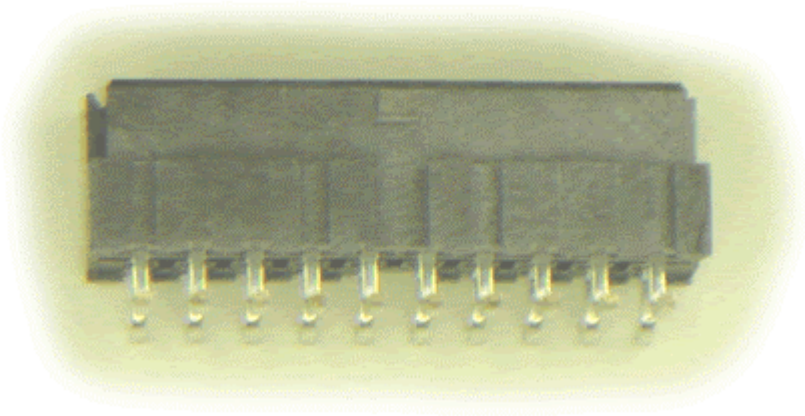
Project Number: NA	Tracking Code: TC0252--0066		
Requested by: John Reid	Date: 12/23/02	Product Rev: 2	
Part #: LS2-110-02-F-D	Lot #: 12/23/02	Tech: GL / TC	Eng: J. Tozier
Part description: 2mm Terminal/Socket Combo			Qty to test: 10
Test Start: 12/27/02	Test Completed: 12/31/02		



CCC and Mating/ Unmating forces with 100 Cycle Durability
Summary Report

PART DESCRIPTION

2mm Terminal/Socket Combo

Part #: LS2-110-02-F-D	Tracking Code: TC0252--0066
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CERTIFICATION

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

SCOPE

To perform the following tests: Standard CCC and Mating/ Unmating forces with 100 cycle durability

APPLICABLE DOCUMENTS

Standards: EIA Publication 364

TEST SAMPLES AND PREPARATION

1) All materials were manufactured in accordance with the applicable product specification.
2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
3) After soldering, the parts to be used for LLCR testing were cleaned according to TLWI-0001:
   a) Sample test boards are to be ultrasonically cleaned after test lead attachment, preparation and/or soldering using the following process.
   b) Sample test boards are immersed into Branson 3510 cleaner containing Kyzen Ionox HC1 (or equivalent) with the following conditions:
      i) Temperature: ----------55° C+/- 5° C
      ii) Frequency:----------40 KHz
      iii) Immersion Time: ----------5 to 10 Minutes
      iv) Sample test boards are removed and placed into the Branson 3510 cleaner containing deionized water with the following conditions:
      v) Temperature: ----------55° C +/- 5° C
      vi) Frequency:----------40 KHz
      vii) Immersion Time: ----------5 to 10 Minutes
      viii) Sample test boards are removed and placed in a beaker positioned on a hot plate with a magnetic stirrer containing deionized water warmed to 55° C +/- 5° C for 1/2 to 1 minute
   c) Upon removal, the sample test boards are rinsed for 1/2 to 1 minute in room temperature free flowing deionized water.
   d) After the final rinse, the sample test boards are dried in an air-circulating oven for 10 to 15 minutes at 50° C +/- 5° C
   e) Sample test boards are then allowed to set and recover to room ambient condition prior to testing.
4) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
5) Any additional preparation will be noted in the individual test procedures.

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ATTRIBUTE DEFINITION

TEMPERATURE RISE (Current Carrying Capacity, CCC):

1) EIA-364-70, *Temperature Rise versus Current Test Procedure for Electrical Connectors and Sockets*.
2) When current passes through a contact, the temperature of the contact increases as a result of I^2R (resistive) heating.
3) The number of contacts being investigated plays a significant part in power dissipation and therefore temperature rise.
4) The size of the temperature probe can affect the measured temperature.
5) Copper traces on PC boards will contribute to temperature rise:
   a) Self heating (resistive)
   b) Reduction in heat sink capacity affecting the heated contacts
6) A de-rating curve, usually 20%, is calculated.
7) Calculated de-rated currents at three temperature points are reported:
   a) Ambient
   b) 60 ^{o} C
   c) 75 ^{o} C
   d) 80 ^{o} C
8) Typically, neighboring contacts (in close proximity to maximize heat build up) are energized.
9) The thermocouple (or temperature measuring probe) will be positioned at a location to sense the MAXIMUM temperature in the vicinity of the heat generation area.
10) A computer program, *TR 803.exe*, ensures accurate stability for data acquisition.
11) Hook-up wire cross section is larger than the cross section of any connector leads/PC board traces, jumpers, etc.
12) Hook-up wire length is longer than the minimum specified in the referencing standard.

MATING/UNMATING:

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

TEMPERATURE RISE (Current Carrying Capacity, CCC):

1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
2) The thermocouples were placed at a location to sense the MAXIMUM temperature generated during testing.
3) Temperature readings recorded are those for which three successive readings, 15 minutes apart, differ less than 1° C (computer controlled data acquisition).
4) Six adjacent contacts were powered:
   a) Linear
   b) Clustered

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RESULTS

Temperature Rise, CCC At 80°C, relative to 105°C		
6 Contacts in Series	Linear	Clustered
	2.9 A at 20% de-rated	3.2 A at 20% de-rated

	Initial				After 100 Cycles			
	Mating		Unmating		Mating		Unmating	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	77.9	4.87	70.0	4.37	95.9	5.99	76.8	4.80
Maximum	*86.5*	*5.41*	*89.1*	*5.57*	*115.0*	*7.19*	*115.8*	*7.24*
Average	***80.8***	***5.05***	***75.5***	***4.72***	***105.0***	***6.56***	***96.1***	***6.01***

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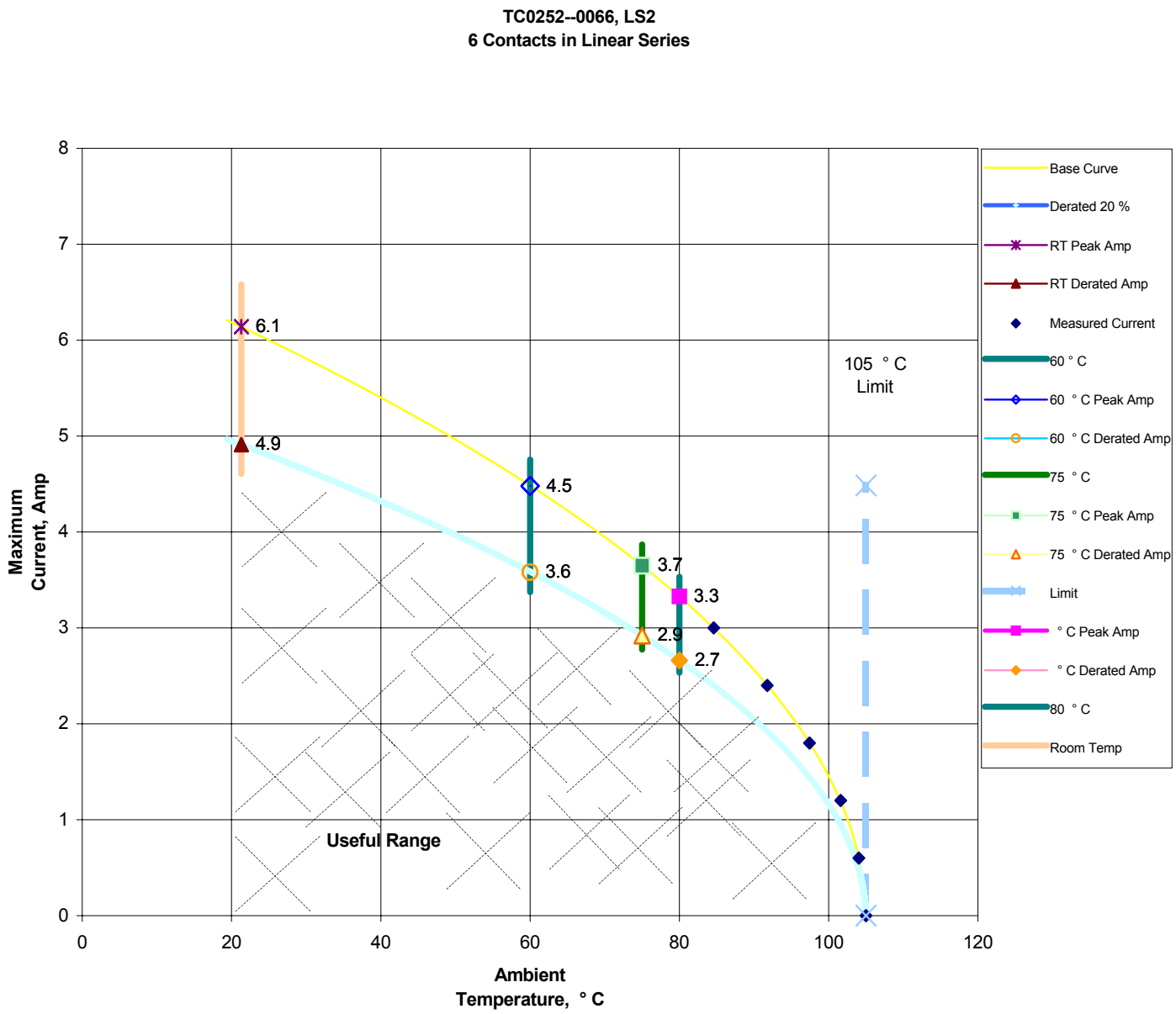
DATA SUMMARIES



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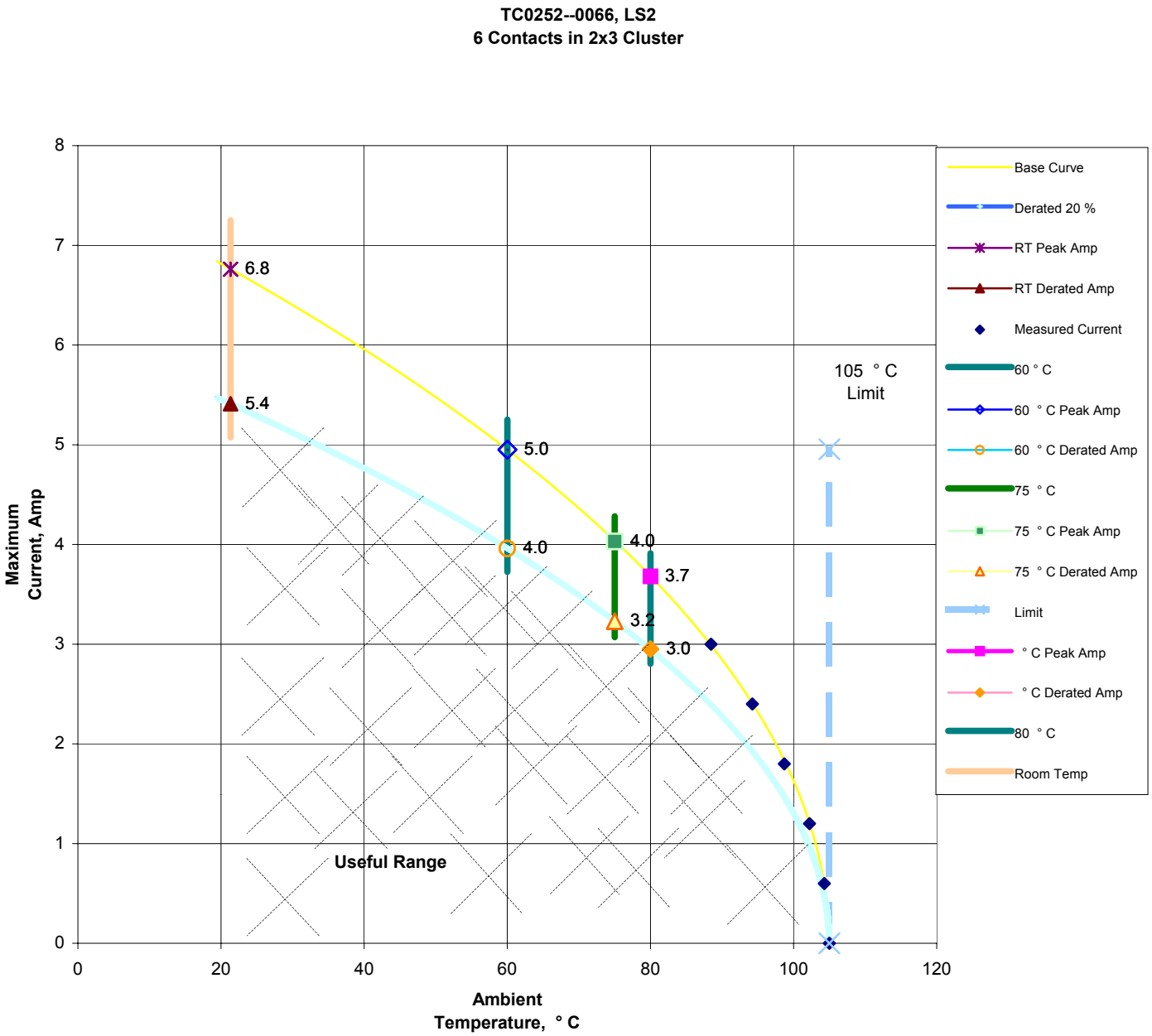

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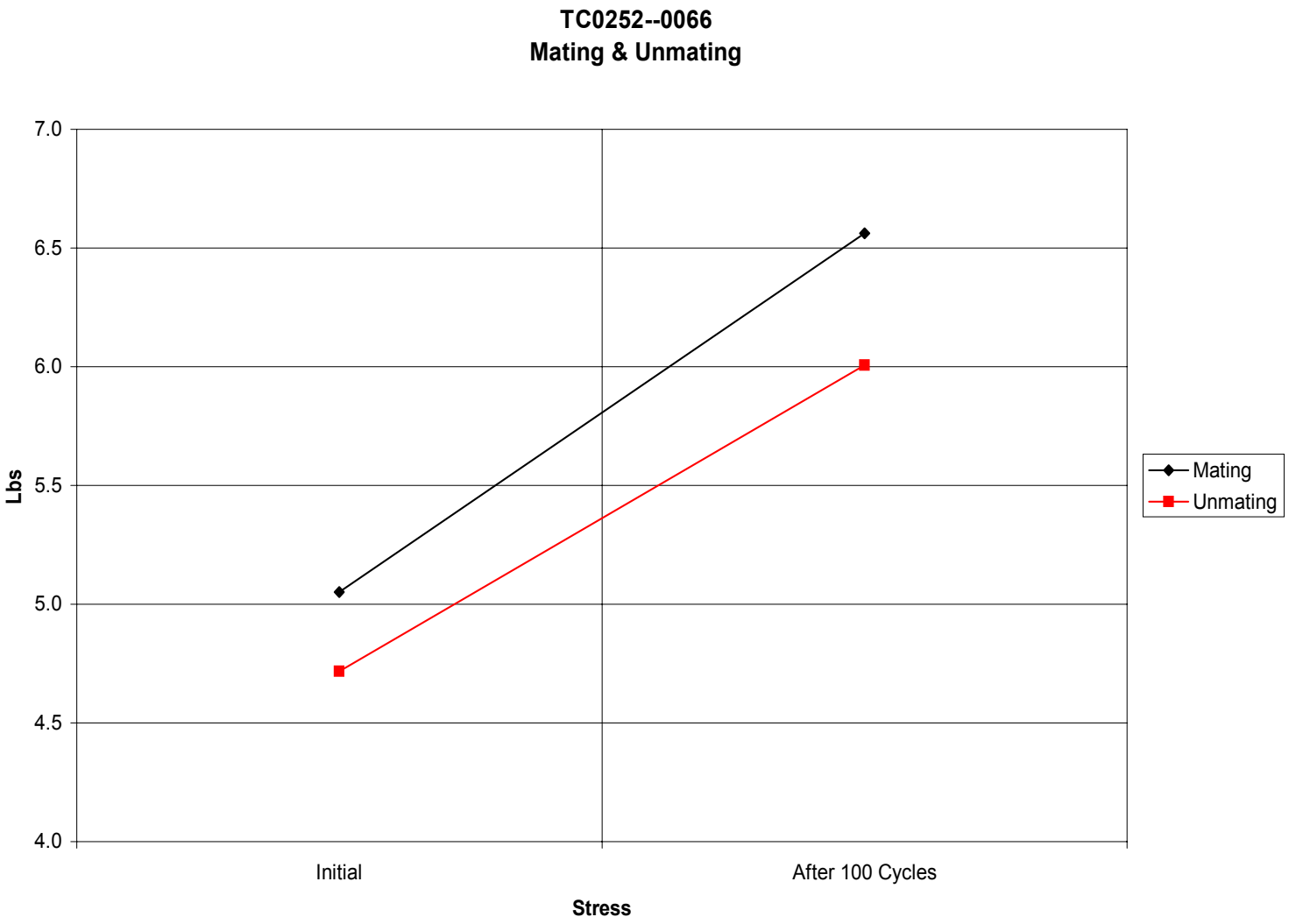

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DATA SUMMARIES

MATING/UNMATING DATA:

Test Date:	12/27/2002
Operator:	GL
Temperature (C):	23
Humidity (RH):	25%
Equipment ID:	TCT-02
Load Cell ID:	LC-500N
Part #	LS2-110-02-F-D

	Initial				After 100 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
Sample#	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
1	79.1	4.94	75.7	4.73	97.1	6.07	86.4	5.40
2	85.1	5.32	85.7	5.36	115.0	7.19	115.8	7.24
3	79.1	4.94	71.2	4.45	99.1	6.19	85.3	5.33
4	82.9	5.18	89.1	5.57	98.0	6.12	94.6	5.91
5	79.0	4.94	70.0	4.37	106.8	6.68	94.0	5.88
6	79.6	4.98	73.8	4.61	95.9	5.99	76.8	4.80
7	77.9	4.87	71.0	4.44	107.4	6.71	110.5	6.91
8	79.1	4.94	72.2	4.52	105.4	6.59	94.0	5.88
9	86.5	5.41	71.8	4.49	113.5	7.09	105.8	6.62
10	80.1	5.01	74.3	4.65	111.8	6.99	97.8	6.11

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EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: THL-01
Description: Temperature/Humidity Chart Recorder
Manufacturer: Dickson
Model: THDX
Serial #: 9316255
Accuracy: Temp: +/- 1C; Humidity: +/-2% RH (0 - 60%) +/- 3% RH (61 - 95%).
… Last Cal: 7/15/02, Next Cal: 7/15/03

Equipment #: PS-01
Description: System Power Supply
Manufacturer: Hewlett Packard
Model: HP 6033A
Serial #: (HP) 3329A-07330
Accuracy: See Manual 10/16/02- Had a fuse replaced and equipment was re-calibrated.
… Last Cal10/16/02, Next Cal: 10/31/03

Equipment #: MO-02
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0780546
Accuracy: See Manual
… Last Cal: 6/25/02, Next Cal: 6/25/03

Equipment #: TC090601-103/105
Description: IC Thermocouple-103/105
Manufacturer: Samtec
Model:
Serial #: TC090601-103/105
Accuracy: +/- 1 degree C

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Equipment #: TCT-02
Description: Dillon Quantrol TC2 Test Stand
Manufacturer: Dillon
Model: PCM
Serial #: 280769
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.
… Last Cal: 8/15/01, Next Cal: 8/31/03

Equipment #: LC-500N
Description: 500 N Load Cell
Manufacturer: Dillon
Model: TC2 Load Cell
Serial #: 5314
Accuracy: +/- 0.2% of Full Scale +/- 1 LSC
… Last Cal: 2/12/02, Next Cal: 2/12/03