	0.3	0.4
3B-2-110	5.4	0.2	0.4
3B-2-112	5.9	0.0	0.1
3B-2-114	5.3	0.2	0.2
MAX	5.9	0.5	0.6
MIN	5.3	0.0	0.0
AVG	5.5	0.2	0.3
STD	0.2	0.1	0.1
Open	0	0	0
Tech	G.P.	G.P.	G.P.
Equip ID	400	400	400
	1047	1047	1047

TEST RESULTS

GROUP 4

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/8/00 COMPLETE DATE: 5/8/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 38%

EQUIPMENT ID#: 400, 1047

PWB TO COMPLIANT COMPONENT RESISTANCE

PURPOSE:

1. To evaluate the compliant resistance characteristics of the compliant component system.

2. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 06.

2. The points of application were in accordance with Figure #2.

3. Test Conditions:

   a) Test Current (Amps) : 100 ma maximum
   b) Voltage : 20 mv
   c) No. of Observations : 25 per test sample

4. All subsequent measurements of compliant pin resistance were performed on the same contacts indicated herein.

REQUIREMENTS: See next page.

REQUIREMENTS:

The compliant resistance shall not exceed 1.0 mΩ.

RESULTS:

1. The following is a summary of the data observed:

PWB TO COMPLIANT COMPONENT RESISTANCE
(Milliohms)

Sample ID#	Avg.	Max.	Min.	Std. Dev.
4-1	0.83	0.90	0.76	0.04
4-2	0.84	0.90	0.78	0.03

2. See data files 9970913 and 9970914 for individual data points.

PROJECT NO.: 99709	SPECIFICATION: Samtec Test Plan
PART NO.: PTHF-130-02-G-Q	PART DESCRIPTION: 120 Pos. Compliant Pin Conn.
SAMPLE SIZE: 2 Connectors	TECHNICIAN: GP
START DATE: 5/8/00	COMPLETE DATE: 5/8/00
ROOM AMBIENT: 18°C	RELATIVE HUMIDITY: 38%
EQUIPMENT ID#: 400, 1047	

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

PURPOSE:

1. To evaluate contact resistance characteristics of the contact systems under conditions where applied voltages and currents do not alter the physical contact interface and will detect oxides and films which degrade electrical stability. It is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments as well as any significant loss of contact pressure.

2. The electrical stability of the system is determined by comparing the initial resistance value to that observed after a given test exposure. The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.

PROCEDURE:

1. The test was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 23 with the following conditions:

2. Test Conditions:

   a) Test Current : 100 ma maximum
   b) Open Circuit Voltage : 20 mv
   c) No. of Positions Tested : 25 per test sample

3. The points of application are shown in Figure #3, page 15.

REQUIREMENTS: See next page.

REQUIREMENTS:

Low level circuit resistance shall be measured and recorded.

RESULTS:

1. The following is a summary of the data observed:

	LOW LEVEL CIRCUIT RESISTANCE (Milliohms)			
Sample ID#	Avg.	Max.	Min.	Std. Dev.
4-1	5.5	5.8	5.1	0.2
4-2	5.5	6.4	5.0	0.3

2. See data files 9970915 and 9970916 for individual data points.

PROJECT NO.: 99709	SPECIFICATION: Samtec Test Plan
PART NO.: PTHF-130-02-G-Q	PART DESCRIPTION: 120 Pos. Compliant Pin Conn.
SAMPLE SIZE: 2 Connectors	TECHNICIAN: GP
START DATE: 5/9/00	COMPLETE DATE: 5/22/00
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 38%
EQUIPMENT ID#: 107, 666, 681, 1125	

TEMPERATURE LIFE

PURPOSE:

1. To evaluate the impact on electrical stability of the contact system when exposed to a thermal environment. Said environment may generate temperature dependent failure mechanisms such as:

2. Dry oxidation of base metals and/or underplates which have reached the contacting surfaces by impurity, diffusion or pore corrosion.

3. Dry oxidation due to smearing of base metal and/or underplate on the contact surfaces or exposure of same due to wear.

4. Reduced normal (contact) force due to stress relaxation as a result of a thermal environment.

PROCEDURE:

1. The test samples were placed in the test chamber after it had reached equilibrium at the specified temperature level. The test exposure was performed in accordance with Samtec's Test Plan and EIA 364 Specification, Test Procedure 17, with the following conditions:

2. Test Condition:

   a) Temperature : 105°C ± 2°C
   b) Duration : 300 hours
   c) Mated Condition : mated
   d) Mounting Condition : mounted

PROCEDURE: Continued

3. Prior to performing attribute measurements, the test samples were allowed to recover to room ambient conditions.

4. All subsequent attribute testing was performed in accordance with the procedures previously indicated.

REQUIREMENTS:

1. There shall be no evidence of physical damage or deterioration of the test samples so exposed.

2. The change in low level circuit resistance shall not exceed +15.0 mΩ.

3. The change in compliant component resistance shall not exceed +1.0 mΩ.

RESULTS:

1. The following is a summary of the data observed:

LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std Dev.
4-1	-0.2	+0.8	0.4
4-2	-0.1	+0.5	0.3

2. See data files 9970915 and 9970916 for individual data points.

3. The following is a summary of the data observed:

PWB TO COMPLIANT COMPONENT RESISTANCE
(Milliohms)

Sample ID#	Avg. Change	Max. Change	Std Dev.
4-1	0.00	+0.01	0.01
4-2	0.00	+0.01	0.00

4. See data files 9970913 and 9970914 for individual data points.

Compliant Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 4 (ID# 4-1)
File #: 9970913

Current : 100ma

Delta values
units : milliohms

Temp °C	22	22
R.H. %	38	44
Date :	08May00	22May00
Posi ID	Initial	T.Life
4-1-1	0.87	0.00
4-1-3	0.85	0.00
4-1-5	0.84	0.01
4-1-7	0.81	0.00
4-1-9	0.86	0.01
4-1-11	0.81	0.00
4-1-13	0.82	0.00
4-1-15	0.82	0.00
4-1-17	0.83	0.01
4-1-19	0.82	0.01
4-1-20	0.78	0.01
4-1-25	0.78	0.00
4-1-30	0.81	0.01
4-1-92	0.88	0.01
4-1-94	0.79	0.00
4-1-96	0.82	0.01
4-1-98	0.76	0.01
4-1-100	0.90	0.01
4-1-102	0.84	0.00
4-1-104	0.80	0.00
4-1-106	0.76	0.01
4-1-108	0.89	0.00
4-1-110	0.87	0.01
4-1-112	0.87	0.00
4-1-114	0.82	0.01
MAX	0.90	0.01
MIN	0.76	0.00
AVG	0.83	0.00
STD	0.04	0.01
Open	0	0
Tech	G.P.	AC
Equip ID	400	1125
	1047	681

Compliant Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 4 (ID# 4-2)
File #: 9970914

Current : 100ma

Delta values
units : milliohms

Temp °C	22	22
R.H. %	38	44
Date :	08May00	22May00
Posi ID	Initial	T.Life
4-2-1	0.84	0.00
4-2-3	0.78	0.00
4-2-5	0.80	0.01
4-2-7	0.82	0.00
4-2-9	0.84	0.00
4-2-11	0.83	0.00
4-2-13	0.84	0.00
4-2-15	0.89	0.00
4-2-17	0.83	0.00
4-2-19	0.81	0.01
4-2-20	0.82	0.01
4-2-25	0.88	0.00
4-2-30	0.88	0.01
4-2-92	0.86	-0.01
4-2-94	0.85	-0.01
4-2-96	0.86	0.01
4-2-98	0.85	0.00
4-2-100	0.83	0.01
4-2-102	0.81	0.00
4-2-104	0.85	0.00
4-2-106	0.82	0.01
4-2-108	0.90	0.01
4-2-110	0.83	0.01
4-2-112	0.84	0.01
4-2-114	0.82	0.00
MAX	0.90	0.01
MIN	0.78	-0.01
AVG	0.84	0.00
STD	0.03	0.00
Open	0	0
Tech	G.P.	AC
Equip ID	400	1125
	1047	681

Low Level Contact Resistance

Project : 99709
Customer: Samtec
Product: PTHF-130-02-G-Q
Description: 120 Position compliant pin connector
Open circuit voltage : 20mv

Spec: Samtec test plan
Subgroup : Gr. 4 (ID# 4-1)
File #: 9970915

Current : 100ma

Delta values
units : milliohms

Temp °C	18	22
R.H. %	38	44
Date :	08May00	05/22/2000
Posi ID	Initial	T-Life
4-1-1	5.8	0.8
4-1-3	5.5	-0.2
4-1-5	5.2	-0.2
4-1-7	5.6	-0.8
4-1-9	5.5	-0.3
4-1-11	5.3	0.0
4-1-13	5.1	0.1
4-1-15	5.7	-0.1
4-1-17	5.2	0.1
4-1-19	5.6	-0.6
4-1-20	5.5	-0.3
4-1-25	5.6	-0.5
4-1-30	5.6	0.1
4-1-92	5.1	0.0
4-1-94	5.6	-0.5
4-1-96	5.4	0.0
4-1-98	5.3	-0.6
4-1-100	5.8	-0.5
4-1-102	5.6	-0.8
4-1-104	5.4	0.2
4-1-106	5.7	-0.8
4-1-108	5.5	-0.1
4-1-110	5.4	-0.5
4-1-112	5.4	-0.4
4-1-114	5.5	-0.1
MAX	5.8	0.8
MIN	5.1	-0.8
AVG	5.5	-0.2
STD	0.2	0.4
Open	0	0.00
Tech	G.P.	AC
Equip ID	400	1125
	1047	681

Low Level Contact Resistance

Project :	99709	Spec:	Samtec test plan
Customer:	Samtec	Subgroup :	Gr. 4 (ID# 4-2)
Product:	PTHF-130-02-G-Q	File #:	9970916
Description:	120 Position compliant pin connector		
Open circuit voltage :	20mv	Current :	100ma

Delta values
units : milliohms

Temp °C	22	22
R.H. %	38	44
Date :	08May00	22May00
Posi ID	Initial	T-Life
4-2-1	5.6	-0.1
4-2-3	5.0	0.5
4-2-5	5.4	0.0
4-2-7	5.1	0.3
4-2-9	5.3	0.0
4-211	5.2	0.0
4-2-13	5.5	-0.7
4-2-15	5.4	0.3
4-2-17	5.0	-0.1
4-2-19	5.5	-0.4
4-2-20	6.4	-0.9
4-2-25	5.4	-0.2
4-2-30	6.0	-0.1
4-2-92	5.3	-0.3
4-2-94	5.8	0.1
4-2-96	5.1	0.3
4-2-98	5.5	-0.6
4-2-100	5.2	0.0
4-2-102	5.5	-0.3
4-2-104	5.3	-0.3
4-2-106	5.3	0.3
4-2-108	5.8	-0.5
4-2-110	5.5	0.0
4-2-112	6.0	-0.3
4-2-114	5.4	-0.2
MAX	6.4	0.5
MIN	5.0	-0.9
AVG	5.5	-0.1
STD	0.3	0.3
Open	0	0
Tech	G.P.	AC
Equip ID	1047	1125
		681

TEST RESULTS

SUPPLEMENTAL GROUP

PROJECT NO.: 99709	SPECIFICATION: Samtec Test Plan
PART NO.: PTHF-130-02-G-Q	PART DESCRIPTION: 120 Pos. Compliant Pin Conn.
SAMPLE SIZE: 5 Contacts	TECHNICIAN: GP
START DATE: 5/31/00	COMPLETE DATE: 5/31/00
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 40%
EQUIPMENT ID#: 53, 92, 455, 487, 631, 683, 1126, 1139	

NORMAL FORCE

PURPOSE:

1. To determine the magnitude of normal force generated at any given deflection level within the normal operating levels of the contact system. To determine the magnitude of permanent set, if any, and its impact on loss of normal force. This data and its relationship to contact interface is then evaluated in proper perspective when reviewed with other attributes.

2. Normal force is one of the basic attributes of a contact system. It is a direct indication of contact pressure as well as contact integrity. The magnitude of said force can establish the gas tight condition between contacting surfaces. A gas tight interface prevents harsh environments and oxide or film growth from penetrating between surfaces which may cause degradation of electrical stability. It will also influence fretting motion and wear.

3. Fretting motion is dependent on contact geometry, as well as normal force. It can wear through the finish system exposing the underplate and may result in fretting corrosion or increase rate of oxidation or film growth of the base metal or underplate exposure.

PROCEDURE:

1. The test was performed with the contact outside of its plastic housing.

PROCEDURE: Continued

2. One tine of the contact was removed to expose the opposing tine to be tested.

3. The prepared sample was placed in a special holding fixture on a X-Y moveable table.

4. The sample was positioned in such a manner so as to allow a special probe attached to a force transducer to deflect the contact element to a given distance as specified.

5. As the contact element is deflected to the level desired, the normal force characteristic is plotted directly and simultaneously.

6. The probe/force traducer is interconnected with a linear transducer, amplifier, data acquisition/computer system and plotter.

7. This test is a destructive procedure.

REQUIREMENTS:

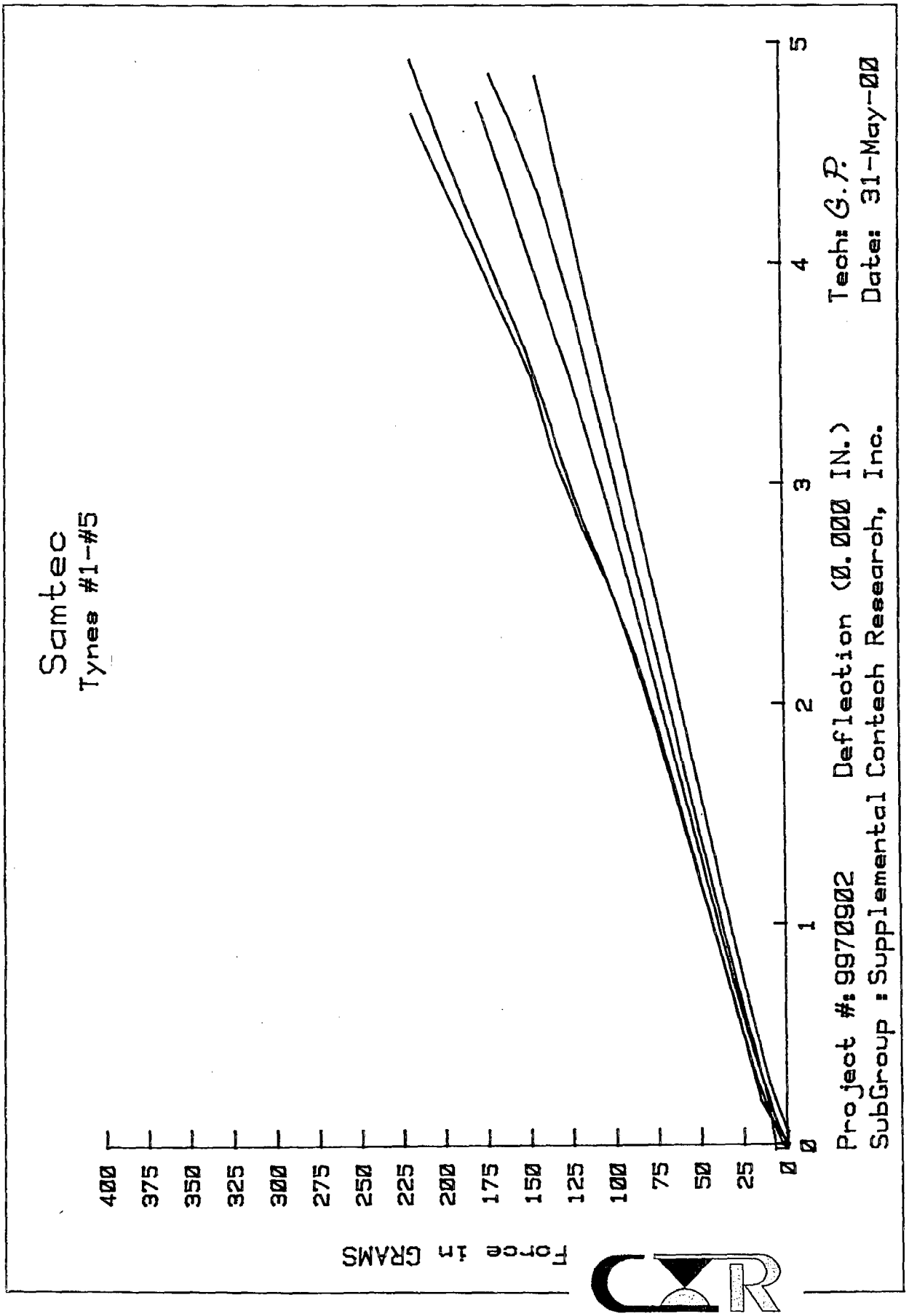
The force/deflection characteristic shall be plotted.

RESULTS:

1. The force/deflection characteristic is shown in Figure #7, page 72a.

2. The normal force characteristic for 5 contacts are shown on the same plot.

3. The spring rate of the contact system tested was 34 grams/0.001" deflection.


Samtec
Tynes #1-#5
Force in GRAMS
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
0
1
2
3
4
5
Project #: 9970902
SubGroup : Supplemental Contech Research, Inc.
Deflection (0.000 IN.)
Tech: G.P.
Date: 31-May-00

PROJECT NO.: 99709 SPECIFICATION: Samtec Test Plan

PART NO.: PTHF-130-02-G-Q PART DESCRIPTION: 120 Pos. Compliant Pin Conn.

SAMPLE SIZE: 2 Connectors TECHNICIAN: GP

START DATE: 5/31/00 COMPLETE DATE: 5/31/00

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 40%

EQUIPMENT ID#: 609, 621

SOLVENT RESISTANCE

PURPOSE:

To determine the ability of the plastic housing to withstand normal cleaning solvents without damage. The solvent used is considered severe. If, however, the plastic remains stable and undamaged when so exposed it is considered to be immune to all the common solutions available.

PROCEDURE:

1. The test samples were ultrasonically cleaned after test lead attachment, preparation and/or soldering using the following process:

   A) Test samples were immersed into the Branson 8210 cleaner which contained Kyzen Ionex HC cleaning solution with the following conditions:

      a) Temperature : 55° ± 4°C
      b) Frequency : 43 KHz
      c) Immersion Time : 3 to 5 Minutes

   B) Test samples were slowly removed and placed into the Branson 5210 cleaner which contained DI water with the following conditions:

      a) Temperature : 55° ± 4°C
      b) Frequency : 47 KHz
      c) Immersion Time : 1 to 2 Minutes

PROCEDURE:

C) Test samples were removed and placed in a Fisher Thermix agitator containing DI water warmed to 55° ± 5°C for 1 to 2 minutes.

D) Upon removal, the test samples were rinsed for 1 to 2 minutes in free flowing DI water at 55° ± 5°C.

E) After final rinse, test samples were dried in an air circulating oven for 2 to 3 minutes minimum at 50° ± 2°C.

REQUIREMENTS:

1. The marking shall be complete and legible.

2. There shall be no evidence of discoloration, degradation or physical damage to the plastic housing.

RESULTS:

All samples so tested met the requirements specified.

PROJECT NO.: 99709	SPECIFICATION: Samtec Test Plan
PART NO.: PTHF-130-02-G-Q	PART DESCRIPTION: 120 Pos. Compliant Pin Conn.
SAMPLE SIZE: 15 Compliant Pins	TECHNICIAN: GP
START DATE: 6/6/00	COMPLETE DATE: 6/16/00
ROOM AMBIENT: N/A	RELATIVE HUMIDITY: N/A
EQUIPMENT ID#: 38, 340, Thielsch Engineering	

CROSSECTIONING

PURPOSE:

To determine the magnitude of contact interface between the compliant pin section and plated thru hole by visual examination.

PROCEDURE:

1. Prior to crossectioning, the plated thru holes were conditioned 3X in the manner as follows:

   a) An untested compliant pin was inserted into an untested plated thru hole to a depth which accurately represents actual connector mounting. (See Figure #8, page 78.)

   b) The compliant pin was removed and a second untested pin was inserted into the same plated thru hole.

   c) The second compliant pin was removed and a third untested pin was inserted into the same plated thru hole.

   d) These compliant pins remained inserted and were utilized for the crossectioning procedure.

REQUIREMENTS: See next page.

REQUIREMENTS:

1. Five compliant pins shall be crossectioned in the vertical axis approximately half way through the compliant pin in a plane perpendicular with the compliant pin face. See Figures #9 through #12.

2. Five compliant pins shall be crossectioned in the horizontal axis 0.010" down from the face of the annular ring in the direction of insertion. See Figures #13 and 14.

3. Five compliant pins shall be crossectioned in the vertical axis 0.030" down from the face of the annular ring in the direction of insertion. See Figures #15 and 16.

RESULTS:

See Figures #9 thru #16.

FIGURE #5

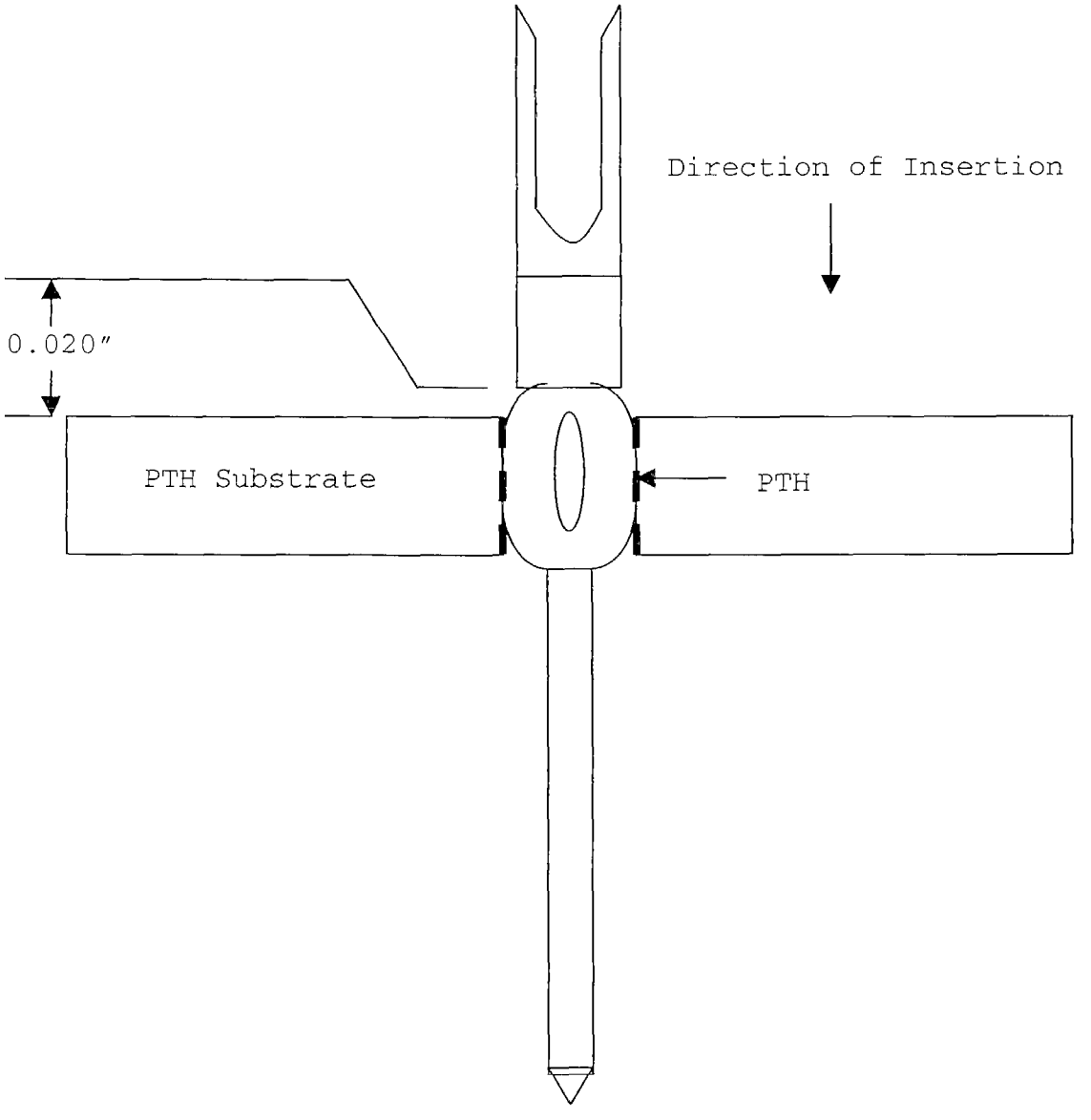


FIGURE #9

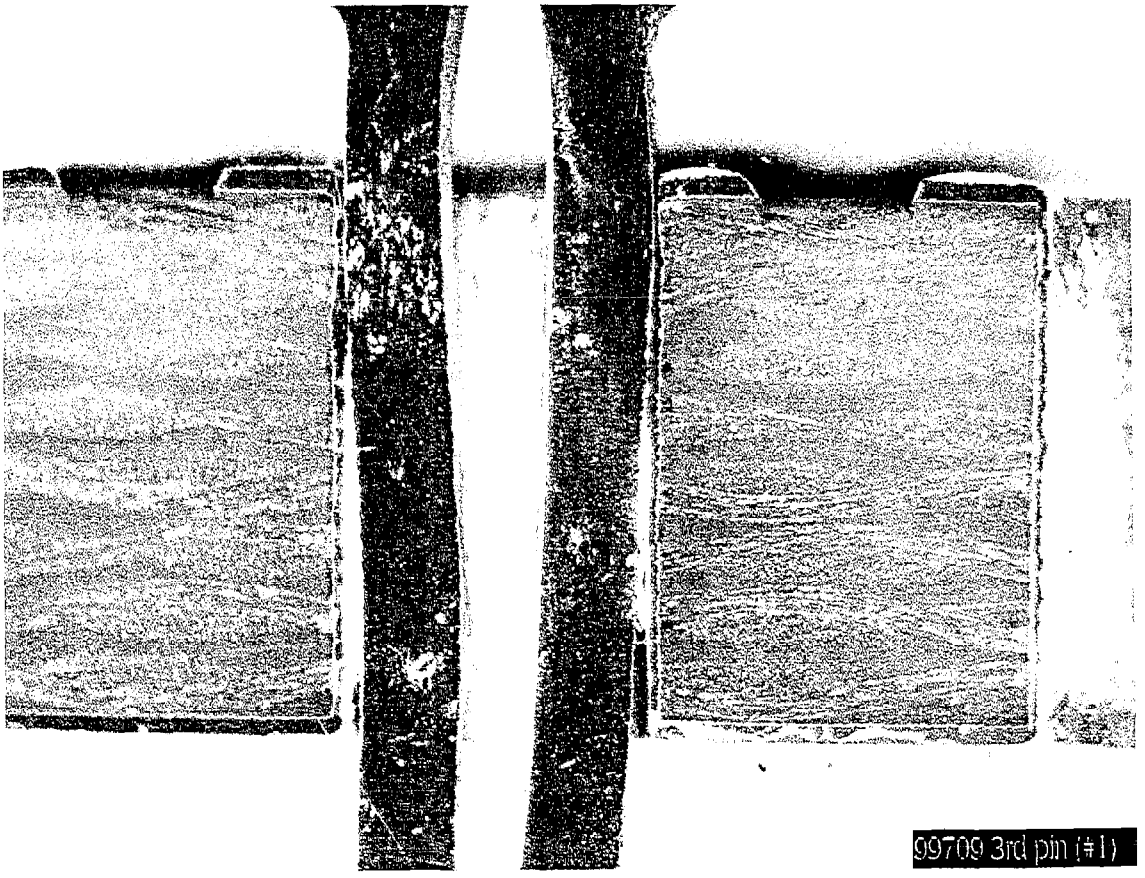


FIGURE #10

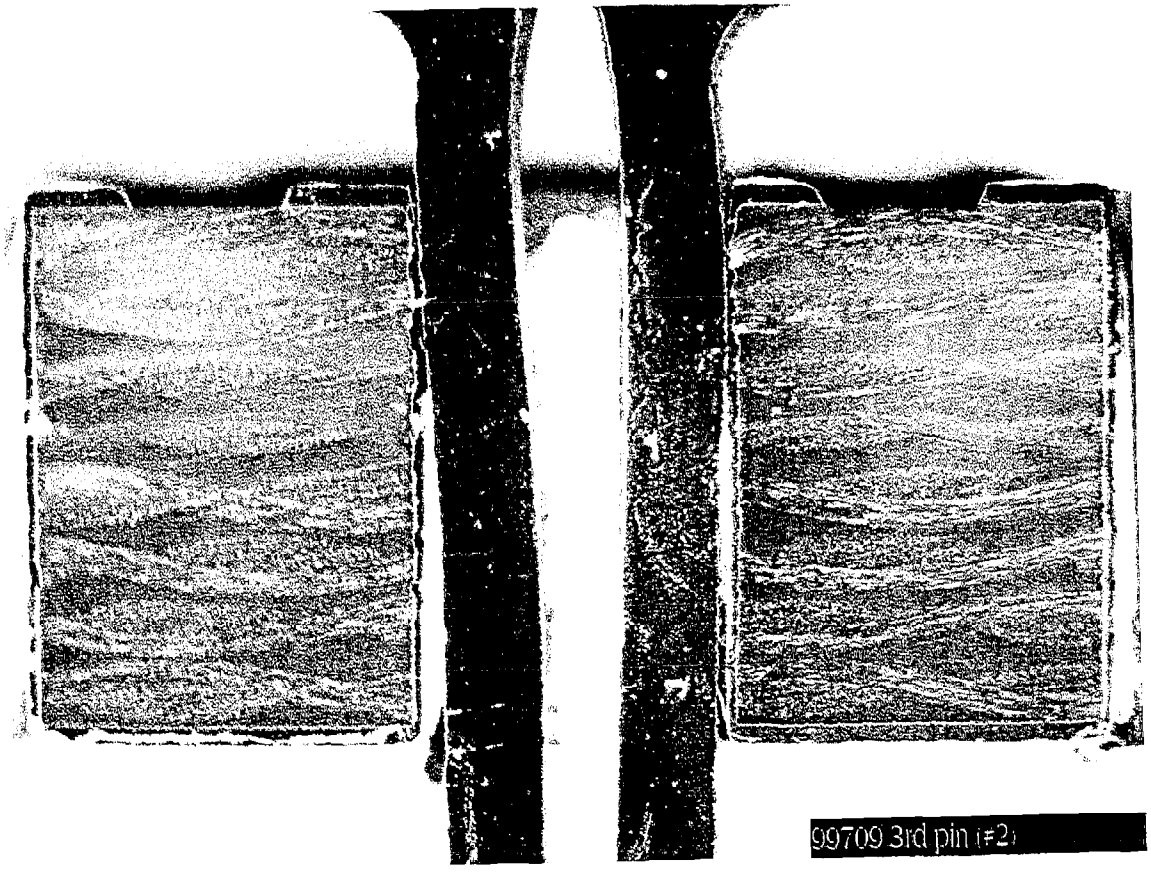


FIGURE #11

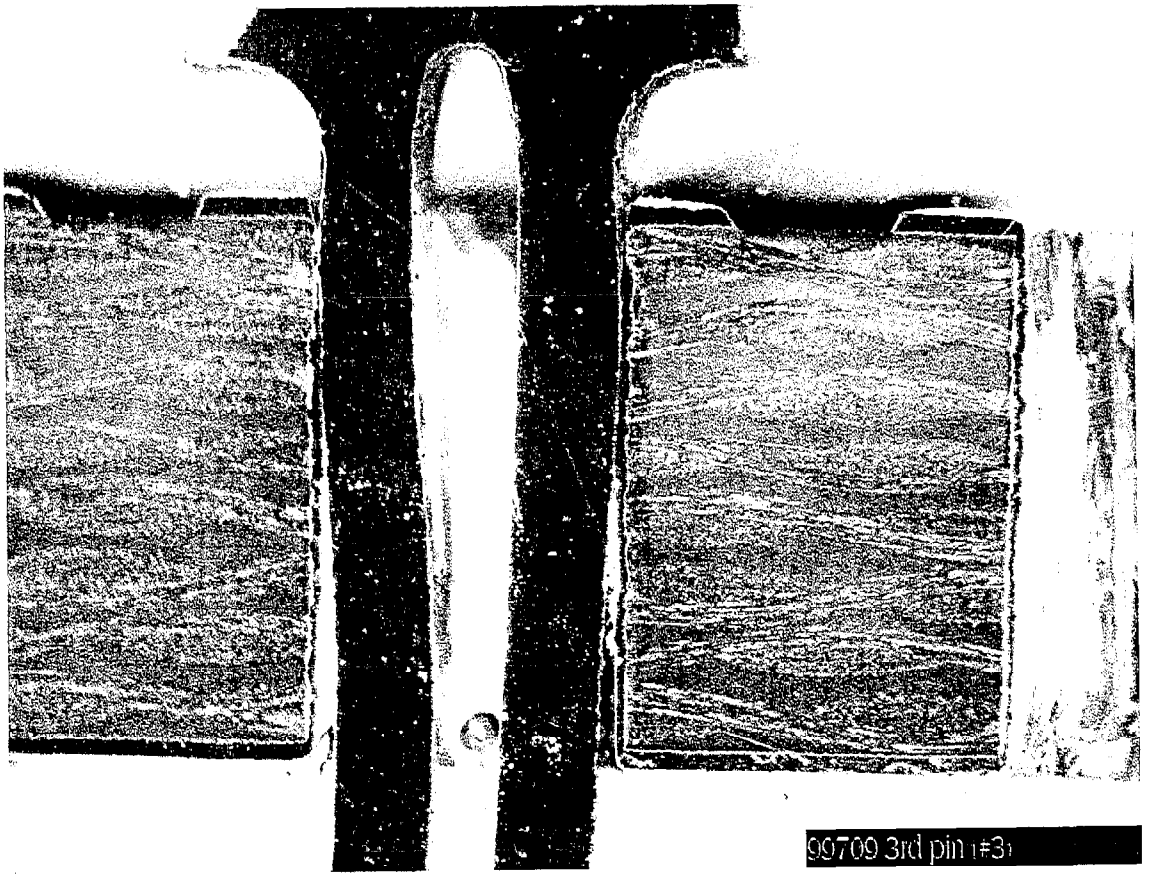


FIGURE #12

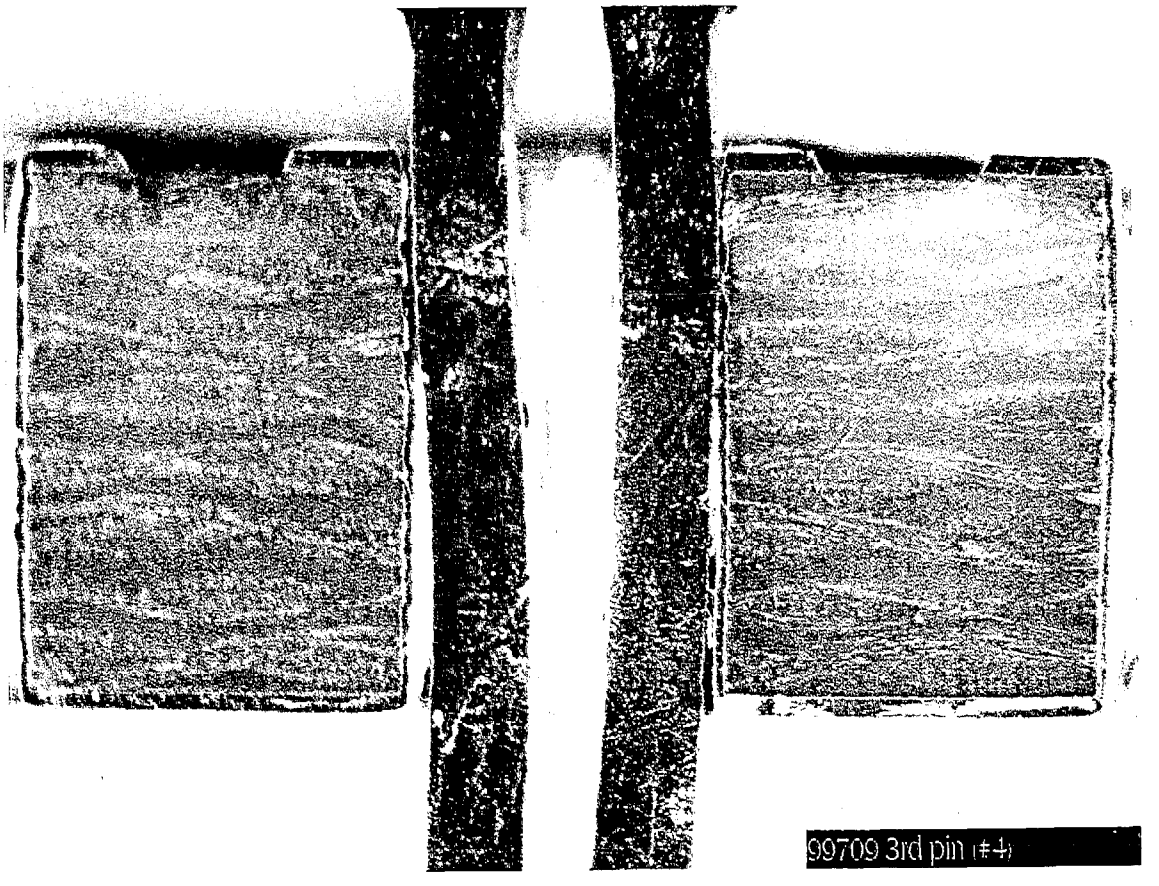


FIGURE #13

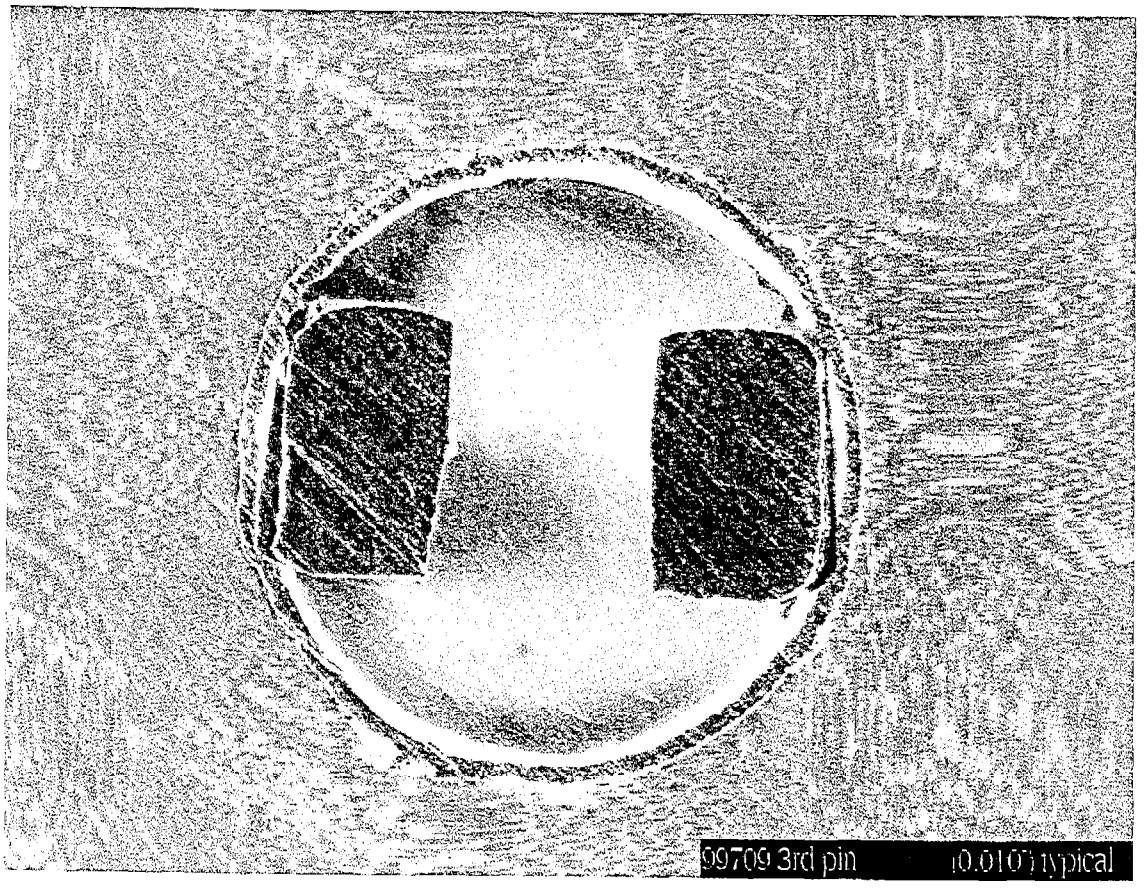


FIGURE #14

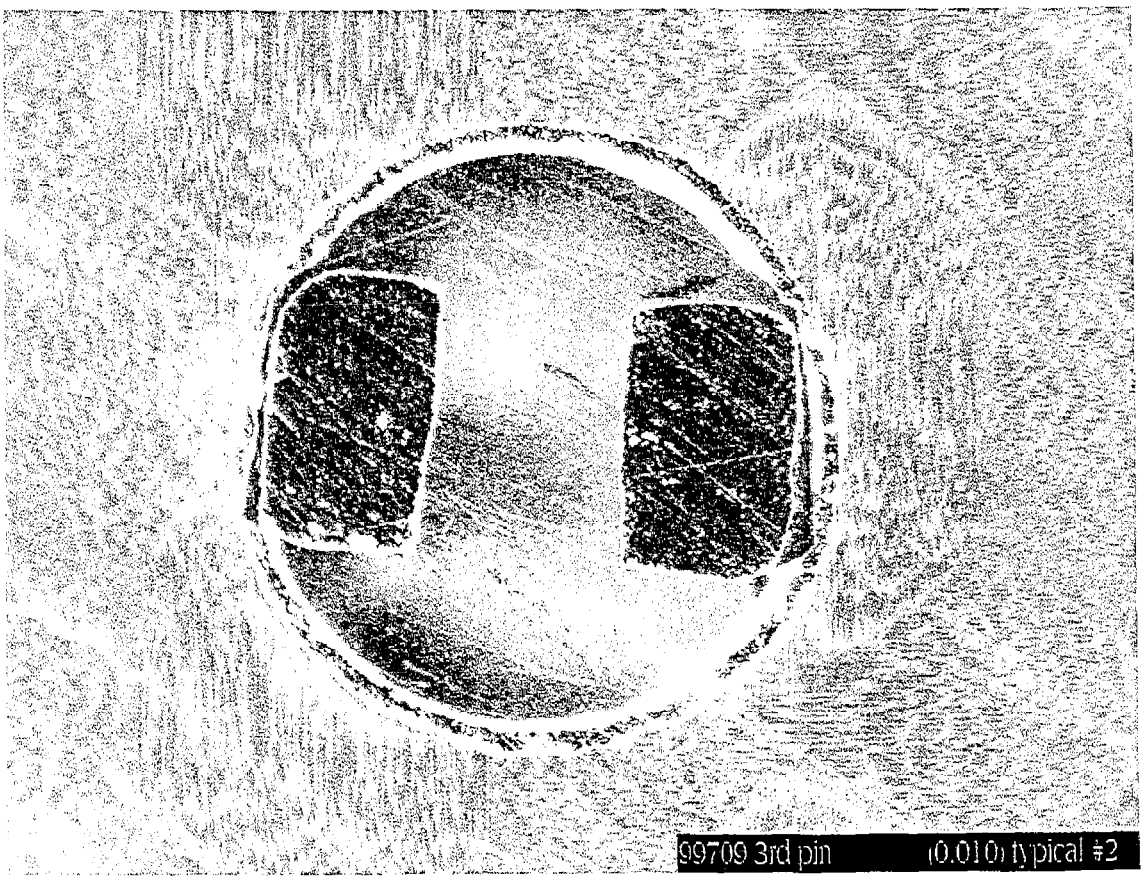


FIGURE #15

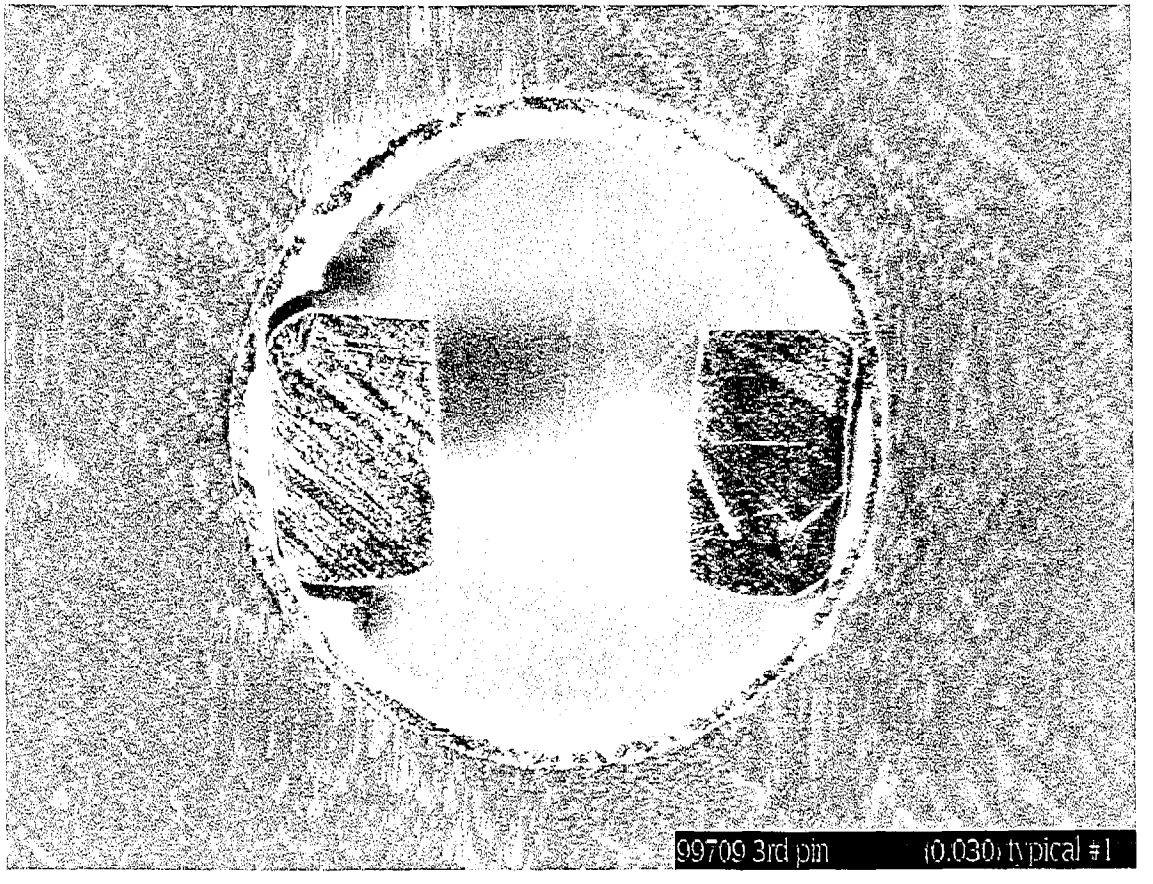
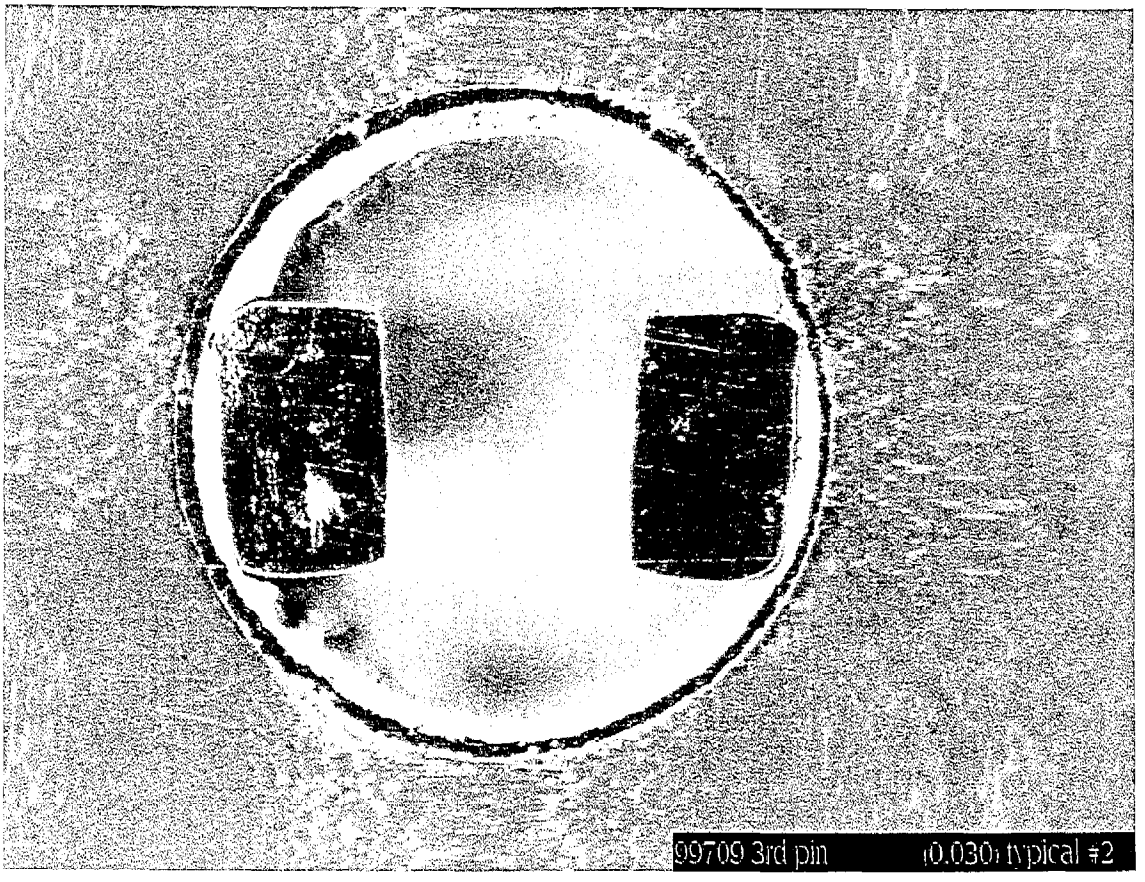


FIGURE #16



PROJECT NO.: 99709	SPECIFICATION: N/A
PART NO.: PTHF-130-02-G-Q	PART DESCRIPTION: Contacts
SAMPLE SIZE: 25/Hole Size	TECHNICIAN: LL/MEM
START DATE: 12/6/99	COMPLETE DATE: 12/9/99
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 38%
EQUIPMENT ID#: 206, 244, 476, 488, 562, 1138	

COMPLIANT PIN INSERTION/RETENTION RESISTANCE

PROCEDURE:

1. This test was performed prior to the full qualification test. It was performed to assure that basic features and requirements of the compliant portion of the contacts were at an acceptable level.

2. The test sponsor supplied test boards with pth holes identified as 0.033, 0.036 an 0.039 dia holes.

3. Each contact was inserted into a plated thru hole of the printed circuit board involved.

4. The force to insert the contact was measured and recorded.

5. The compliant resistance was measured and recorded.

6. The force to remove each pin was measured and recorded.

7. After performing initial retention, a second untested pin was inserted and removed from each of the plated thru holes previously used.

8. A third untested pin was inserted into each of the plated thru holes previously used and the insertion force and compliant resistance measured and recorded.

9. The assembled contacts were exposed to a gas tight environment in accordance with EIA 364, Test Procedure 36.

10. The compliant resistance was measured and recorded.

REQUIREMENTS: See next page.

REQUIREMENTS:

1. The compliant pin insertion and retention force shall be measured and recorded.

2. The initial compliant resistance shall not exceed 1.0 milliohm.

3. The change in resistance shall not exceed +1.0 mΩ.

RESULTS:

1. The following is a summary of the data observed:

		INSERTION FORCE (Pounds)		RETENTION FORCE (Pounds)	
A)	0.033 Dia. Hole	1st Pin	3rd Pin	1st Pin	3rd Pin
	Avg.	8.3	7.5	5.8	5.0
	Max.	9.3	8.8	7.0	7.6
	Min.	6.8	6.5	3.1	3.2
	Std. Dev.	0.6	0.6	0.8	1.0
B)	0.036 Dia. Hole				
	Avg.	6.6	6.0	5.8	4.4
	Max.	8.2	7.5	6.7	5.5
	Min.	5.2	4.9	3.1	3.7
	Std. Dev.	0.7	0.7	0.8	0.6
C)	0.039 Dia. Hole				
	Avg.	5.9	5.7	5.3	4.9
	Max.	6.9	6.9	6.5	6.0
	Min.	5.0	4.6	3.3	3.2
	Std. Dev.	0.5	0.7	0.8	0.6

2. See data files 966301 thru 966303 for individual data points.

RESULTS: Continued

3. The following is a summary of the data observed:

		COMPLIANT RESISTANCE (Milliohms)		
A)	0.033 Dia. Hole	Avg.	Max.	Std. Dev.
	Initial	0.65	0.73	0.06
	3rd Pin	+0.07	+0.19	0.06
	After Gas Tight	+0.06	+0.27	0.08
B)	0.036 Dia. Hole	Avg.	Max.	Std. Dev.
	Initial	0.56	0.67	0.06
	3rd Pin	+0.11	+0.31	0.08
	After Gas Tight	+0.25	+0.40	0.09
C)	0.039 Dia. Hole	Avg.	Max.	Std. Dev.
	Initial	0.69	0.79	0.05
	3rd Pin	0.00	+0.11	0.07
	After Gas Tight	+0.09	+0.26	0.09

4. See data files 966301.LLCR thru 966303.LLCR for individual data points.

INSERTION/RETENTION FORCE

Project #	99663	Spec:	N/A
Customer:	SAMTEC	Subgroup :	N/A
Product :	PTHF-130-02-G-Q	File #:	966301
Description:	COMPLIANT PIN (0.033 DIA HOLE)	Rate:1in/min & 1 lb/sec	

Actual values
Units: pounds

Temp °C	22	22	22	22
R.H. %	38	38	40	30
Date :	12/06/1999	12/06/1999	12/07/1999	12/09/1999
Pos ID	1ST.INS.	1ST.RET.	3RD.INS.	3RD.RET.
1	8.9	5.5	6.6	3.3
2	8.9	5.3	6.5	3.9
3	8.4	6.3	6.7	4.3
4	7.8	6.4	7.5	6.0
5	8.0	4.7	7.8	5.1
6	7.7	4.7	7.3	4.9
7	8.0	6.3	7.9	5.3
8	8.5	6.2	7.8	5.3
9	6.8	5.5	7.7	4.5
10	7.9	5.5	6.9	5.1
11	7.9	5.5	7.4	4.6
12	8.1	6.0	8.4	5.7
13	7.8	5.6	7.7	5.1
14	7.7	6.0	7.8	5.6
15	8.1	3.1	8.5	6.6
16	8.9	5.7	7.9	5.7
17	8.2	6.4	8.8	7.6
18	8.3	5.6	7.5	3.5
19	9.0	6.4	7.9	5.0
20	8.8	6.7	7.4	4.3
21	9.3	6.7	6.7	3.2
22	8.9	7.0	7.6	5.3
23	8.8	6.7	7.3	5.5
24	7.8	5.7	7.8	4.3
25	7.9	6.0	7.3	5.6
Max	9.3	7.0	8.8	7.6
Min	6.8	3.1	6.5	3.2
Avg	8.3	5.8	7.5	5.0
Std	0.6	0.8	0.6	1.0
Tech	LL	LL	LL	LL
Equip ID	206	206	206	206
	488	488	488	488
	562	562	562	562

LOW LEVEL CONTACT RESISTANCE

Project : 99663
Customer : SAMTEC
Product : PTHF-130-02-G-Q
Description: COMPLIANT PIN (0.033 DIA HOLE)
Open circuit voltage: 20 millivolts

Spec: N/A
Subgroup : N/A
File #: 9966301lcr
Test current: 100 milliamps

Units: milliohms
Delta values

Temp 'C	22	22	22
R.H. %	38	40	32
Date :	12/6/99	12/7/99	12/8/99
Posi ID	Initial	3rd.Pin	G.Tight
1	0.72	0.09	0.27
2	0.70	0.07	0.03
3	0.67	0.06	0.09
4	0.64	0.15	0.06
5	0.63	0.07	0.10
6	0.72	0.03	0.07
7	0.66	0.04	-0.02
8	0.69	0.10	0.05
9	0.64	0.03	0.05
10	0.69	-0.01	0.03
11	0.69	0.04	0.05
12	0.67	0.15	-0.05
13	0.73	-0.02	-0.01
14	0.68	0.02	-0.07
15	0.71	0.05	0.20
16	0.66	0.05	0.13
17	0.66	-0.01	0.07
18	0.69	0.00	-0.06
19	0.66	0.05	-0.04
20	0.65	0.04	0.05
21	0.49	0.19	0.18
22	0.60	0.05	-0.01
23	0.53	0.17	0.14
24	0.55	0.11	0.10
25	0.55	0.11	0.11
MAX	0.73	0.19	0.27
MIN	0.49	-0.02	-0.07
AVG	0.65	0.07	0.06
STD	0.06	0.06	0.08
Open	0	0	0
Tech	MEM	MEM	MEM
Equip ID	244	244	244
	476	476	476
	1138	1138	1138

INSERTION/RETENTION FORCE

Project #	99663	Spec:	N/A
Customer:	SAMTEC	Subgroup :	N/A
Product :	PTHF-103-03-G-Q	File #:	966302
Description:	COMPLIANT PIN (0.036 DIA HOLE)	Rate:1in/min & 1 lb/sec	

Actual values
Units: pounds

Temp °C	22	22	22	22
R.H. %	38	38	40	30
Date :	12/06/1999	12/06/1999	12/07/1999	12/09/1999
Pos ID	1ST.INS.	1ST.RET.	3RD.INS.	3RD.RET.
1	8.2	6.3	6.5	4.0
2	6.2	5.1	6.4	4.2
3	7.2	6.6	6.4	5.3
4	6.2	6.2	5.5	3.9
5	8.1	6.7	4.9	3.9
6	6.1	5.7	6.1	4.5
7	6.6	4.6	6.2	4.5
8	5.2	5.7	5.1	3.8
9	6.7	6.1	6.1	4.2
10	5.6	5.0	5.8	4.0
11	6.4	6.3	5.3	3.9
12	6.5	3.1	5.0	3.7
13	6.2	5.9	6.3	4.5
14	6.6	5.7	5.5	3.8
15	7.5	5.7	5.9	4.3
16	6.9	5.1	7.5	5.3
17	6.7	6.2	6.9	5.5
18	6.7	5.8	6.6	5.1
19	6.8	6.7	6.5	5.0
20	6.4	6.0	5.3	4.2
21	7.0	6.3	6.2	5.1
22	7.1	6.2	6.4	5.3
23	6.5	5.6	5.3	4.3
24	6.1	6.0	5.2	4.6
25	6.3	6.3	6.0	3.9
Max	8.2	6.7	7.5	5.5
Min	5.2	3.1	4.9	3.7
Avg	6.6	5.8	6.0	4.4
Std	0.7	0.8	0.7	0.6
Tech	LL	LL	LL	LL
Equip ID	206	206	206	206
	488	488	488	488
	562	562	562	562

LOW LEVEL CONTACT RESISTANCE

Project : 99663
Customer : SAMTEC
Product : PTHF-130-02-G-Q
Description: COMPLIANT PIN (0.036 DIA HOLE)
Open circuit voltage: 20 millivolts

Spec: N/A
Subgroup : N/A
File #: 9966302lcr

Test current: 100 milliamps

Units: milliohms
Delta values

Temp 'C	22	22	22
R.H. %	38	32	32
Date :	12/6/99	12/8/99	12/8/99
Posi ID	Initial	3rd.Pin	G.Tight
1	0.60	0.14	0.35
2	0.48	0.16	0.40
3	0.56	0.13	0.29
4	0.49	0.15	0.33
5	0.55	0.07	0.27
6	0.54	0.01	0.27
7	0.51	0.23	0.37
8	0.49	0.18	0.34
9	0.42	0.31	0.37
10	0.64	-0.03	0.23
11	0.56	0.16	0.25
12	0.55	0.11	0.27
13	0.62	0.16	0.25
14	0.56	0.19	0.29
15	0.65	0.09	0.29
16	0.58	0.06	0.19
17	0.56	0.03	0.21
18	0.63	0.08	0.10
19	0.54	0.12	0.19
20	0.62	0.03	0.13
21	0.59	0.04	0.18
22	0.56	0.02	0.19
23	0.67	-0.02	0.07
24	0.55	0.17	0.30
25	0.55	0.15	0.23
MAX	0.67	0.31	0.40
MIN	0.42	-0.03	0.07
AVG	0.56	0.11	0.25
STD	0.06	0.08	0.09
Open	0	0	0
Tech	MEM	MEM	MEM
Equip ID	244	244	244
	475	475	475
	1138	1138	1138

INSERTION/RETENTION FORCE

Project #	99663	Spec:	N/A
Customer:	SAMTEC	Subgroup :	N/A
Product :	PTHF-130-02-G-Q	File #:	9966303
Description:	COMPLIANT PIN (0.039 DIA HOLE)	Rate:1in/min & 1 lb/sec	

Actual values
Units: pounds

Temp °C	22	22	22	22
R.H. %	38	40	32	30
Date :	12/06/1999	12/07/1999	12/08/1999	12/09/1999
Pos ID	1ST.INS.	1ST.RET.	3RD.INS.	3RD.RET.
1	5.6	3.3	6.4	5.3
2	5.8	5.5	6.9	6.0
3	6.9	6.5	6.0	5.2
4	5.8	4.8	4.6	4.1
5	6.3	5.8	5.8	5.3
6	6.2	5.1	4.7	4.2
7	6.6	6.0	6.5	5.1
8	5.6	5.4	5.1	4.2
9	5.5	5.9	5.3	4.8
10	5.7	5.5	4.8	4.4
11	5.2	5.5	5.0	5.0
12	5.0	5.4	6.1	5.3
13	6.9	4.5	5.7	5.2
14	5.9	5.6	6.2	4.8
15	5.9	5.4	5.7	4.6
16	5.9	4.8	4.8	3.2
17	6.9	6.1	4.9	4.0
18	6.0	5.6	5.6	4.7
19	5.8	5.7	5.7	4.9
20	5.5	5.2	6.0	5.7
21	6.3	6.4	6.7	6.0
22	6.0	5.5	6.2	5.3
23	5.4	4.5	6.8	5.4
24	5.5	4.6	5.9	5.0
25	5.3	3.7	6.3	4.8
Max	6.9	6.5	6.9	6.0
Min	5.0	3.3	4.6	3.2
Avg	5.9	5.3	5.7	4.9
Std	0.5	0.8	0.7	0.6
Tech	LL	LL	LL	LL
Equip ID	206	206	206	206
	488	488	488	488
	562	562	562	562

LOW LEVEL CONTACT RESISTANCE

Project : 99663
Customer : SAMTEC
Product : PTHF-130-02-G-Q
Description: COMPLIANT PIN (0.039 DIA HOLE)
Open circuit voltage: 20 millivolts

Spec: N/A
Subgroup : N/A
File #: 9966303lcr
Test current: 100 milliamps

Units: milliohms
Delta values

Temp 'C	22	22	22
R.H. %	38	32	32
Date :	12/6/99	12/8/99	12/8/99
Posi ID	Initial	3rd.Pin	G.Tight
1	0.66	0.04	0.24
2	0.74	-0.01	0.04
3	0.56	0.07	0.18
4	0.61	0.11	0.14
5	0.71	-0.02	0.05
6	0.66	-0.08	0.14
7	0.68	0.03	0.10
8	0.71	0.08	0.11
9	0.68	0.02	0.09
10	0.71	0.07	0.10
11	0.70	0.05	0.07
12	0.70	-0.02	0.02
13	0.79	-0.12	-0.05
14	0.66	-0.02	0.07
15	0.77	0.02	-0.05
16	0.64	0.08	0.26
17	0.63	-0.06	0.13
18	0.71	0.03	-0.04
19	0.76	-0.05	-0.01
20	0.69	-0.03	0.11
21	0.70	-0.02	0.02
22	0.63	-0.04	0.13
23	0.73	-0.15	-0.01
24	0.71	0.00	0.14
25	0.61	0.10	0.23
MAX	0.79	0.11	0.26
MIN	0.56	-0.15	-0.05
AVG	0.69	0.00	0.09
STD	0.05	0.07	0.09
Open	0	0	0
Tech	MEM	MEM	MEM
Equip ID	244	244	244
	475	475	475
	1138	1138	1138