

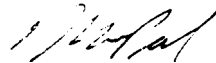
APRIL 21, 1992

TEST REPORT #92117

QUALIFICATION TESTING

TSM-131, SSM-131 SERIES

SAMTEC CORPORATION



APPROVED BY: -MAX PEEL'
PRESIDENT AND DIRECTOR OF ADVANCED RESEARCH
CONTECH RESEARCH, INC.



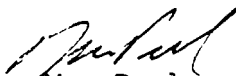
Contech Research

CERTIFICATION

This is to certify that the evaluation described herein was designed and executed by personnel of Contech Research, Inc. It was performed with the concurrence of Samtec Corporation 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 MIL-STD-45662, as applicable.

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


Max Peel
President

MP/js



SCOPE

To perform qualification testing on TSM/SSM-131 Series Connectors as manufactured and submitted by the test sponsor, Samtec Corporation.

TEST SAMPLES AND PREPARATION

1. The following test samples were submitted by the test sponsor, Samtec Corporation, for the evaluation to be performed by Contech Research, Inc.
 - a) TSM-131-01-S-DV, 36 Position
 - b) SSM-131-03-S-DV, 36 Position
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. All test samples were coded and identified to maintain continuity throughout the test sequences.
5. The test samples were not cleaned prior to testing.
6. Connectors were tested in an unmounted condition (not terminated to test boards).
7. Unless otherwise specified in the test procedures used, in further preparation was used.
8. All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to MIL-STD-45662, as applicable.



T E S T

1. The following test groups were established, see Test Plan Flow Diagram, Figure #1.

Group 1 : Gas Tight Series
Group 2 : Vibration/Shock Series (LLCR)
Group 3 : Vibration/Shock Series (Contact Interruptions)
Group 4 : Thermal Shock/Cyclic Humidity Series (LLCR)
Group 5 : Thermal Shock/Cyclic Humidity Series (IR & DWV)
Group 6 : Thermal Relaxation Series

2. Supplemental Tests:

a) Normal Force

FIGURE #1

SAMPLE PREPARATION

LLCR	MATING FORCE	IF	LLCR	DWV		
GAS TIGHT	1ST CYCLE	WF	DURABILITY	THERMAL SHOCK	LLCR	NORMAL FORCE
LLCR	LLCR	MATING FORCE	LLCR	DWV	THERMAL AGE	
	UNMATING FORCE 1ST CYCLE	UNMATING FORCE	THERMAL SHOCK	IR	LLCR	
	DURABILITY	DURABILITY	LLCR	CYCLIC HUMIDITY	GAS TIGHT	
	MATING FORCE	MATING FORCE	HUMIDITY	IR	LLCR	
	UNMATING FORCE	UNMATING FORCE	LLCR	CAPACITANCE		
	LLCR	VIBRATION 1.0 MICROSEC.				
	VIBRATION	SHOCK 1.0 MICROSEC.				
	LLCR					
	SHOCK					
	LLCR					
<u>Gr. 1</u>	<u>Gr. 2</u>	<u>Gr. 3</u>	<u>Gr. 4</u>	<u>Gr. 5</u>	<u>Gr. 6</u>	<u>Gr. 7</u>



MONITORING TESTS

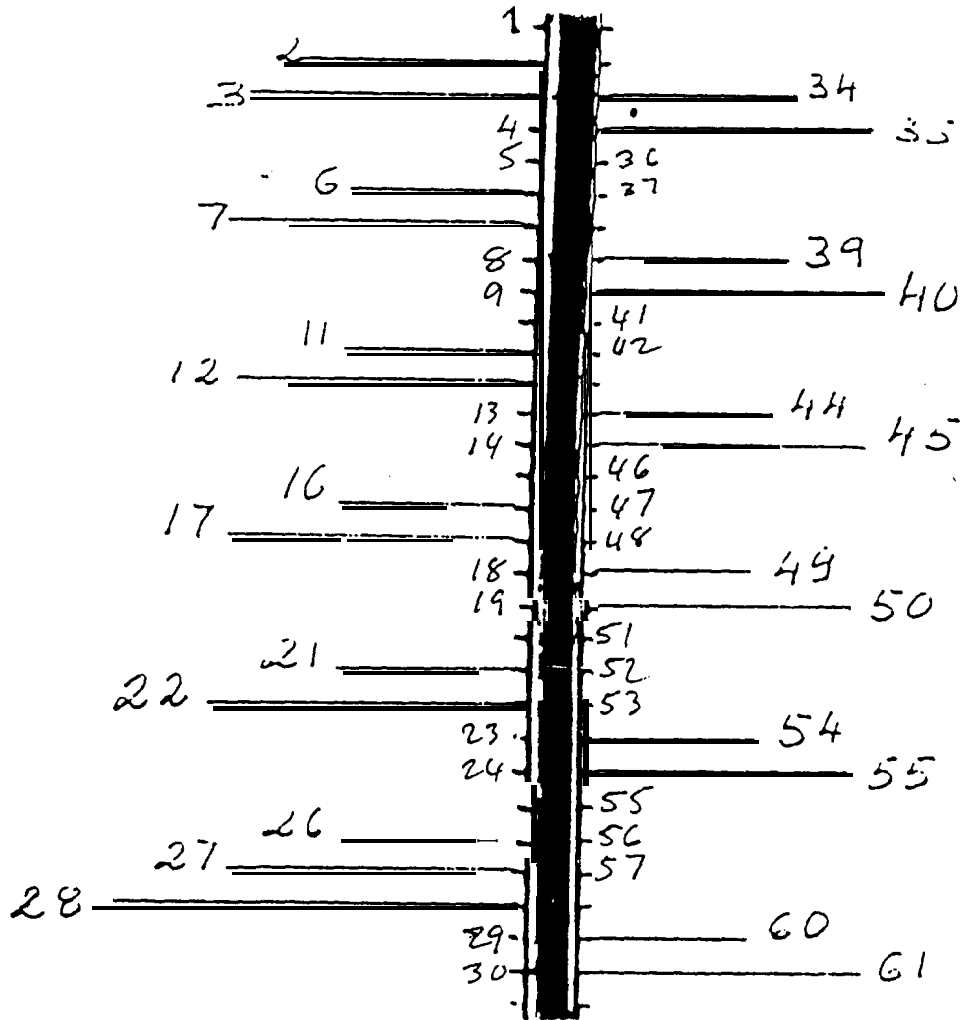
Throughout the test sequences selected for this evaluation one test was performed on a periodic basis. The following is the rationale for this test which is significant and important in evaluating the data in proper perspective.

LOW LEVEL CIRCUIT RESISTANCE

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.
2. The test method is also sensitive to and may detect the presence of fretting corrosion induced by mechanical or thermal environments and any significant loss of contact pressure.
3. This attribute was monitored after each preconditioning and/or test exposure in order to determine said stability of the connector material systems as they progress through the applicable test sequences.
4. The electrical stability of the system is determined by comparing the resistance value after a given test exposure to its initial value (prior to any exposure). The difference is the change in resistance occurring whose magnitude establishes the stability of the interface being evaluated.
5. The test is performed with a four wire system. The test is performed in accordance with MIL-STD-1344, Method 3002 with a 100 milliamp maximum test current and an open circuit voltage of 20 millivolts. Measurements are taken in the forward and reverse direction and averaged.
6. In order to categorized the change occurring in the low level circuit resistance in the test sequences performed, the following guidelines are used:
 - a) <5.0 milliohm change: Stable
 - b) 5.1 to 10.0 : Stable with minor changes
 - c) 10.1 to 15.0 : Stable with significant change
 - d) 15.1 to 25.0 : Marginal stability in non-benign applications.
 - e) 25.1 to 50.0 : Unstable in non-benign applications. Marginal in benign applications.
 - f) >50.1 : Unstable
7. voltage probes were placed within 0.050 inch of the plastic housings.



CONTACT POSITION LOCATION



DATA SUMMARY

<u>TEST</u>	<u>REQUIREMENTS</u>	<u>RESULTS</u>
<u>Group 1</u>		
LLCR	<10.0 mΩ	<5.3 mΩ
Gas Tight	No damage	Passed
LLCR	<20.0 mΩ	<5.1 mΩ
<u>Group 2</u>		
LLCR	<10.0 mΩ	<6.6 mΩ
Mating Force	Record	<14.5 lbs.
Unmating Force	Record	>10.5 lbs.
Durability	No damage	Passed
Mating Force	Record	<13.3 lbs.
Unmating Force	Record	>11.0 lbs.
LLCR	<20.0 mΩ	<5.5 mΩ
Vibration	No damage	Passed
LLCR	<20.0 mΩ	<15.3 mΩ
Shock	No damage	Passed
LLCR	<20.0 mΩ	<12.7 mΩ
<u>Group 3</u>		
Engagement Forces	Record	<2.0 oz.
Separation Forces	Record	>0.8 oz.
Mating Forces	Record	<20.0 lbs.
Unmating Forces	Record	>12.5 lbs.
Durability	No damage	Passed
Mating Forces	Record	<16.5 lbs.
Unmating Forces	Record	>11.5 lbs.
Vibration	No damage	Passed
	1.0 microsecond	Passed
Shock	No damage	Passed
	1.0 microsecond	Passed
<u>Group 4</u>		
LLCR	10.0 mΩ	
Durability	No damage	
LLCR	20.0 m	
Thermal Shock	No damage	
LLCR	20.0 mΩ	
Cyclic Humidity	No damage	
LLCR	20.0 mΩ	



DATA SUMMARY

<u>TEST</u>	<u>REQUIREMENTS</u>	<u>RESULTS</u>
<u>Group 5</u>		
Insulation Resistance	>5000 megohms	50,000 megohms
DW	1000 VAC	Passed
Thermal Shock	No damage	Passed
DW	1000 VAC	Passed
Cyclic Humidity	No damage	Passed
Resistance	>1000 megohms	50,000 megohms
Capacitance	<2.0 pF	0.5 pF

Group 6

LLCR	<10.0 mΩ	5.9 mΩ
Thermal Age	No damage	Passed
LLCR	<20.0 mΩ	5.7 mΩ
Gas Tight	No damage	Passed
LLCR	<20.0 mΩ	5.4 mΩ

Supplemental Test

Normal Force	Plot	20.0 gms/0.001" +Preload
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LLCR = Low Level Circuit Resistance
DWV = Dielectric Withstanding Voltage



Equipment List

ID#	Last Cal	Next Cal	Equipment Name	Manufacturer	Accuracy	Model #	Serial #	Freq Cal
18			Bench Oven	Blue M Company	±0.5°C	POM7-256C	P38-1452	Each Test
27	2/19/92	8/19/92	Temp/Hum Cycle	Blue M Company	±1% of span	FR-256PC-1	F2-249	3 months
30	1/16/92	7/16/92	Discontinuity Monitor	Associated Test Lab	± 50 ns	DM-600-10	382-1	6 months
34			Shock Machine	Avco	See ID# 14 & 117	SM110-3	1047	Each Test
38			Universal Test Stand	Chatillon	N/A	UTSM-SS	1030	N/A
45			Plotter	Hewlett Packard	N/A	7225B	2106A03238	N/A
99	1/7/92	1/7/93	T/M Microscope	Mitutoyo Corp.	See specification	TM111	30046	12 months
1 15	6/30/91	6/30/92	Vibration Controller	B & K	±4%	1047	1162161	12 months
117	3/12/92	9/12/92	Oscilloscope	Hewlett Packard	See specification	54200	2445A 00127	6 months
157	3/5/92	9/5/92	Digibridge	Genrad Inc.	See specification	1657	7131004010	6 months
159	11/21/91	5/21/92	Force Gage (30 lbs.)	Chatillon	2.5% of full scale	DPP-30	3884	6 months
192	10/10/91	10/10/92	Vertical Thermal Shock	Cincinnati Sub Zero	N/A	VTS-1-5-3	88-11094	12 months
200			Power Supply	PCB Piezotronics	N/A	482A	4210	N/A
206	3/12/92	3/12/93	Digital Force Gage	Chatillon Company	±.25% of full scale	DFGRS-10	2346	12 months
207	10/24/91	4/24/92	Micro-ohm Meter	Keithley Company	See manual	580	438208	6 months
223			PCB Power Supply	PCB Piezotronics	N/A	482	4356	N/A
251			Computer System	Packard Bell	N/A	286	105670	N/A
281			Vibration Power Supply	Ling Dynamics	See manual	DPA 10K	156	N/A
282			Vibration Shaker	Ling Dynamics	N/A	V-730	163	N/A
295	2/20/92	8/20/92	Micro Ohm Meter	Keithley Company	See manual	580	480781	6 months
315			X - Y Table	N.E. Affiliated Tech.	N/A	XY-6060	N/A	N/A
321	2/13/92	2/13/93	AC-DC Hipot/Megohmmeter	Hipotronics Co.	N/A	H306B	DS16-201	12 months
323			Computer	Legatech	See manual	286-12	N/A	N/A
398	2/4/92	8/4/92	500 Pound Force Gage	Commercial Scale Co.	±.15 % f.s.	DFI-500	11792	6 months

82

TEST RESULTS

Gas Tight Series

Group 1



PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-17-92 COMPLETE DATE: 4-7-92

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 26%

EQUIPMENT ID#: 295, 323, Applicable Glassware

GAS TIGHT

PURPOSE:

To evaluate the integrity of the contact interface by assessment of the gas tight characteristics of the contacting surfaces. The gas tight characteristic is the ability of contacting surfaces to prevent harsh environment from penetrating between them and forming oxides and/or films which will degrade electrical performance.

PROCEDURE:

1. The test was performed in accordance with EIA RS-364, TP-36, Method I.
2. Nitric acid was placed in the test chamber of a sufficient volume to result in saturation of the test chamber. The conditions were room ambient.
3. The solution was allowed to saturate the test chamber for a minimum of 15 minutes.
4. The test samples were placed in the test chamber and exposed for one hour \pm 5.0 minutes.
5. The test samples were placed in such a manner as not to be closer than 1" (25mm) from the wall of the test chamber and not closer than 3" (76mm) from the solution surfaces.
6. After exposure, the samples were removed from the test chamber and oven dried at 50°C for a minimum of one hour.

PROCEDURE -- Continued:

8. Within 60 minutes of drying, the final low level circuit resistance was measured and recorded. Measurements were performed with the test sample at room ambient.
9. Low level circuit resistance was measured in accordance with MIL-STD-1344, method 3002 with a 100 milliamp test current and 20 millivolt open circuit voltage.

REQUIREMENTS:

1. The initial low level circuit resistance shall not exceed 10.0 milliohms.
2. The final low level circuit resistance shall not exceed 20.0 milliohms.

RESULTS:

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

LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

<u>Sample ID#</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Avg. Change</u>	<u>Max Change</u>
ID# 1-1, Initial	4.6	5.3	4.2		
Final	4.4	5.0	4.1	-0.2	+0.2
ID# 1-2, Initial	4.5	5.2	4.1		
Final	4.5	5.1	4.1	0.0	+0.7

2. See pages 11a thru 11b for individual data points.



LOW-LEVEL CONTACT RESISTANCE

Project #: 92117
 Customer: SAMTEC
 Product: 62 POSITION CONNECTOR
 Description: TSM-131-01--S-DV/SSM-131-03-S-DV

Spec: MIL-STD-1344 METHOD 3002
 SubGroup: 1 [ID# 1-1
 File #: 211701
 Print Date: 07Apr92

Open circuit voltage: 2^o millivolts

Test current: 100 milliamps

Units: milliohms
 Delta values

Temp °C	+22	+23
R.H. %	26	30
Date	17Mar92	07Apr92
Pos ID	INITIAL	GASTIGHT
2	4.60	0.00
3	4.17	-0.02
6	4.87	-0.48
7	4.48	-0.18
11	4.73	+0.23
12	5.11	-0.73
16	5.32	-0.97
17	4.31	+0.22
21	4.38	-0.13
22	4.56	-0.04
26	4.86	-0.26
27	4.59	-0.24
28	5.05	-0.28
34	4.50	+0.17
35	4.59	-0.09
39	4.22	-0.02
40	4.46	-0.19
44	4.34	+0.07
45	4.69	≅ 44
49	4.20	+0.19
50	4.52	0.00
54	4.50	+0.01
55	4.90	-0.75
60	4.36	-0.10
61	5.05	-0.51

HIGH	5.32	+0.23
LOW	4.17	-0.97
AVG	4.61	-0.18
STD DEV	0.31	0.31
OPENS	0	0

INITIALS LL RVD

NOTES:

1 - An asterisk (*) indicates an open circuit or a value greater than 2 ohms.

LOW-LEVEL CONTACT RESISTANCE

Project #: 92117
Customer: SAMTEC
Product: 62 POSITION CONNECTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: MIL-STD-1344 METHOD 3002
SubGroup: 1 [ID# 1-2
File #: 211702
Print Date: 07Apr92

Open circuit voltage: 20 millivolts

Test current: 100 milliamps

Units: milliohms
Delta values

Temp °C	+22	+23
R.H. %	26	30
Date	17Mar92	07Apr92
Pos ID	INITIAL	GASIGHT
2	4.47	-0.25
3	4.15	+0.01
6	4.39	+0.70
7	4.54	+0.60
11	4.20	+0.11
12	4.62	-0.10
16	4.14	-0.07
17	4.43	-0.23
21	4.64	+0.12
22	4.16	+0.01
26	5.15	-0.54
27	4.99	-0.57
28	4.51	+0.53
34	4.40	-0.11
35	4.10	+0.05
39	4.43	+0.40
40	4.50	-0.27
44	4.13	+0.31
45	4.46	+0.03
49	4.36	+0.19
50	4.38	-0.29
54	4.47	-0.07
55	4.88	-0.37
60	4.72	+0.01
61	4.69	-0.20

HIGH	5.15	+0.70
LOW	4.10	-0.57
AVG	4.46	0.00
STD DEV	0.27	0.33
OPENS	0	0

INITIALS LL RVO

NOTES:

1 - An asterisk (*) indicates an open circuit or a value greater than 2 ohms.

TEST RESULTS

Vibration/Shock Series (LLCR)

Group 2



PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-26-92 COMPLETE DATE: 3-26-92

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 26%

EQUIPMENT ID#: 159, **315, 38**

MATING AND UNMATING FORCE

PURPOSE:

To determine the mechanical forces required to mate and unmate the connector halves with all guiding and applicable hardware assembled to the test samples.

PROCEDURE:

1. The test was performed in accordance with MIL-STD-1344, Method 2013.
2. The test samples were fixtured to the base plate of the test stand and applicable force gauge.
3. The fixturing was accomplished to assure axial alignment and allowed self centering movement to exist.
4. The test rate was 1.0 inch/minute.

REQUIREMENTS:

The force required to mate and unmate the connector halves shall be measured and recorded.

RESULTS:

The following is a summary of the observed forces measured and recorded.

<u>Sample ID#</u>	<u>MATING FORCE (Pounds)</u>	<u>UNMATING FORCE (Pounds)</u>
2-1	12.0	10.5
2-2	14.5	12.5



PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-26-92 COMPLETE DATE: 3-26-92

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 26%

EQUIPMENT ID#: 295, 323

LOW LEVEL CIRCUIT RESISTANCE (LLCR)

PURPOSE:

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 pressure.

PROCEDURE:

1. This test was performed in accordance with MIL-STD-1344, Method 3002 with a 100 milliamp maximum test current and an open circuit voltage of **20 millivolts** (four wire technique).
2. The voltage probes were attached to the contact terminations on the solder side of the test board within 0.060" of the board surface.
3. The voltage probes were attached to the contact terminations within 0.060" of the connector housing.

REQUIREMENTS:

The low level circuit resistance as measured shall not exceed 10.0 mΩ.

RESULTS:

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

LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

<u>Sample_ID#</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Std. Dev.</u>
2-1	5.2	6.6	4.8	0.4
2-2	5.3	6.4	4.8	0.4

3. See pages 21a thru 21b for individual data points.



PROJECT NO.:	92117	SPECIFICATION:	N/A

PART NO.:	TSM-131-01-S-DV	DESCRIPTION:	Receptacle and Header
	SSM-131-03-S-DV		Connectors

SAMPLE SIZE:	One Each	TECHNICIAN:	RO

START DATE:	3-27-92	COMPLETE DATE:	3-27-92

ROOM AMBIENT:	26°C	RELATIVE HUMIDITY:	32%

EQUIPMENT ID#:	295, 323, 38, 398, 315, Manual		

DURABILITY

PURPOSE:

1. To determine the effects of subjecting the test samples to a predetermined number of mating and unmating cycles simulating the expected mechanical life of the of the product being evaluated.
2. 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 asses any impact on electrical stability resulting from wear or other wear dependent phenomenon.
3. This type of 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 MIL-STD-1344, Method 2016.
2. Test Conditions:
 - a) No. of Cycles : 50
 - b) Rate : 500 cycles/hr
3. The test samples were axially aligned to accomplish the mating and unmating function allowing for self-centering movement.

PROCEDURE - Continued

4. Low level circuit resistance was performed in accordance with MIL-STD-1344, Method 3002 using a 100 milliamp maximum test voltage and a 20.0 millivolt open circuit voltage.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples so tested.
2. The force required to mate and unmate the connector halves shall be measured and recorded.
3. The LLCR shall not exceed 20.0 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:

LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

<u>Sample ID#</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Avg.</u> <u>Change</u>	<u>Max</u> <u>Change</u>	<u>Std.</u> <u>Dev.</u>
2.2	5.1	5.5	4.8	-0.2	+0.7	0.4

3. See pages thru for individual data points.
4. The following is a summary of the data observed:

<u>Sample ID#</u>	<u>MATING FORCE</u> <u>(Pounds)</u>	<u>UNMATING FORCE</u> <u>(Pounds)</u>
2.2	13.3	11.0

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 4 -9-92 COMPLETE DATE: 4-14-92

ROOM AMBIENT: 20°C RELATIVE HUMIDITY: 24%

EQUIPMENT ID#: 281, 115, 223, 282, 323, 295

VIBRATION. SINUSOIDAL

PURPOSE:

1. To evaluate the test samples to determine if fretting corrosion occurs due to mechanical motion. To evaluate the integrity of the test samples relative to a severe mechanical environment.
2. To determine the effects of vibration within the predominant vibration frequency range and magnitudes that may be encountered during the life of the product being evaluated.

PROCEDURE:

1. Low level circuit resistance was measured and recorded in accordance with MIL-STD-1344, Method 3002, with a 100 milliamp maximum test current and a 20.0 millivolt open circuit voltage.
2. Vibration was performed in accordance with MIL-STD-1344, Method 2005, Test Condition III.
3. Test Conditions:
 - a) Frequency : 10 to 2000 to 10 Hz
 - b) Amplitude : 0.06" da or 15 G's
 - c) Duration : 4.0 hrs/axis, 3 axis total
 - d) Test Current : 100 ma
 - e) Sweep Time : 20 minutes

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.
2. The low level circuit resistance shall not exceed 20.0 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)

<u>Sample ID#</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Avg.</u> <u>Change</u>	<u>Max</u> <u>Change</u>	<u>Std.</u> <u>Dev.</u>
2-1	5.6	8.5	4.9	+0.5	+2.9	0.9
2-2	6.1	15.3	4.7	+0.8	+10.23	2.3

3. See pages **21a** thru 21b for individual data points.

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 4-14-92 COMPLETE DATE: 4-14-92

ROOM AMBIENT: 20°C RELATIVE HUMIDITY: 24%

EQUIPMENT ID#: 34, 117, 45, 200, 323, 295

MECHANICAL SHOCK (SPECIFIED PULSE)

PURPOSE:

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

PROCEDURE:

1. The shock test was performed in accordance with MIL-STD-1344, Method 2004, Test Condition A.
2. Test Conditions:
 - a) Peak value : 50.0 G
 - b) Duration : 11.0 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. Final low level circuit resistance was measured in accordance with MIL-STD-1344, method 3002 with a 100 milliamp maximum test current and a 20.0 millivolt open circuit voltage.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.
2. The low level circuit resistance shall not exceed 20.0 milliohms.

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

LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

<u>Sample ID#</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Avg.</u> <u>Change</u>	<u>Max</u> <u>Change</u>	<u>Std.</u> <u>Dev.</u>
2-1	5.3	7.3	4.8	+0.2	+2.3	0.8
2-2	6.0	12.7	4.8	+0.7	+7.6	1.8

3. See pages thru for individual data points.
4. The following are the shock characteristics as shown in Figures # 1 (calibration pulse), and # 2 (test pulse) :

	<u>Calibration</u>	<u>Test</u>
<u>X-Axis (Duration)</u>		
Delay 1 to 1: Duration time	10.96 ms	11.05 ms
Milliseconds per division	5.00 ms	5.00 ms
<u>Y-Axis (G Level)</u>		
MV/div x 0.1 G: G's/division	10.0 G's	10.0G's
Vamp 1 x 0.1 : G level	51.6 G's	51.6G's

LOW-LEVEL CONTACT RESISTANCE

Project #: 92117
Customer: SAMEC
Product: 62 POSITION CONNECTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: ML-STD-1344 METHOD 3002
SubGroup: 2 [ID# 2-1]
File #: 211703
Print Date: 14Apr92

Open circuit voltage: 20 millivolts

Test current: 100 milliamps

Units: milliohms
Delta values

Temp °C	+26	+16	+20
R.H. %	30	24	24
Date	24Har92	14Apr92	14Apr92
Pos ID	1stMATE	VIBR.	M.SHOCK
2	4.87	+0.35	+1.30
3	4.82	to.34	to.42
4	5.01	+0.96	+0.10
7	4.90	0.00	-0.04
11	4.82	+0.03	+0.24
12	4.94	to.07	to.20
14	5.22	-0.28	-0.22
17	5.41	-0.05	-0.37
21	5.21	-0.20	-0.22
22	5.39	-0.24	-0.40
24	5.24	-0.13	-0.08
27	5.13	to.37	to.49
28	4.95	to.23	to.50
34	5.10	to.12	to.12
35	5.04	+0.32	-0.20
39	4.94	+1.09	to.04
40	6.58	-0.43	-1.47
44	4.84	t1.22	t1.13
45	5.19	-0.01	+0.28
49	5.47	-0.30	-0.39
50	5.92	+2.58	+0.06
54	4.94	+2.86	+2.33
55	5.25	to.12	+0.21
40	5.52	+1.82	+1.68
41.	5.50	+1.34	-0.24
HIGH	4.58	+2.86	t2.33
LOW	4.82	-0.43	-1.47
AVG	5.21	+0.48	to.22
STD DEV	0.39	0.09	0.76
OPENS	0	0	0
INITIALS	RVO	RVO	RVO

NOTES:

1 - An asterisk (x) indicates an open circuit or a value greater than 2 ohms.

LOW-LEVEL CONTACT RESISTANCE

Project #: 92117
Customer: SAMTEC
Product: 42 POSITION CONNECTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: HIL-STD-1344 METHOD 3002
SubGroup: 2 [ID# 2-2]
File #: 211704
Print Date: 16Apr92

Open circuit voltage: 20 millivolts

Test current: 100 milliamps

Units: milliohms
 Delta values

Temp °C	+26	+26	+16	+20
R.H. %	30	32	24	24
Date	26Mar92	27Mar92	14Apr92	14Apr92
Pos ID	1stMATE	DURAB	VIBR.	t1. SHOCK
2	5.02	to. 10	+1.87	+2.76
3	5.02	to. 03	+1.67	+3.84
4	4.94	to. 14	+0.47	to. 27
7	6.18	-1.02	+0.37	-0.75
11	5.03	+0.13	+1.55	+1.75
12	5.08	to. 07	-0.05	+0.05
16	5.04	to. 04	-0.03	to. 07
17	5.02	-0.12	+0.21	+0.20
21	4.87	+0.33	+0.36	tcl. 37
22	5.00	-0.06	+0.49	+0.21
24	5.52	-0.44	-0.24	-0.43
27	4.83	+0.69	+0.47	+0.22
28	5.14	-0.32	-0.04	-0.26
34	5.25	-0.31	+5.14	to. 92
35	5.24	-0.22	+1.18	+1.96
39	4.93	-0.12	+1.11	+1.27
40	5.37	-0.37	-0.03	to. 24
44	4.00	-1.04	-1.17	-0.91
45	6.44	-0.94	-1.42	-1.21
49	5.45	-0.20	+0.31	to. 27
50	5.14	-0.22	-0.50	-0.34
54	5.18	-0.21	-0.24	-0.14
55	5.74	-0.88	-0.91	-0.42
40	4.85	-0.02	+0.10	+0.19
41	5.12	+0.04	t10.25	+7.57
HIGH	4.44	+0.69	+10.23	+7.57
LOW	4.83	-1.04	-1.42	-1.21
AVG	5.26	-0.20	to. 33	+0.70
STD DEV	Cl. 42	0.42	2.33	1.84
OPENS	0	0	0	0
INITIALS	RVD	RVD	RVD	RVD

NOTES:

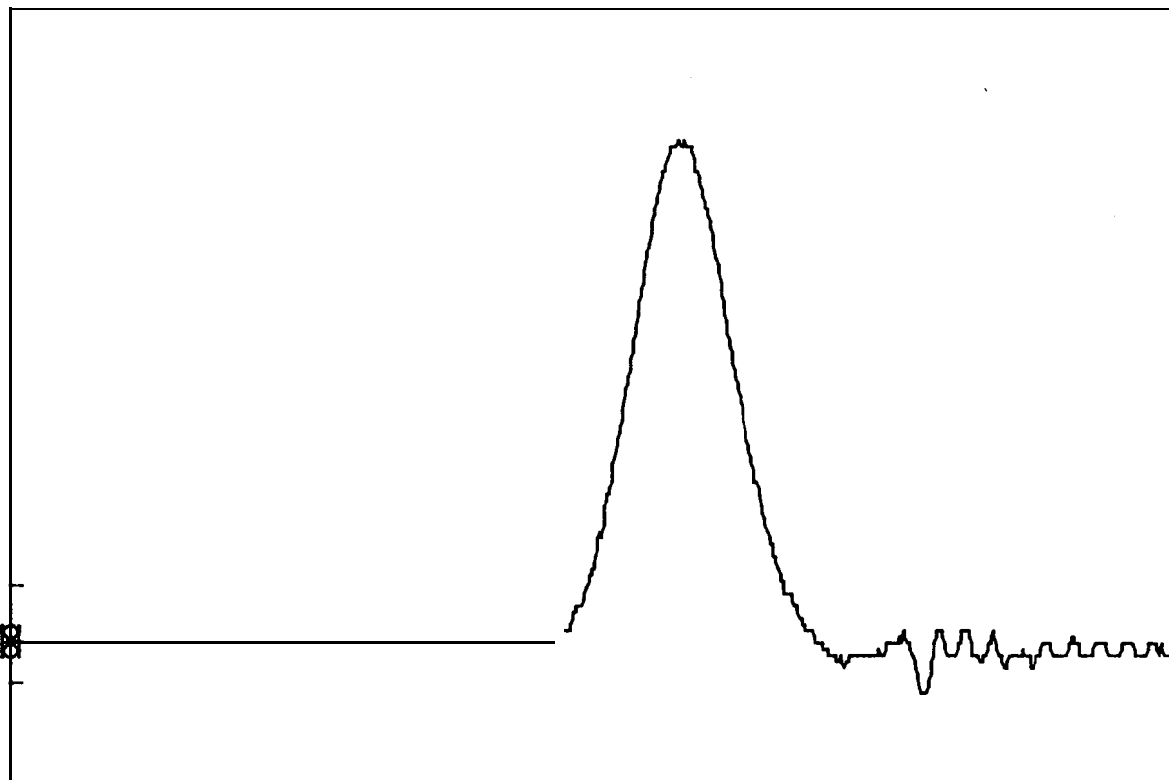
1 - An asterisk (*) indicates an open circuit or a value greater than 2 ohms.

Delay 1 to 1 = 10.96 ms

V ampl 1 = 516 mV

Graph [1] 100 mV/div 250 mV 5.00 ms/div -25.00 ms

1: [Mem 0]
92117 CAL.



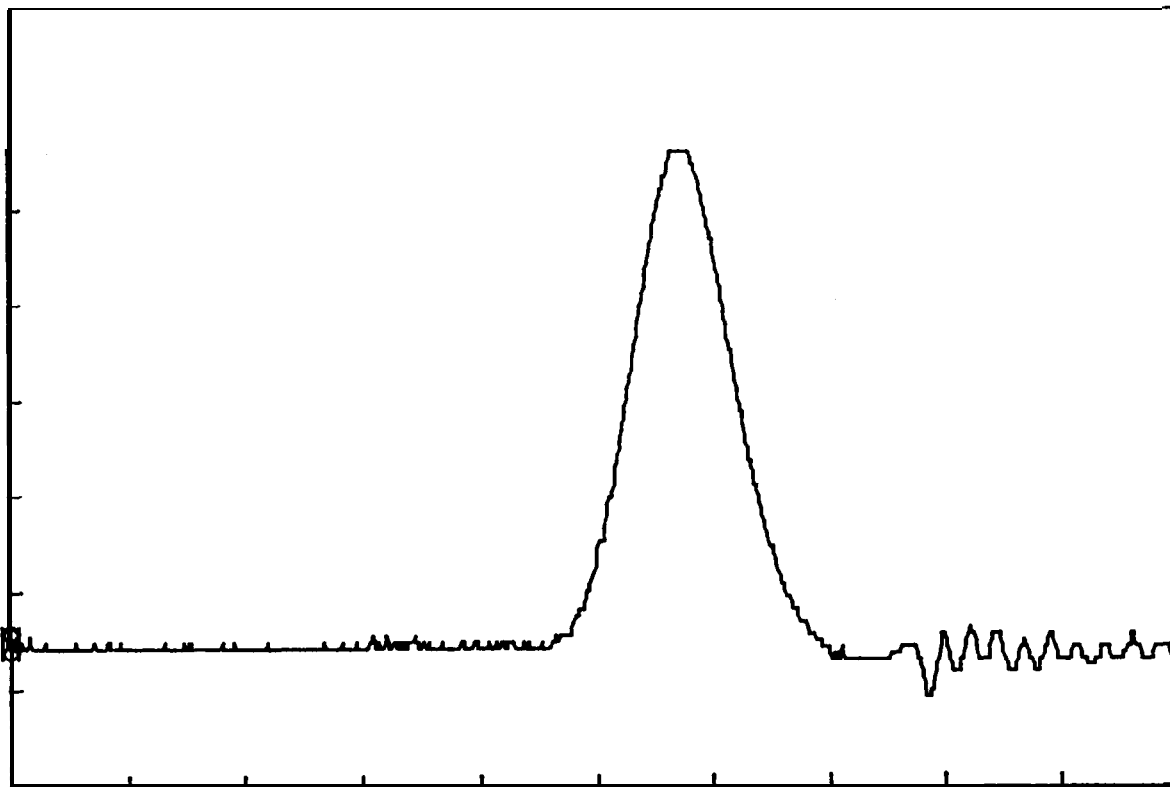
21c

Delay 1 to 1 = 11.05 ms

V ampl 1 = 516 mV

Graph [1] 100 mV/div 250 mV s ●00ms/div -25.00 ms

1: [Mem 3]
92117 ACT.



TEST RESULTS

Vibration/Shock Testing (Contact Interruptions)

Group 3



PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-20-92 COMPLETE DATE: 3-20-92

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 28%

EQUIPMENT ID#: 38, 206

ENGAGEMENT AND SEPARATION FORCE

PURPOSE:

To determine the magnitude of mechanical forces required to mate and unmate the a test pin to and from an individual socket contact.

PROCEDURE:

1. The test was performed in accordance with MIL-STD-1344, Method 2014, Procedure I.
2. Test Conditions:
 - a) Test Pin Diameter : 0.025 ± 0.0001 inches
 - b) No. of Observations : 25
 - c) Rate : 1.0 inch/minute
3. The test pin was cleaned with isopropyl alcohol after every ten measurements.

REQUIREMENTS:

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

RESULTS:

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

<u>Sample_ID#</u>	<u>ENGAGEMENT FORCE</u> <u>(Ounces)</u>			<u>SEPARATION FORCE</u> <u>(Ounces)</u>		
	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>
3-1	1.5	2.0	1.2	1.1	1.6	0.8
3-2	1.3	2.0	1.0	1.0	1.3	0.8

2. See pages 24a thru 24d for individual data points.



INSERTION/WITHDRAWAL FORCE

Project #: 92117
Customer: SAMTEC
product: 62 POSITION CONNCTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: ML-STD-1344 METHOD 2014
SubGroup: 3 [ID# 3-1]
File #: 211711
Print Date: 20Mar92

Units: OUNCES
Delta values

Temp °C	+22
R.H. %	28
Date	20Mar92
<u>ID #</u>	<u>INSERTIO</u>
4	1.50
5	1.98
8	1.92
9	1.68
13	1.41
14	1.30
18	1.34
19	1.33
23	1.41
24	1.22
29	1.34
30	1.30
36	1.62
37	1.39
41	1.42
42	1.54
46	1.62
47	1.33
48	1.60
51	1.22
52	1.58
53	1.17
55	1.30
56	1.74
57	1.30

HIGH 1.98
LOW 1.17
AVG 1.47
STD DEV 0.21
OPENS 0

INITIALS RVO

Project #: 92117
Customer: SAMEC
Product: 62 POSITION CONNECTOR
Description: COPY

Spec: ML-STD-1344 METHOD 2014
SubGroup: 3 [ID# 3-2
File #: 211714
Print Date: 20Mar92

Units: OUNCES
Delta values

Temp °C +22
R.H. % 28
Date 20Mar92

<u>ID #</u>	<u>WTHDRAW</u>
4	1.26
5	1.04
8	1.17
9	1.01
13	0.98
14	1.23
10	1.23
19	1.06
23	1.17
24	1.10
29	0.94
30	1.15
36	1.01
37	1.02
41	1.01
42	1.01
46	0.85
47	1.01
48	0.91
51	0.98
52	0.90
53	0.78
55	0.98
56	0.90
57	1.04

HIGH 1.26
LOW 0.70
AVG 1.03
STD DEV 0.12
OPENS 0

INITIALS RVO

Project #: 92117
Customer: SAMEC
Product: 62 POSITION CONNCTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: ML-STD-1344 METHOD 2014
SubGroup: 3 [ID# 3-1
File #: 211712
Print Date: 20Mar92

Units: OUNCES
Delta values

Temp °C +22
R.H. % 29
Date 20Mar92

<u>ID #</u>	<u>WTHDRAW</u>
4	1.44
5	1.55
8	1.07
9	1.14
13	1.06
14	1.06
18	1.07
19	1.01
23	0.98
24	1.07
29	1.07
30	0.99
36	1.36
37	1.04
41	1.33
42	1.46
46	1.04
47	0.98
48	1.52
51	1.07
52	1.23
53	0.83
55	1.01
56	1.14
57	1.02

HIGH 1.55
LOW 0.83
AVG 1.14
STD DEV 0.19
OPENS 0

INITIALS RVO

INSERTION/WITHDRAWAL FORCE

Project #: 92117
Customer: SAMEC
Product: 62 POSITION CONNECTOR
Description: COPY

Spec: ML-STO-1344 METHOD 2014
SubGroup: 3 [10# 3-2
File #: 211713
Print Date: 20Mar92

Units: OUNCES
Delta values

Temp °C	+22
R.H. %	28
Date	20Mar92
IO #	INSERT10
4	1.36
5	1.33
8	1.98
9	1.20
13	1.26
14	1.58
18	1.60
19	1.33
23	1.76
24	1.74
29	1.18
30	1.41
36	1.14
37	1.07
41	1.14
42	1.02
46	1.06
47	1.06
48	1.10
51	1.07
52	1.17
53	1.18
55	1.04
56	1.02
57	1.10

HIGH 1.90
LOW 1.02
AVG 1.28
STD DEV 0.26
OPENS 0

INITIALS RVG

PROJECT NO.: 92117 SPECIFICATION: N/A

 PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
 SSM-131-03-S-DV Connectors

 SAMPLE SIZE: Two Each TECHNICIAN: RO

 START DATE: 3-26-92 COMPLETE DATE: 3-26-92

 ROOM AMBIENT: 26°C RELATIVE HUMIDITY: 30%

 EQUIPMENT ID#: 38, 159, 315

MATING AND UNMATING FORCE

PURPOSE:

To determine the mechanical forces required to mate and unmate the test samples with all guiding and applicable hardware assembled to the Connector Halves.

 PROCEDURE:

1. The test was performed in accordance with MIL-STD-1344, Method 2013.
2. The test samples were fixtured to the base plate of the test stand and applicable force gauge.
3. The fixturing was accomplished to assure axial alignment and allowed self centering movement to exist.
4. The test rate was 1.0inch/minute.

 REQUIREMENTS:

The force required to mate and unmate the Connector Halves shall be measured and recorded.

 RESULTS:

The following is a summary of the observed forces measured and recorded.

<u>Sample ID#</u>	<u>MATING FORCE (Pounds)</u>	<u>UNMATING FORCE (Pounds)</u>
3-1	17.5	12.5
3-2	20.0	13.0

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: One Each TECHNICIAN: RO

START DATE: 3-27-92 COMPLETE DATE: 3-27-92

ROOM AMBIENT: 26°C RELATIVE HUMIDITY: 32%

EQUIPMENT ID#: 38, 398, 315, Manual

DURABILITY

PURPOSE:

To determine the effects of subjecting the test samples to a predetermined number of mating and unmating cycles simulating the expected mechanical life of the of the product being evaluated.

PROCEDURE:

1. The test was performed in accordance with MIL-STD-1344, Method 2016.
2. Test Conditions:
 - a) No. of Cycles : 50
 - b) Rate .. 500 cycles/hr
3. The test samples were axially aligned to accomplish the mating and unmating function allowing for self-centering movement.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the Connector Halves so tested.
2. The force required to mate and unmate the test samples shall be measured and recorded.

RESULTS:

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

<u>Sample ID#</u>	<u>MATING FORCE</u> <u>(Pounds)</u>	<u>UNMATING FORCE</u> <u>(Pounds)</u>
3-2	16.5	11.5

2. There was no evidence of physical damage to the connector as tested.

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 4-9-92 COMPLETE DATE: 4-14-92

ROOM AMBIENT: 20°C RELATIVE HUMIDITY: 24%

EQUIPMENT ID#: **30, 281, 115, 223, 282**

VIBRATION SINUSOIDAL

PURPOSE:

To determine the effects of vibration within the predominant vibration frequency range and magnitudes that may be encountered during the life of the product being evaluated.

PROCEDURE:

1. Vibration was performed in accordance with MIL-STD-1344, Method 2005, Test Condition III.
2. Test Conditions:
 - a) Frequency : 10 to 2000 to 10 Hz
 - b) Amplitude : **0.06"** da or 15 G's
 - c) Duration : 4.0 hrs/axis, 3 axis total
 - d) Test Current : 100 ma
 - e) Sweep Time : 20 minutes

REQUIREMENTS:

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

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 4-14-92 COMPLETE DATE: 4-14-92

ROOM AMBIENT: 20°C RELATIVE HUMIDITY: 24%

EQUIPMENT ID#: 30, 34, 117, 45, 200

MECHANICAL SHOCK (SPECIFIED PULSE)

PURPOSE:

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

PROCEDURE:

1. The shock test was performed in accordance with MIL-STD-1344, Method 2004, Test Condition A.
2. Test Conditions:
 - a) Peak value : 50.0 G
 - b) Duration : 11.0 milliseconds
 - c) Wave form : Half Sine
 - d) Velocity : 11.3 feet per second
 - e) No. of shocks : 3 shocks/direction, 3 axis (18 total)

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.
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 contact interruption greater than 1.0 microsecond..
3. The following are the shock characteristics as shown in Figures # 1 ((calibration pulse), and # 2 (test pulse) :

	<u>Calibration</u>	<u>Test</u>
<u>X-Axis (Duration)</u>		
Delay 1 to 1: Duration time	10.96 ms	11.05 ms
Milliseconds per division	5.00 ms	5.00 ms
<u>Y-Axis (G Level)</u>		
MV/div x 0.1 G: G's/division	10.0 G's	10.0 G's
Vamp 1 x 0.1 : G level	51.6 G's	51.6 G's

TEST RESULTS

Thermal Shock/Cyclic Humidity (LLCR)

Group 4



PROJECT NO.:	92117	SPECIFICATION:	N/A

PART NO.:	TSM-131-01-S-DV	DESCRIPTION:	Receptacle and Header Connectors
	SSM-131-03-S-DV		

SAMPLE SIZE:	Two Each	TECHNICIAN:	RO

START DATE:	3-17-92	COMPLETE DATE:	3-18-92

ROOM AMBIENT:	22°C	RELATIVE HUMIDITY:	26%

EQUIPMENT ID#:	192, 159, 315, 323, 295		

THERMAL SHOCK

PURPOSE:

To determine the resistance of a given 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. Initial and all subsequent readings of low level circuit resistance was measured and recorded in accordance with MIL-STD-1344, Method 3002, with a 100 milliamp maximum test current and a 20.0 millivolt open circuit voltage. Voltage probe placement was in accordance with that previously indicated.
2. Sample ID# 4-3 and 4-4 were cycled 50 times.
3. The test was performed in accordance with MIL-STD-1344, Method 1003, Test Condition A except as noted.
4. Test Conditions:
 - a) Number of Cycles : 5 cycles
 - b) Hot Extreme : +105°C +3°C/-0°C
 - c) Cold Extreme : -55°C +0°C/-3°C
 - d) Time at Temperature : 30 minutes
 - e) Mated Condition : mated
5. The total number of cycles were performed continuously.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.
2. The low level circuit resistance shall not exceed 20.0mΩ.

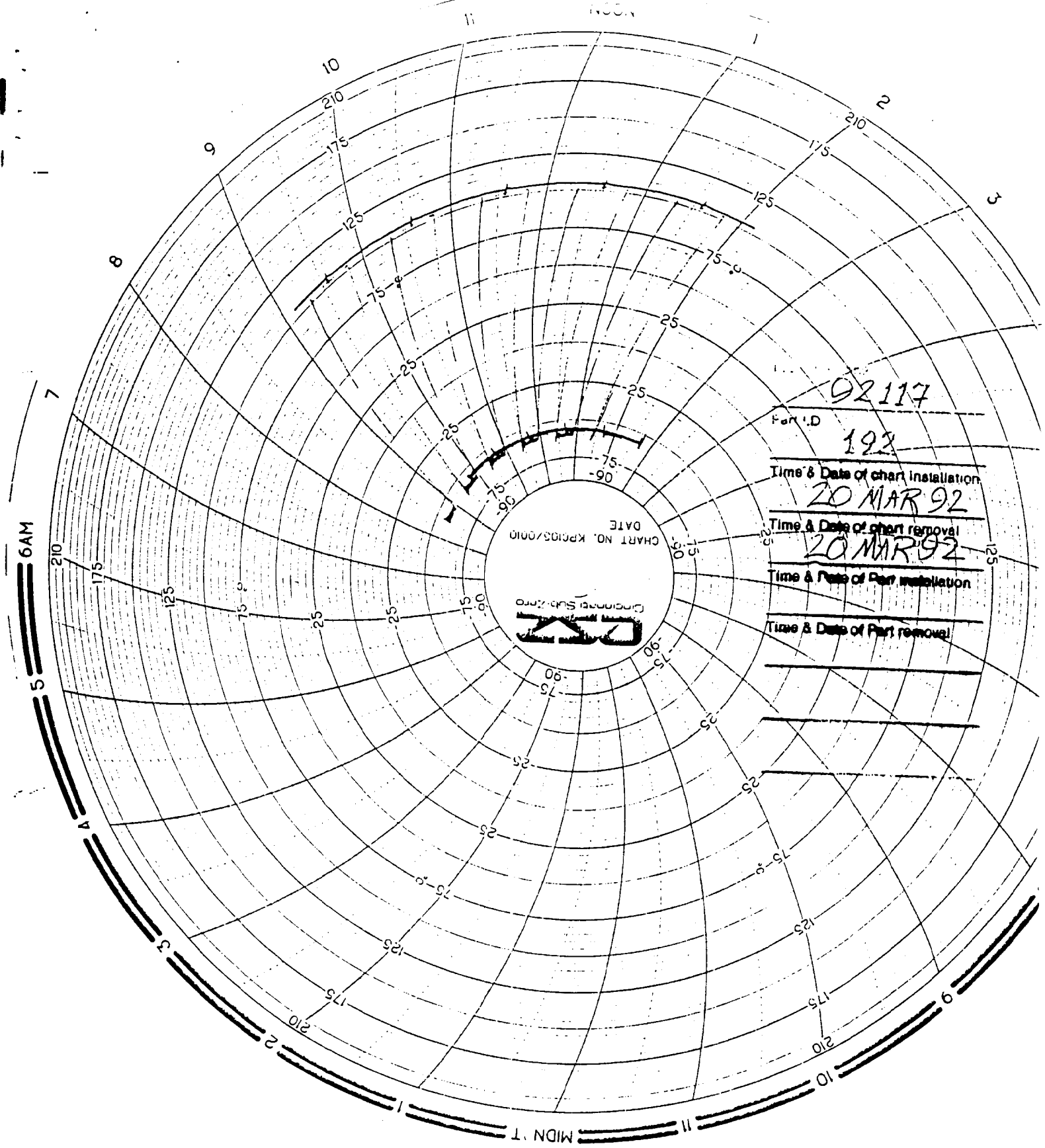
RESULTS:

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)

<u>Sample ID#</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Avg. Change</u>	<u>Max Change</u>
ID# 4-1, Initial	4.7	5.6	4.0	---	---
Final	4.6	5.1	4.1	-0.1	+0.5
ID# 4-2, Initial	4.7	5.3	4.3	---	----
Final	4.4	5.0	4.1	-0.3	+0.3
ID# 4-3, Initial	5.3	6.0	4.7	---	---
After Dur.	5.4	11.5	4.7	+0.1	+6.3
Final	6.2	13.3	4.8	+0.9	+8.1
ID# 4-4, Initial	5.2	7.0	4.2	---	---
After Dur.	5.7	12.4	4.6	+0.5	+5.5
Final	5.6	9.9	4.4	+0.4	+3.0

3. See pages 35a thru 35d for individual data points.



92117

Part I.D
192

Time & Date of chart installation
20 MAR 92

Time & Date of chart removal
20 MAR 92

Time & Date of Part installation

Time & Date of Part removal

CHART NO. R134A/0010
DATE

Evaporator Sub-cooled
R134a

MIDN T

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-20-92 COMPLETE DATE: 3-30-92

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 28%

EQUIPMENT ID#: 27, 323, 295

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, thermal cycling induces micromotion between contacting surfaces and humidity accelerates the oxidation process.
- b) Oxidation of wear debris resulting from induced micromotion which may have become entrapped between the contacting surfaces
- c) Oxidation of particulates which may have been deposited on the contacting surfaces from the surrounding atmosphere which may have been entrapped between them due to induce micromotion.
- d) Failure mechanisms resulting from a wet oxidation process.
- e) 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:

- 1. The test was performed in accordance with MIL-STD-1344, Method 1002, Procedure II with the following conditions.

PROCEDURE -- Continued:

2. Test Conditions:

- a) Preconditioning (24 hours) : 50°C ± 2°C
- b) Relative Humidity : 90% to 95%
- c) Temperature Conditions : 25°C to 65°C
- d) Mating Conditions : Mated
- e) Mounting Conditions : Mounted
- f) Duration : 240 hours

3. Initial and all subsequent readings of low level circuit resistance was measured and recorded in accordance with MIL-STD-1344, Method 3002, with a 100 milliamp maximum test current and a 20.0 millivolt open circuit voltage. Voltage probe placement was in accordance with that previously indicated.

4. Measurements after completion of the exposure was performed when the test samples recovered to room ambient conditions.

REQUIREMENTS:

- 1. There shall be no evidence of physical deterioration of the test samples as tested.
- 2. The low level circuit resistance shall not exceed 20.0 milliohms.

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)

<u>Sample ID#</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Avg. Change</u>	<u>Max Change</u>
ID# 4-1 (Uncycled)	4.2	4.9	3.6	-0.5	+0.5
ID# 4-2 (Uncycled)	4.3	5.0	3.5	-0.4	+0.5
ID# 4-3 (Cycled)	5.3	6.6	4.8	0.0	+0.7
ID# 4-4 (Cycled)	5.3	5.8	5.0	+0.1	+1.4

- 3. See pages 35a thru 35d for individual data points.

LOW-LEVEL CONTACT RESISTANCE

Project #: 52117
Customer: SAMEC
Product: 62 POSITION CONNECTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: ML-STD-1344 METHOD 3002
SubGroup: 4 [ID# 4-1]
File #: 211705
Print Date: 30Mar92

@pen circuit voltage: 20 millivolts

Test current: 100 milliamps

Units: milliohms
Delta values

Temp °C	+22	+22	+20
R.H. %	30	28	32
Date	13Mar92	20Mar92	30Mar92
Pos ID	INITIAL	T. SHOCK	HUMIDITY
2	4.30	+0.05	-0.74
3	4.67	to.41	-0.84
6	4.37	+0.36	-0.15
7	4.31	+0.34	-0.65
11	4.97	+0.07	-0.81
12	4.32	+0.18	-0.45
16	4.75	+0.02	-0.91
17	4.68	-0.06	-0.89
21	5.57	-0.60	-0.80
22	4.71	-0.42	-0.27
26	4.03	+0.40	+0.16
27	4.36	+0.52	+0.54
28	4.32	+0.25	-0.39
34	4.40	-0.14	-0.29
35	4.24	-0.06	+0.14
35	4.69	-0.44	-0.90
40	4.63	-0.57	-0.48
44	5.04	-0.57	-0.50
45	5.04	-0.85	-0.46
49	5.27	-0.48	-0.54
50	5.29	-0.16	-0.51
54	5.31	-0.64	-0.83
55	4.81	-0.05	-0.11
60	4.46	-0.15	-0.31
61	4.53	-0.40	-0.60
HIGH	5.57	+0.52	+0.54
LOW	4.03	-0.85	-0.91
AVG	4.70	-0.12	-0.48
STD DEV	0.40	0.35	0.38
OPENS	0	0	0
INITIALS	LL	RVO	RVO

NOTES:

1 - An asterisk (*) indicates an open circuit or a value greater than 2 ohms.

LOW LEVEL CONTACT RESISTANCE

Project #: 92117
Customer: SAHTEC
Product: 62 POSITION CONNECTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: HIL-STD-1344 METHOD 3002
SubGroup: 4 [ID# 4-2]
File #: 211706
Print Date: 30Mar92

Open circuit voltage: 20 millivolts

Test current: 100 milliamps

Units: milliohms
Delta values

Temp °C	+22	+22	+20
R.H. %	30	28	32
Date	13Mar92	20Mar92	30Mar92
Pos ID	INITIAL	T. SHOCK	HUMIDITY
2	4.59	+0.05	-0.53
3	4.66	-0.43	-0.51
6	4.36	+0.12	to.54
7	4.50	-0.02	-0.50
11	4.28	-0.06	-0.15
12	4.68	-0.36	-0.69
16	5.29	-0.33	-1.06
17	4.77	-0.20	-0.47
21	4.84	-0.37	-1.08
22	4.65	-0.40	-0.64
26	4.57	+0.23	-0.13
27	4.55	to.29	-0.29
28	4.71	-0.29	-0.10
34	4.25	to.07	-0.72
35	4.75	-0.16	-0.44
35	4.83	-0.53	-0.28
40	4.73	-0.68	-0.60
44	4.49	-0.30	+0.16
45	4.88	-0.48	-0.22
49	4.89	-0.66	+0.12
50	4.60	-0.48	-0.66
54	4.87	-0.47	-0.85
55	4.58	-0.13	-0.34
60	4.26	-0.10	-0.12
61	5.15	-0.53	-0.50
HIGH	5.29	to.29	to.54
LOW	4.25	-0.68	-1.08
AVG	4.67	-0.25	-0.40
STD DEV	0.25	0.27	0.37
OPENS	G	0	0
INITIALS	LL	RVO	RUG

NOTES:

1 - An asterisk (*) indicates an open circuit or a value greater than 2 ohms.

LOW LEVEL CONTACT RESISTANCE

Project #: 92117
Customer: SAMEC
Product: 62 POSITION CONNECTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: NIL-STD-1344 METHOD 3002
SubGroup: 4 [ID# 4-3]
File #: 211707
Print Date: 16Apr92

Open circuit voltage: 20 millivolts

Test current: 100 milliamps

Units: milliohms
Delta values

Temp °C	+22	+22	+22	+20
R.H. %	26	27	28	32
Date	17Mar92	18Mar92	20Mar92	30Mar92
Pos ID	INITIAL	DURAB.	T. SHOCK	HUMIDITY
2	5.42	-0.52	-0.28	+0.56
3	5.68	-0.58	-0.32	to.23
6	5.84	+0.56	t2.13	-0.79
7	5.12	-0.12	+0.10	to.72
11	5.70	-0.70	-0.76	-0.39
12	5.90	+1.30	+2.48	+0.67
16	5.18	-0.38	+2.02	+0.08
17	5.73	-0.63	-0.51	-0.57
21	5.22	+6.28	+8.06	+0.20
22	5.51	-0.21	-0.40	-0.25
26	5.18	+0.62	+2.67	+0.19
27	5.29	-0.49	-0.13	-0.31
28	5.05	to.15	+0.16	-0.08
34	4.74	+0.76	+2.64	to.17
35	4.77	-0.07	+2.29	+0.33
39	5.17	-0.47	-0.31	to.05
40	4.57	-0.17	+2.51	-0.10
44	5.41	-0.71	-0.24	-0.53
45	5.00	-0.20	il.84	-0.11
49	6.04	-1.24	-1.26	-1.28
50	4.95	-0.15	12.71	+0.50
54	4.95	-0.05	+2.59	to.39
55	5.19	-0.15,	+0.06	-0.10
60	5.39	+0.01	-4.60	-0.16
61	5.14	-0.14	-0.07	-0.01
HIGH	6.04	+6.28	t8.06	to.72
LOW	4.74	-1.24	-4.60	-1.28
AVG	5.30	+0.11	to.94	-0.02
STD DEV	0.35	1.35	2.28	0.46
0 PENS	0	0	0	0
INITIALS	LL	RVO	RVO	RVO

NOTES:

1 - An asterisk (*) indicates an open circuit or a value greater than 2 ohms.

LOW LEVEL CONTACT RESISTANCE

Project It: 92117
Customer: SAHTEC
Product: 62 POSITION CONNECTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: NIL-STD-1344 METHOD 3002
SubGroup: 4 [IO# 4-4]
File #: 211708
Print Date: 16Apr92

Open circuit voltage: 20 millivolts

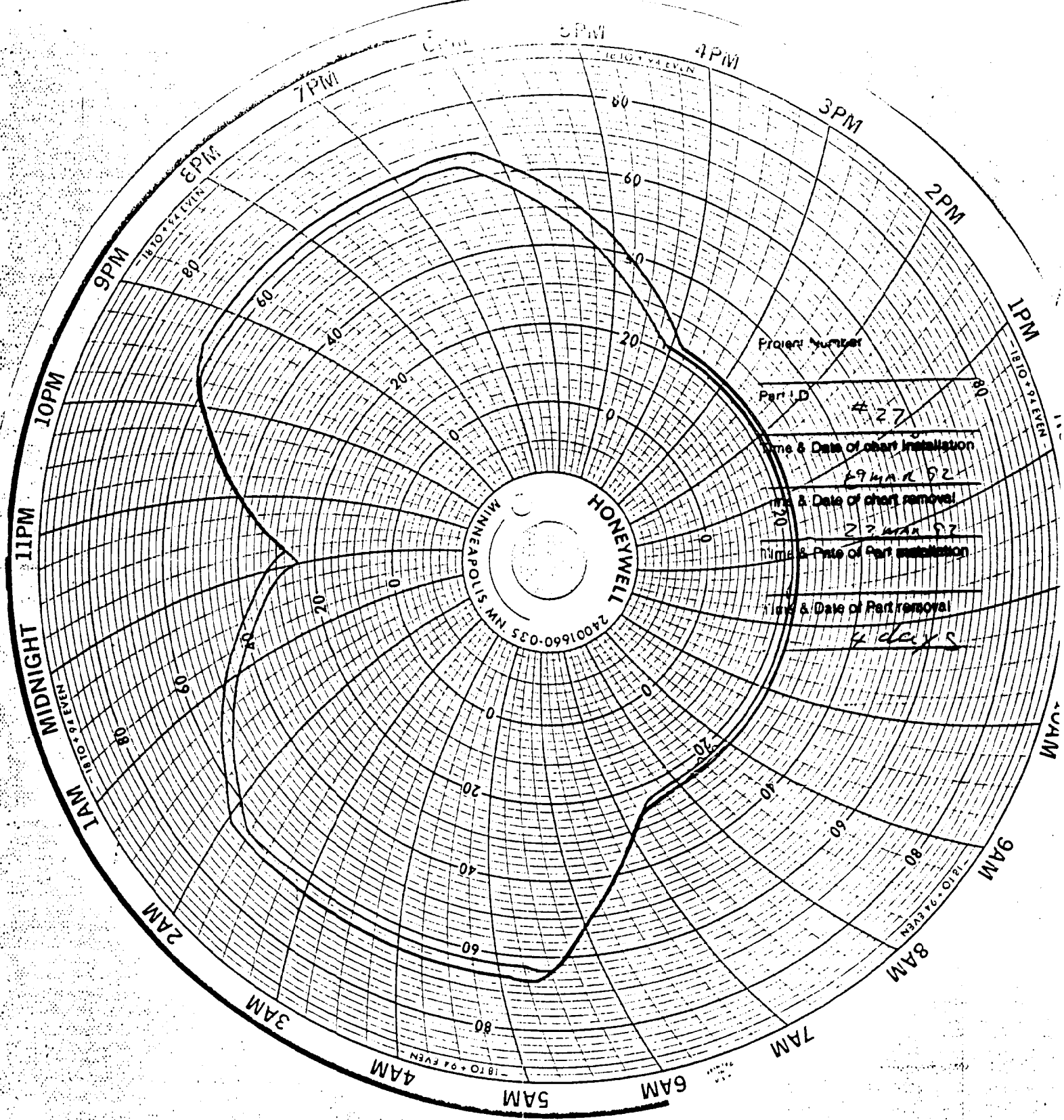
Test current: 100 milliamps

Units: milliohms
Delta values

Temp °C	+22	+22	+22	+20
R.H.%	26	27	28	32
Date	17Mar92	18Mar92	20Mar92	30Mar92
Pos ID	INITIAL	DURAB.	T. SHOCK	HUMIDITY
2	4.99	+0.01	-0.12	+0.10
3	4.58	to. 22	+1.98	+0.62
6	4.91	-0.01	+0.26	+0.17
7	4.71	-0.01	t2.54	to. 29
11	4.71	to. 09	to. 39	+0.62
12	4.20	+4.40	+0.97	+1.44
16	5.21	-0.31	-0.26	to. 31
17	5.18	to. 22	-0.42	to. 03
21	4.71	-0.01	to. 31	+0.29
22	7.00	+1.10	+1.55	-1.44
26	5.39	-0.59	-0.52	-0.21
27	4.65	to. 05	to. 19	+0.50
28	6.95	+5.45	+2.97	-1.71
34	5.38	+1.32	to. 04	-0.12
35	4.99	to. 11	+0.26	+0.60
39	5.54	-0.44	-0.09	to. 31
40	5.38	-0.58	-0.42	-0.21
44	5.39	-0.59	-0.50	-0.34
45	4.93	-0.03	to. 02	to. 35
49	5.30	-0.20	-0.04	to. 44
50	5.36	-0.36	-0.14	+0.44
54	5.25	+1.45	-0.14	-0.04
55	5.05	to. 15	+0.06	+0.08
60	5.16	to. 54	+0.16	-0.08
61	5.11	to. 49	to. 55	+0.60
HIGH	7.00	+5.45	+2.97	+1.44
LOW	4.20	-0.59	-0.52	-1.71
AVG	5.20	+0.50	+0.38	to. 12
STD DEV	0.62	1.44	0.93	0.63
OPENS	0	0	0	0
INITIALS	LL	RVG	RUG	RVO

NOTES:

1 - An asterisk (*) indicates an open circuit or a value greater than 2 ohms.



Project Number _____

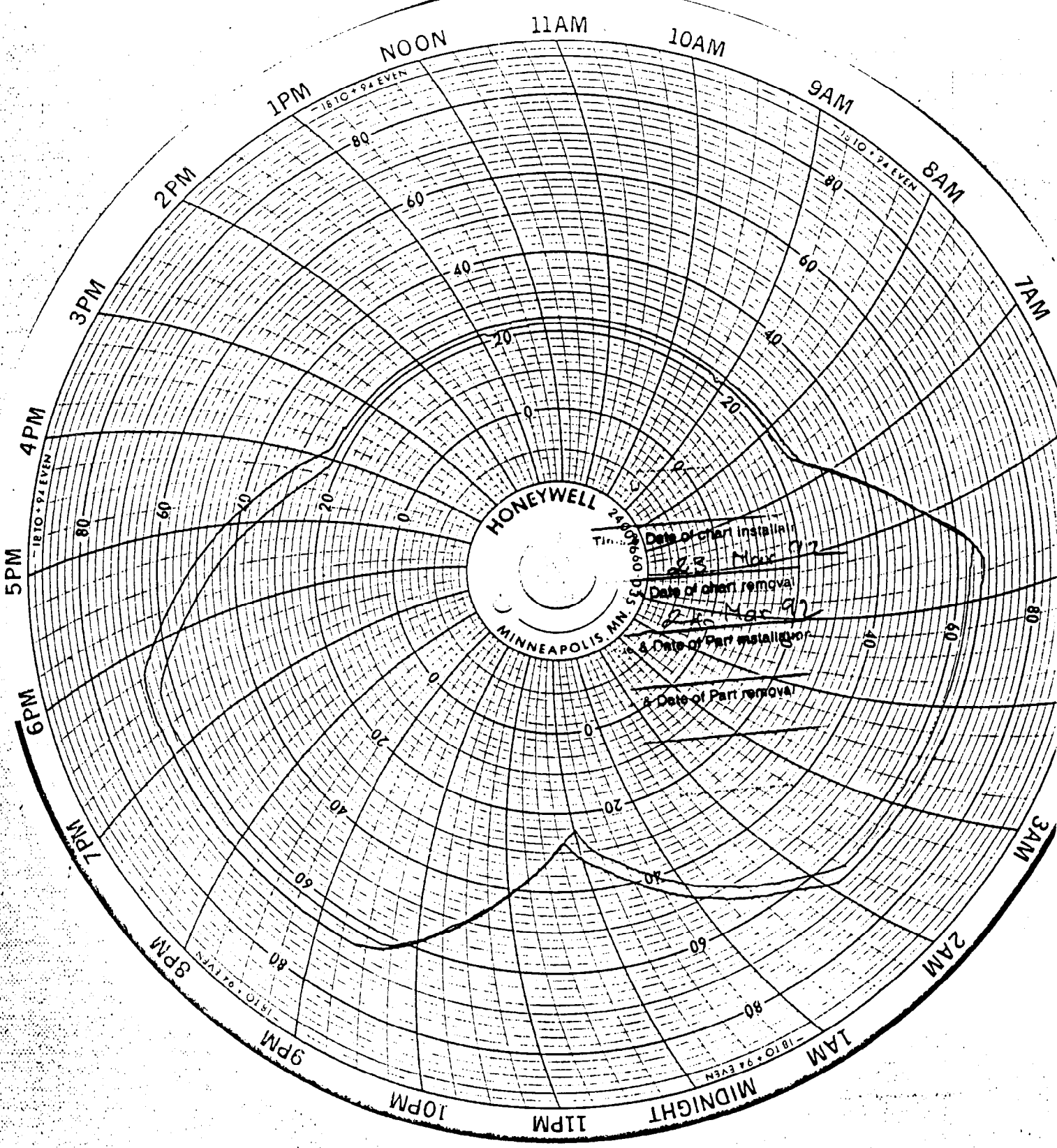
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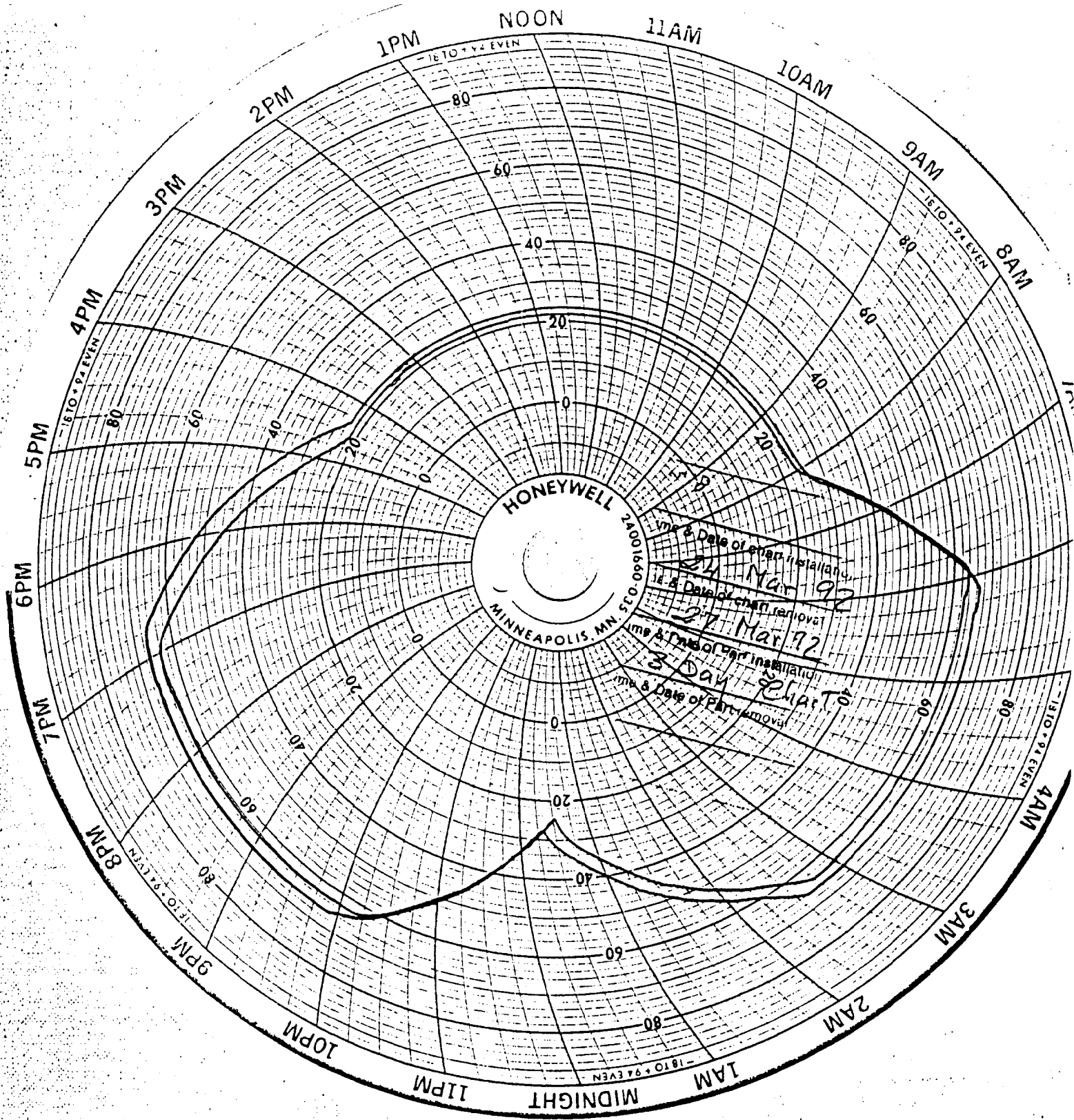
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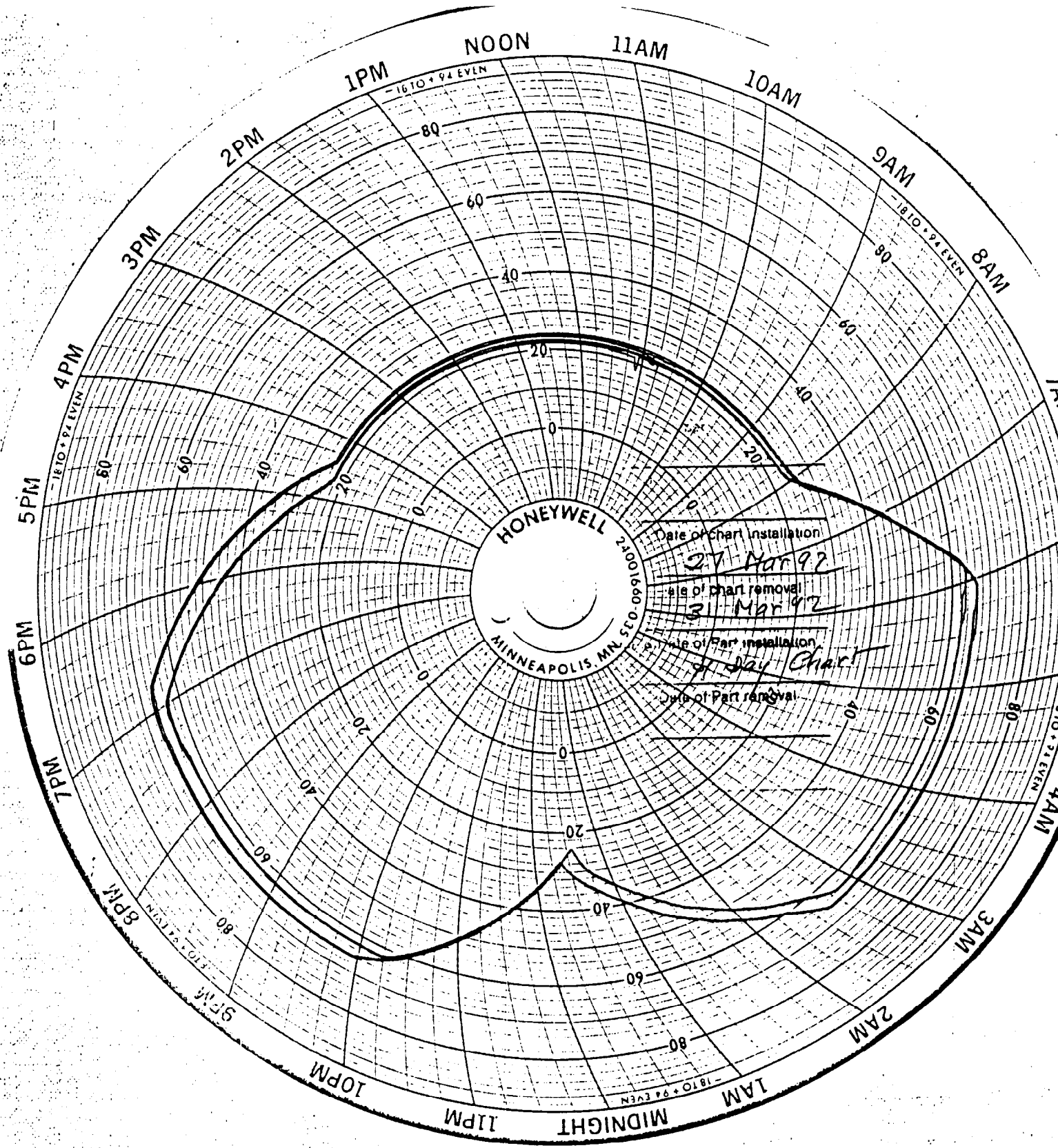
Time & Date of chart removal 23 MAR 82

Time & Date of Part installation _____

Time & Date of Part removal 4 days







HONEYWELL
MINNEAPOLIS, MINN.

Date of Chart Installation
27 Mar 92

Date of Chart Removal
31 Mar 92

Date of Part Installation
9 May Chart

Date of Part Removal

TEST RESULTS

Thermal Shock/Cyclic Humidity (IR & DWV)

Group 5



PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-19-92 COMPLETE DATE: 3-19-92

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 29%

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 MIL-STD-1344, Method 3001.
2. Test Conditions:
 - a) Between adjacent contacts : Yes
 - b) Mated condition : Unmated
 - c) Mounting condition : Unmounted
 - d) Hold time : 60 seconds
 - e) Rate of application : 500 volts/sec.

REQUIREMENTS:

When a 1000 VAC test voltage is applied, there shall be no evidence of breakdown, arcing, etc.

RESULTS:

All test samples as tested met the requirements as specified.

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-17-92 COMPLETE DATE: 3-18-92

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 29%

EQUIPMENT ID#: 192, 321

THERMAL SHOCK

PURPOSE:

To determine the resistance of a given 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 was performed in accordance with MIL-STD-1344, Method 1003, Test Condition A except as indicated.
2. Test Conditions:
 - a) Number of Cycles : 5 cycles
 - b) Hot Extreme : +105°C +3°C/-0°C
 - c) Cold Extreme : -55°C +0°C/-3°C
 - d) Time at Temperature : 30 minutes
 - e) Mating Conditions : Unmated
 - f) Mounting Conditions : Unmounted
3. The total number of cycles were performed continuously.

REQUIREMENTS:

1. There shall be no evidence of physical damage to the test samples as tested.
2. When a 1000 VAC test voltage is applied, there shall be no evidence of arcing, breakdown, etc.

RESULTS:

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

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-20-92 COMPLETE DATE: 3-20-92

ROOM AMBIENT: 22°C RELATIVE HUMIDITY: 28%

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 MIL-STD-1344, Method 3003.
2. Test Conditions:
 - a) Between adjacent contacts : Yes
 - b) Mated condition : Unmated
 - c) Mounting condition : Unmounted
 - d) Electrification time : 2.0 minutes

REQUIREMENTS:

When the specified test voltage is applied (500 VDC), the insulation resistance shall not be less than 5000 megohms.

RESULTS:

The insulation resistance exceeded 50,000 megohms.

REQUIREMENTS -- Continued:

2. When the specified test voltage is applied (500 VDC), the insulation resistance shall exceed 1000 megohms.

RESULTS:

1. There was no evidence of physical damage to the connectors as tested.
2. The insulation resistance exceeded 50,000 megohms.

PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 3-30-92 COMPLETE DATE: 3-30-92

ROOM AMBIENT: 20°C RELATIVE HUMIDITY: 32%

EQUIPMENT ID#: 157

CAPACITANCE

PURPOSE:

To determine the capacitance characteristic between contacts and/or other **metallic** components assembled to their housings.

PROCEDURE:

1. The test was performed in accordance with MIL-STD-202, Method 305.
2. Test Conditions:
 - a) Frequency : 1 KHz
 - b) Polarization : N/A
 - c) Mounting Conditions : Unmounted
 - d) Adjacent Contacts : Yes
 - e) Mating Conditions : Unmated
 - f) No. of Observations : Eight adjacent positions/
connector

REQUIREMENTS:

The capacitance shall not exceed 2.0 pF at the specified frequency.

RESULTS:

The capacitance was less than 0.5 pF.

TEST RESULTS

Thermal Relaxation

Group 6



PROJECT NO.:	92117	SPECIFICATION:	N/A

PART NO.:	TSM-131-01-S-DV	DESCRIPTION:	Receptacle and Header Connectors
	SSM-131-03-S-DV		

SAMPLE SIZE:	Two Each	TECHNICIAN:	RO

START DATE:	3-13-92	COMPLETE DATE:	4-7-92

ROOM AMBIENT:	22°C	RELATIVE HUMIDITY:	30%

EQUIPMENT ID#:	251, 207, Applicable Glassware, 18		

THERMAL RELAXATION

PURPOSE:

1. Contacts in their operating mode are normally subjected to mechanical stresses and exposure to operational temperatures. The operational temperatures are generated from adjacent power sources and/or components as well as current flowing through the connector system. Contact materials under such conditions will tend to relax which results in a permanent loss of normal force. Contingent on the magnitude of this relaxation with its resultant loss of normal force, potentially unstable electrical condition may be created. All contact materials exhibit some degree of relaxation.
2. To evaluate the magnitude of permanent set beyond that induced by mechanical stresses of contact materials when exposed to a thermal environment which may impact electrical stability.

PROCEDURE:

1. The mated system was exposed to 105°C for 300 hours.
2. Initial and subsequent low level circuit resistance was measured and recorded in accordance with MIL-STD-1344, Method 3002 with a 100 milliamp test current and a 20 millivolt open circuit voltage. Voltage probe placement was in accordance with that previously indicated.
3. Upon completion of the exposure, the samples were exposed to a gas tight environment as described in Group 1 and low level circuit resistance recorded.

Note: The final step (item #3) was performed to determine if thermal relaxation resulted in the loss of the gas tight interface.

REQUIREMENTS:

1. The low level circuit resistance shall not exceed 20.0 milliohms.
-

RESULTS :

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

LOW LEVEL CIRCUIT RESISTANCE
(Milliohms)

<u>Sample ID#</u>	<u>Avg.</u>	<u>Max</u>	<u>Min.</u>	<u>Avg. Change</u>	<u>Max Change</u>
ID# 6-1, Initial	4.8	5.9	4.2	---	---
After Thermal	4.7	5.7	4.0	-0.1	+0.9
After Gas Tight	4.6	5.4	4.0	-0.2	+0.7
ID# 6-2, Initial	4.5	5.0	4.1	---	---
After Thermal	4.3	5.1	3.9	-0.2	+0.7
After Gas Tight	4.3	4.8	3.9	-0.2	+0.4

- 2 See pages 45a thru 45b for individual data points.

LOW-LEVEL CONTACT RESISTANCE

Project #: 92117
Customer: SAMTEC
Product: 62 POSITION CONNECTOR
Description: TSM-131-01-S-DV/SSM-131-03-S-DV

Spec: MIL-STD-1344 **METHOD 3002**
SubGroup: 6 [ID# 6-1]
File #: 211709
Print Date: 07Apr92

Open circuit voltage: 20 millivolts

Test current: 100 milliamps

Units: **milliohms**
 Delta **values**

Temp °C	+22	+22	+23
R.H. %	30	34	30
Date	13Mar92	01Apr92	07Apr92
Pos ID	INITIAL	T. AGE	GASTIGHT
2	4.53	+0.21	-0.24
3	4.39	+0.13	+0.06
6	4.29	+0.86	+0.24
7	4.74	to. 24	+0.70
11	5.08	-0.52	-0.54
12	4.62	-0.12	-0.07
16	4.22	-0.24	+0.42
17	4.79	-0.39	-0.52
21	5.04	-0.72	-0.73
22	5.29	+0.47	-0.10
26	4.41	to. 01	-0.16
27	4.76	+0.41	-0.28
28	4.85	+0.61	-0.50
34	5.38	-0.97	-0.82
35	4.53	to. 04	+0.30
39	4.74	-0.34	-0.59
40	4.85	-0.63	-0.41
44	4.95	-0.47	-0.69
45	4.52	-0.21	-0.13
49	5.90	-1.32	-1.28
50	4.44	+0.14	+0.34
54	4.66	-0.10	+0.22
55	4.64	-0.30	-0.19
60	4.75	+0.17	+0.17
61	4.73	-0.13	-0.71
HIGH	5.90	+0.86	+0.70
LOW	4.22	-1.32	-1.28
AVG	4.76	-0.12	-0.22
STD DEV	0.37	0.51	0.46
OPENS	0	0	0
INITIAL5	LL	RVO	RVO

NOTES:

1 - An asterisk (*) indicates an open circuit or a value greater than 2 ohms.

LOW-LEVEL CONTACT RESISTANCE

Project #: 92117
Customer: SAMTEC
Product: 62 POSITION CONNECTOR
Description: TSM-131-01-S-DV/S5M-131-03-S-DV

Spec: MIL-STD-1344 METHOD 3002
SubGroup: 6 [ID# 6-2]
File #: 211710
Print Date: 07Apr92

Open circuit voltage: 20 millivolts

Test current: 100 milliamps

Units: milliohms
Delta values

Temp °C	+22	+22	+23
R.H. %	30	34	30
Date	13Mar92	01Apr92	07Apr92
Pos ID	INITIAL	T. AGE	GASTIGHT
2	4.33	+0.05	+0.02
3	4.12	-0.08	+0.08
6	4.44	-0.16	+0.35
7	4.67	-0.30	-0.05
11	4.54	-0.06	-0.24
12	4.27	+0.27	+0.09
16	4.56	-0.52	-0.64
17	4.46	-0.38	-0.46
21	4.25	-0.12	+0.31
22	4.58	-0.18	-0.31
26	4.46	-0.15	+0.13
27	4.83	-0.14	-0.48
28	4.81	+0.31	-0.15
34	4.54	-0.51	-0.30
35	4.48	-0.30	-0.54
39	4.95	-0.63	-0.86
40	4.34	-0.45	-0.43
44	4.70	-0.59	-0.65
45	4.43	-0.22	-0.21
49	4.84	-0.81	-0.64
50	4.51	-0.50	-0.43
54	4.53	-0.28	-0.27
55	4.46	-0.36	-0.54
60	4.16	+0.72	+0.30
61	4.38	+0.52	+0.15
HIGH	4.95	+0.72	+0.35
LOW	4.12	-0.81	-0.86
AVG	4.51	-0.28	-0.23
STD DEV	0.21	0.31	0.34
OPENS	0	0	0
INITIALS	LL	SVD	RVD

OTEC1

An asterisk (*) indicates an open circuit or a value greater than 2 ohms.

TEST RESULTS

Supplemental Testing



PROJECT NO.: 92117 SPECIFICATION: N/A

PART NO.: TSM-131-01-S-DV DESCRIPTION: Receptacle and Header
SSM-131-03-S-DV Connectors

SAMPLE SIZE: Two Each TECHNICIAN: RO

START DATE: 4-16-92 COMPLETE DATE: 4-16-92

ROOM AMBIENT: 22c RELATIVE HUMIDITY: 48%

EQUIPMENT ID#: 99

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.

PROCEDURE:

1. The prepared sample was placed in a special holding fixture on a X-Y moveable table.
2. 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.
3. The probe/force transducer is interconnected with a linear transducer, amplifier, data acquisition/computer system and recorder.
4. As the contact element is deflected to the level desired, the normal force characteristic is plotted directly and simultaneously.

PROCEDURE -- Continued:

5. The test was performed with the contacts assembled in their housing.

REQUIREMENTS:

The force/deflection characteristic shall be plotted.

RESULTS :

1. The force/deflection characteristic is shown in Figure 1.
2. The spring rate of the contact system tested is **20.0** grams/0.001 deflection.
3. The system has a preload feature resulting in 55 to **80** grams of normal force.
4. The initial contact gaps as measured ranged between **0.017** to 0.018 inches. The projected normal force is 125 to 150 grams.