

**AMP**

ENVIRONMENTAL TESTING LABORATORY

<b>Job Number:</b> 93.11.30.	<b>Project Number:</b> 150.020.	<b>Date of issue:</b> December 1993.
<b>Description:</b>  <b>Micro-MaTch.</b> Wire to Board. (Qualification test)		<b>Part numbers:</b> 2-215079-0. 1-215079-6. 1-215083-6. 2-215083-0.

**Scope:**

To investigate the behaviour of the Micro-MaTch Miniature Connector system, when tested in accordance with the AMP PRODUCT SPECIFICATION 108-19052, Revision A. Tested were Wire to Board connections, consisting of Female Top Entry with Male On Wire.

**Conclusions:**

All tested connector assemblies meet the requirements of the AMP PRODUCT SPECIFICATION.

<b>Test Specification:</b>	IEC 512 series. IEC 68 series. AMP PRODUCT SPECIFICATION 108-19052, rev.A.	
<b>Test Carried Out:</b>	1 See pages 4 to 6. 2 3	
<b>Distribution:</b>	1 Mr.H.vd Steen (P.E.). 2 Doc.Centre. 3 File Lab.	
<b>Test Engineer:</b>	C. Mayers. <i>[Signature]</i>	<b>Requested by:</b> Product Engineering.
<b>Laboratory Manager:</b>	W.M. de Cock <i>[Signature]</i>	<b>Classification:</b> UNRESTRICTED.
<b>Disposal of Samples:</b>	Returned.	<b>Report Number:</b> R 041 - 1664
<b>Appendices:</b>	Page 1 of 49 Pages	



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**EQUIPMENT USED:**

Equipment	Manufacturer	Type
Microscope	Wild	M7.
Push Pull tester	AMP	Mk II.
Carrier amplifier	HBM	KWS 3073/SP350
Personal computer	Hewlett Packard	9816.
Digital Voltmeter	Hewlett Packard	3478A.
Scanner	Hewlett Packard	3497A.
Digital Multimeter	Keithley	195 T.
Precision voltage source	Data precision	8200.
Oven	Heraeus	T 5042.
Climatic chamber	Heraeus/Vötsch	VLK 08-300.
Climatic chamber	Heraeus/Vötsch	VMS2-08-20-64.
Exciter control	Brüel & Kjaer	1047.
Conditioning amplifier	Brüel & Kjaer	2626.
Power amplifier	Ling Dynamics	TP 02K.
Vibration Table	Ling Dynamics	710L.
Digital oscilloscope	Gould	OS 4040.
Tensile tester	Karl Frank	81560.
Carrier amplifier	HBM	KWS 3073.
X-Y recorder	Hewlett Packard	7044A.
Power supply	Philips	PE 1516.
Temperature recorder	Philips	PM 8236.
Electrometer	Keithley	617.
High voltage tester	Beckman	PA-5.

**DESCRIPTION of TESTSAMPLES:**

All tested samples were taken at random from current production.

Female connector	: 20 position.	Partnumber: 2-215079-0.	(FTE)
Female connector	: 16 position.	Partnumber: 1-215079-6.	(FTE)
Male connector	: 20 position.	Partnumber: 2-215083-0.	(MOW)
Male connector	: 16 position.	Partnumber: 1-215083-6.	(MOW)

FTE	: Female Top Entry.
MOW	: Male on Wire.
MOB	: Male On Board

Ribboncable : Kabel Metall, 28 AWG, 7 strands. Approx. 2,07 mΩ/cm.

Termination tool	: Bench press.	Partnumber	: 733280-1.
	: Female connectors		: 45 samples.
	: Male connectors		: 45 samples.

**TEST PROCEDURES:**

- Visual examination:** acc.to IEC 512-2-1a.  
Magnification was 10x.
- Termination Resistance:** acc.to IEC 512-2-2a.  
Maximum open voltage 20 milliVolt.  
Maximum current 100 milliAmpere.  
Measuringpoints see figure 1 on page 6.
- For testgroup 2:  
All contacts measured. Termination resistance consists of bulk cable + bulk connectors and contact resistance + slot resistance.
- For testgroups 1, 3 and 8:  
All contacts measured. Termination resistance consists of contact resistance + slot resistance + bulk connectors.
- Requirement:**  
10 milliOhm. (maximum excluding bulk cable).
- Insulation Resistance:** acc.to IEC 512-2-3a.  
Test voltage : 100 volt DC.  
Duration : 1 minute
- Requirement:**  
1000 Mohm minimum.
- Voltage Proof:** acc.to IEC 512-2-4a.  
Test voltage : 500 Volt AC.  
Duration : 1 minute.
- Requirement:**  
No breakdown or flashover.
- Damp Heat Cyclic:** acc.to IEC 512-6-11m.  
One cycle consists of:  
Upper temperature : 55°C.  
Lower temperature : 25°C.  
Relative humidity : 95%.  
Duration one cycle : 12 + 12 hours.( IEC 68-2-30)  
Number of cycles : 1 and 5 remaining cycles.  
Storage : unmated.
- Cold:** acc.to IEC 512-6-11j.  
2 Hours storage at -40°C. in unmated condition.
- Dry Heat:** acc.to IEC 512-6-11i.  
16 Hours storage at 105°C. in unmated condition.

**AMP**

ENVIRONMENTAL TESTING LABORATORY

**Rapid change of Temperature:**

acc.to IEC 512-6-11d.

One cycle consists of:  
 Upper temperature : 105°C. for 15 minutes.  
 Lower temperature : -40°C. for 15 minutes.  
 Number of cycles : 10 in mated condition.

**Engaging and Separating force:**

acc.to IEC 512-7-13a.

These measurements were executed on the push pull tester

**Requirement:**  
 Engaging maximum : 5 Newton / contact.  
 Separating minimum : 1 Newton / contact.

**Mechanical Endurance:**

acc.to IEC 512-5-9a.

Number of operation : 20.  
 Frequency : 10 times per minute.

**Vibration:**

acc.to IEC 512-4-6d.

10-55-10 Hz. Traversed with one octave per minute.  
 Displacement 0,75 mm peak.  
 Duration: 10 cycles. in acc. with IEC 68-2-6-test Fc.

**Requirement:**  
 No physical damage. No discontinuity > 1  $\mu$ Sec.

**Contact Retention in housing:**

acc.to IEC 512-8-16f.

10 Newton per individual contact.  
 Male terminated to ribboncable.  
 See figure 2 and 3 on page 38.

**Requirement:**  
 No dislodge from housing.

**Axial tensile strength:**

acc.to IEC 512-8-16d.

The axial tensile strength of wire was determined on the tensile tester.  
 Speed: 25 mm. per minute.

**Requirement:**  
 10 Newton / contact minimum.

**Solderability:**

acc.to IEC 68-2-20 Ta.

Solderbath temperature : 235°C.  
 Ageing 3. : 16 hours at 155°C.

**Requirement:**  
 Maximum 5% dewetting.

Resistance to Soldering Heat:

acc.to IEC 68-2-20Tb.

Method :1A  
 Solderbath :260°C.  
 Duration :5 seconds.

**Requirement:**  
 No functional damage.

Dry Heat under Cyclic current loading:

acc.to IEC 512-5-9e.

The current / temperature behaviour of Wire To Board version was verified by testing of the FTE / MOB version, because the latter is more critical. Comparative measurements have shown that the temperature rise at:

1 A DC is 25°C for FTE / MOW combination and  
 50°C for FTE / MOB combination.

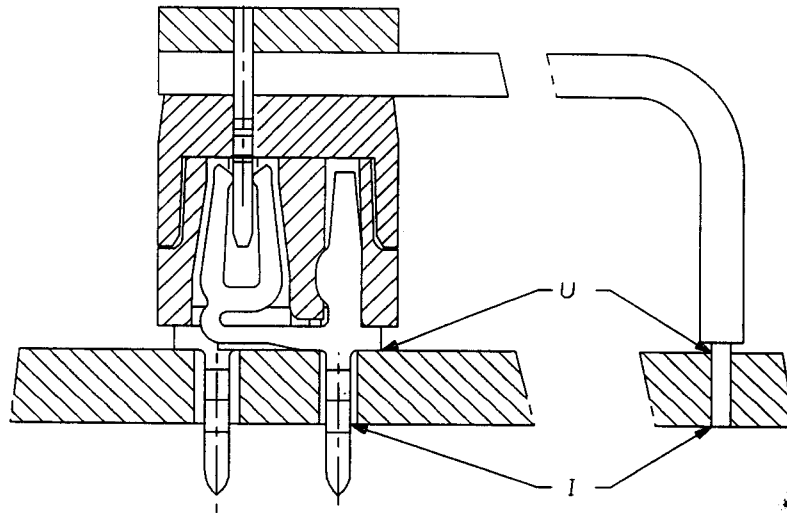
The testsamples were placed in an oven.  
 Ambient temperature :70°C.

The samples were, all in series, connected to a current source with a current of 125% of the specified current. That means 0,8 A.(curve B of Prod.Spec.)

One cycle consists of :45 minutes on ON.  
 :15 minutes on OFF.

500 Of these cycles were done.

**Measuringpoints termination resistance.**



**TEST SEQUENCES:**

- Testgroup 1:** Visual Examination  
Termination Resistance  
Dry Heat  
Damp Heat cyclic, 1 cycle  
Cold  
Damp Heat cyclic, 5 remaining cycles.  
Termination Resistance.  
Visual Examination.  
Number of Samples: 5 Males on ribboncable, for 4-wire measurements.  
5 Females handsoldered on PCB.
- Testgroup 2:** Visual Examination.  
Engaging Force.  
Termination Resistance.  
Separating Force.  
Mechanical Endurance.  
Engaging Force, last cycle.  
Termination Resistance.  
Damp Heat cyclic, 6 cycles.  
Termination Resistance.  
Separating Force.  
Visual Examination.  
Number of Samples: 5 Males on 7,5 cm. ribboncable.  
5 Female handsoldered on PCB.
- Testgroup 3:** Visual Examination.  
Termination Resistance.  
Rapid Change of Temperature.  
Termination Resistance.  
Vibration.  
Termination Resistance.  
Number of Samples: 5 Males on ribboncable, for 4-wire measurements.  
5 Female handsoldered on PCB.
- Testgroup 4:** Visual Examination.  
Solderability.  
Visual Examination.  
Number of Samples: 5.
- Testgroup 5:** Visual Examination.  
Resistance to soldering heat.  
Visual Examination.  
Number of Samples: 5.
- Testgroup 6:** Visual Examination.  
Axial tensile strength of wire termination. (half lot)  
Rapid Change of Temperature. (half lot)  
Axial Tensile strength of wire termination.  
Number of Samples: 10 Males on 15 cm. ribboncable.



- Testgroup 7:**            **Visual Examination.**  
**Contact Retention in housing.**  
**Visual Examination.**  
**Number of Samples: 5 Males on 15 cm. ribboncable.**  
**5 Females handsoldered on PCB.**
- Testgroup 8:**            **Visual Examination.**  
**Termination Resistance.**  
**Dry Heat under loaded Current cycling.**  
**Termination Resistance.**  
**Visual Examination.**  
**Number of Samples: 5 Males on ribboncable, for 4-wire measurements.**  
**5 Females handsoldered on PCB.**
- Testgroup 9:**            **Visual Examination.**  
**Insulation Resistance.**  
**Voltage Proof.**  
**Dry Heat**  
**Damp Heat cyclic, 1 cycle.**  
**Cold.**  
**Damp Heat cyclic, 5 remaining cycles.**  
**Insulation Resistance.**  
**Voltage Proof.**  
**Rapid change of temperature.**  
**Insulation Resistance.**  
**Voltage Proof.**  
**Visual Examination.**  
**Number of Samples: 5 Males on 7,5 cm. ribboncable.**  
**5 Females.**





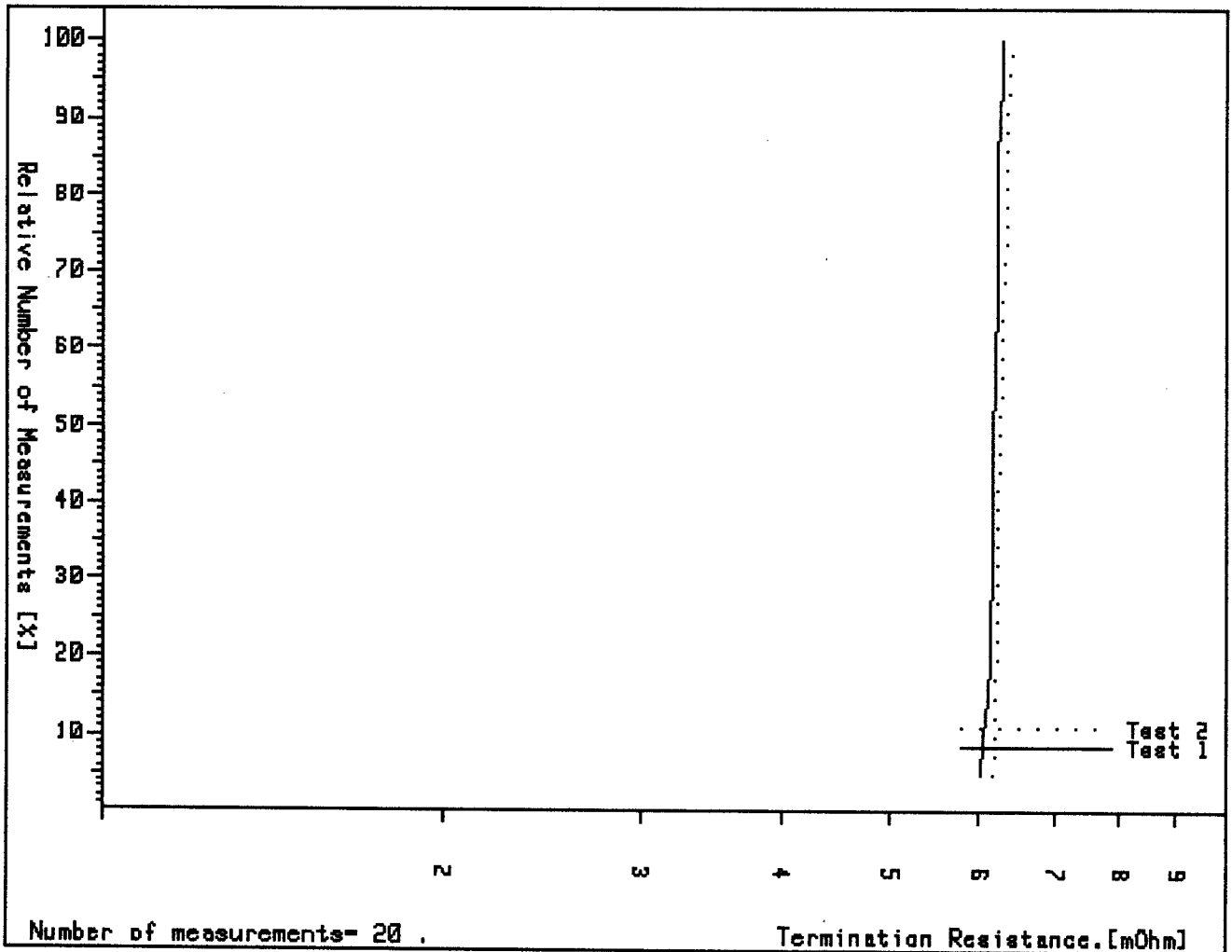
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Product: MicroMaTch. FTE-MOW. (93.07.12)  
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Test 1 : Termination Resistance Initial.  
Test 2 : Climatic Sequence.  
Group : 1  
Lot : 1  
-----

----- All values in milliOhms -----

	Test 1	Test 2	delta R
Max. :	6,29	6,41	0,27
Min. :	6,02	6,16	0,01
Mean :	6,18	6,28	0,10
StDv :	0,07	0,07	0,07

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\*\*\*\*\*  
 Termination Resistances in milliOhms.  
 \*\*\*\*\*  
 Product Tested: MicroMaTch. FTE-MOW. (93.07.12)  
 -----

Col. Group	Lot	Test
-1-: 1	1	Termination Resistance Initial.
-2-: 1	1	Climatic Sequence.
	-1-	-2-
01	6,04	6,22
02	6,14	6,41
03	6,29	6,36
04	6,02	6,24
05	6,17	6,21
06	6,12	6,20
07	6,16	6,19
08	6,15	6,16
09	6,22	6,26
10	6,20	6,23
11	6,19	6,24
12	6,14	6,30
13	6,21	6,33
14	6,21	6,25
15	6,25	6,29
16	6,17	6,33
17	6,17	6,28
18	6,28	6,34
19	6,23	6,35
20	6,23	6,38

-----  
 Max.:           6,29           6,41  
 Min.:           6,02           6,16  
 Mean:           6,18           6,28

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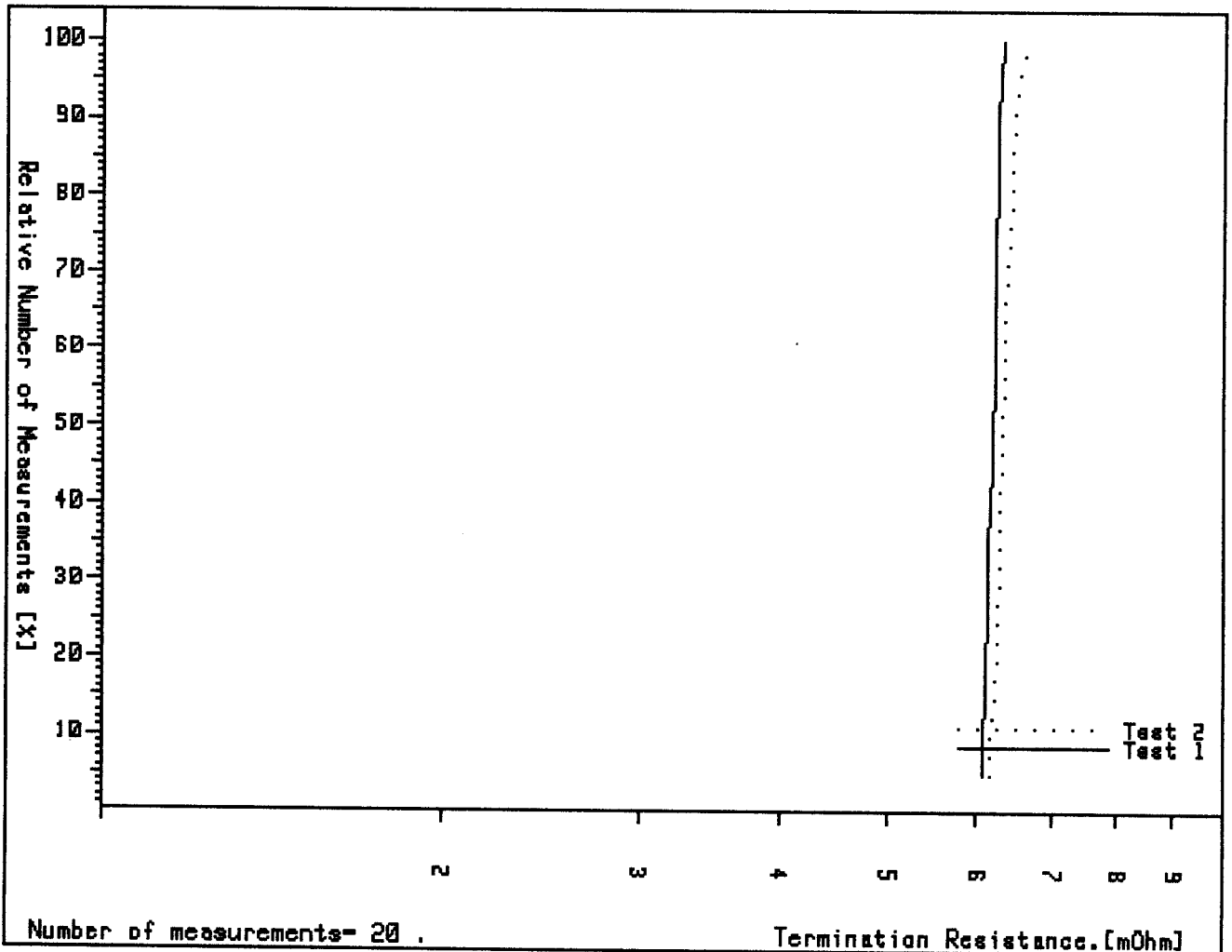
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 Product: MicroMaTch. FTE-MOW. (93.07.12)  
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Test 1 : Termination Resistance Initial.  
 Test 2 : Climatic Sequence.  
 Group : 1  
 Lot : 2  
 -----

----- All values in milliOhms -----

	Test 1	Test 2	delta R
Max. :	6,30	6,62	0,37
Min. :	6,06	6,16	-0,00
Mean :	6,19	6,34	0,16
StDv :	0,07	0,12	0,10

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Termination Resistances in milliOhms.

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Product Tested: MicroMaTch. FTE-MOW. (93.07.12)

Col. Group	Lot	Test
-1-: 1	2	Termination Resistance Initial.
-2-: 1	2	Climatic Sequence.

	-1-	-2-
01	6,08	6,17
02	6,22	6,42
03	6,26	6,45
04	6,12	6,21
05	6,24	6,34
06	6,26	6,28
07	6,25	6,62
08	6,06	6,25
09	6,27	6,32
10	6,12	6,26
11	6,23	6,35
12	6,10	6,30
13	6,22	6,36
14	6,14	6,27
15	6,18	6,49
16	6,14	6,47
17	6,22	6,31
18	6,17	6,16
19	6,30	6,45
20	6,19	6,37

Max.:	6,30	6,62
Min.:	6,06	6,16
Mean:	6,19	6,34

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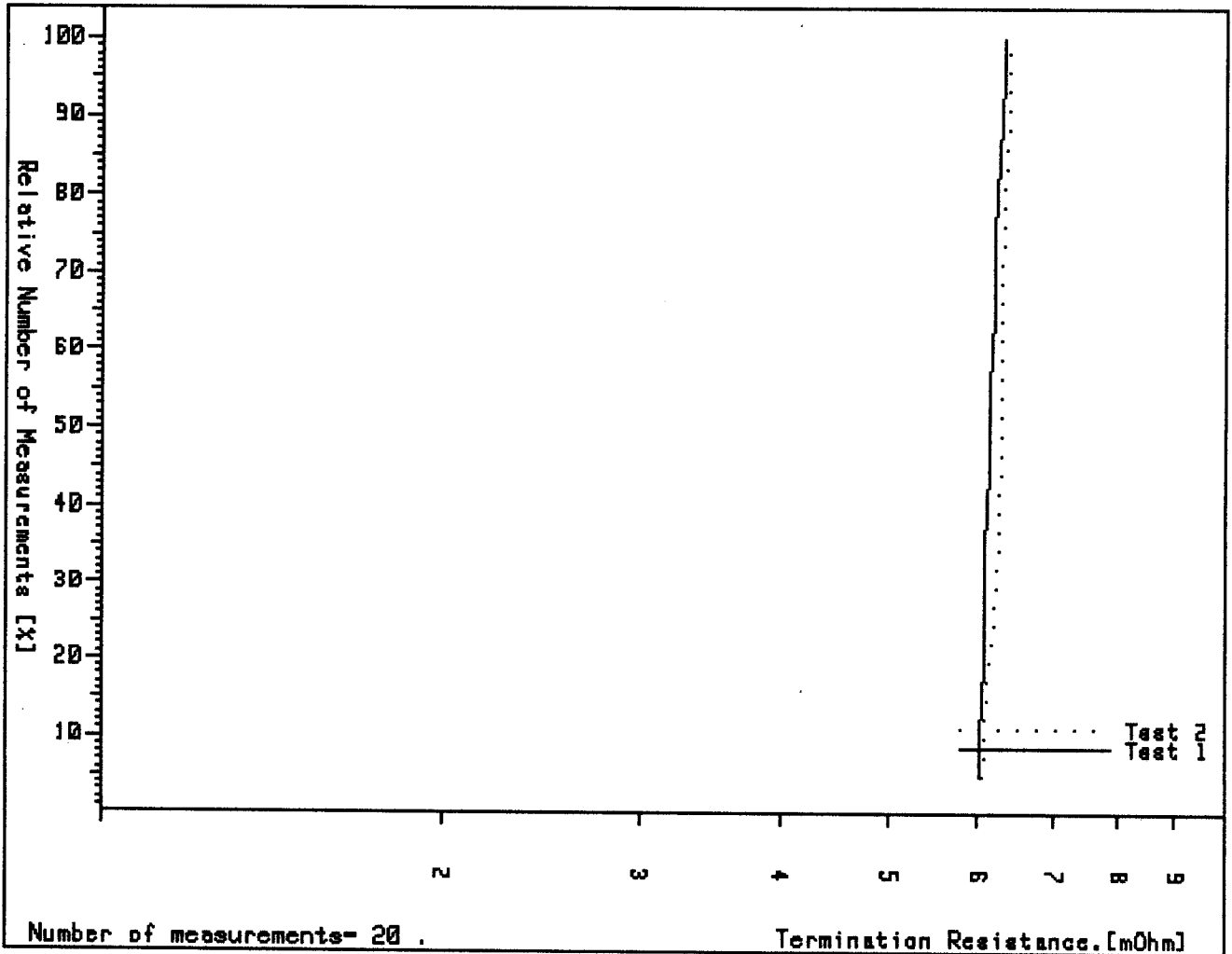


Product: MicroMaTch. FTE-MOW. (93.07.12)

Test 1 : Termination Resistance Initial.  
 Test 2 : Climatic Sequence.  
 Group : 1  
 Lot : 3

All values in milliOhms

	Test 1	Test 2	delta R
Max. :	6,31	6,38	0,22
Min. :	6,00	6,05	-0,05
Mean :	6,15	6,26	0,11
StDv :	0,09	0,10	0,07





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Termination Resistances in milliOhms.

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Product Tested: MicroMaTch. FTE-MOW. (93.07.12)

Col. Group	Lot	Test
-1-: 1	3	Termination Resistance Initial.
-2-: 1	3	Climatic Sequence.

	-1-	-2-
01	6,05	6,24
02	6,02	6,09
03	6,24	6,29
04	6,08	6,13
05	6,30	6,37
06	6,14	6,09
07	6,13	6,32
08	6,00	6,05
09	6,18	6,26
10	6,06	6,20
11	6,20	6,31
12	6,21	6,30
13	6,23	6,28
14	6,07	6,22
15	6,16	6,37
16	6,08	6,30
17	6,29	6,36
18	6,12	6,30
19	6,31	6,38
20	6,11	6,28

Max.:	6,31	6,38
Min.:	6,00	6,05
Mean:	6,15	6,26

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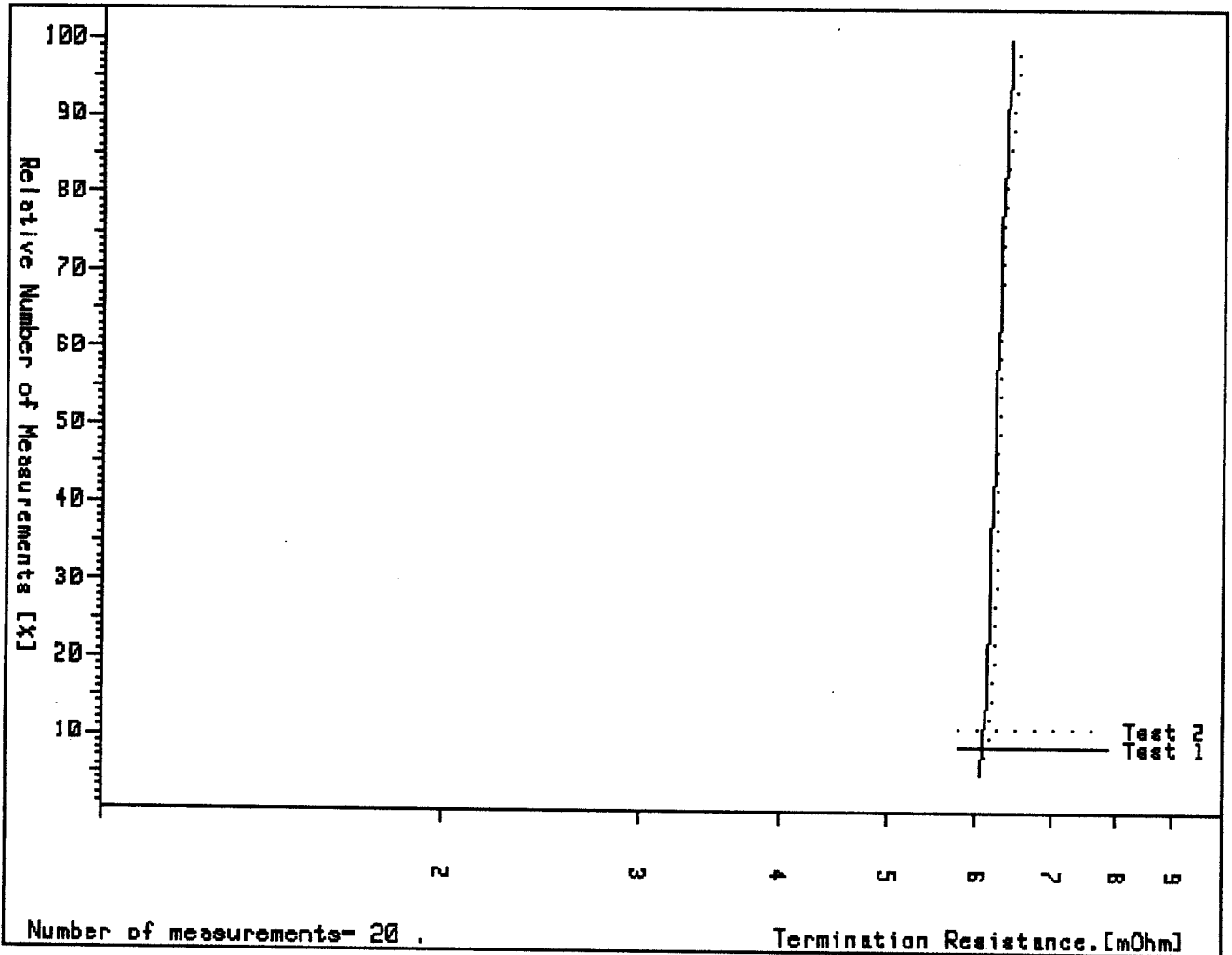
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 Product: MicroMaTch. FTE-MOW. (93.07.12)  
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Test 1 : Termination Resistance Initial.  
 Test 2 : Climatic Sequence.  
 Group : 1  
 Lot : 4  
 -----

----- All values in milliohms -----

	Test 1	Test 2	delta R
Max. :	6,40	6,52	0,44
Min. :	6,06	6,04	-0,11
Mean :	6,23	6,29	0,06
StDv :	0,10	0,11	0,13

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Termination Resistances in milliohms.

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Product Tested: MicroMaTch. FTE-MOW. (93.07.12)

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-----
Col. Group   Lot      Test
-----
-1-: 1       4        Termination Resistance Initial.
-2-: 1       4        Climatic Sequence.
-----

```

	-1-	-2-
01	6,06	6,04
02	6,27	6,17
03	6,25	6,41
04	6,16	6,36
05	6,15	6,25
06	6,17	6,31
07	6,24	6,25
08	6,08	6,52
09	6,22	6,27
10	6,14	6,28
11	6,27	6,29
12	6,13	6,23
13	6,29	6,27
14	6,19	6,20
15	6,40	6,33
16	6,24	6,23
17	6,35	6,26
18	6,35	6,50
19	6,39	6,29
20	6,31	6,43

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Max.:        6,40      6,52
Min.:        6,06      6,04
Mean:        6,23      6,29
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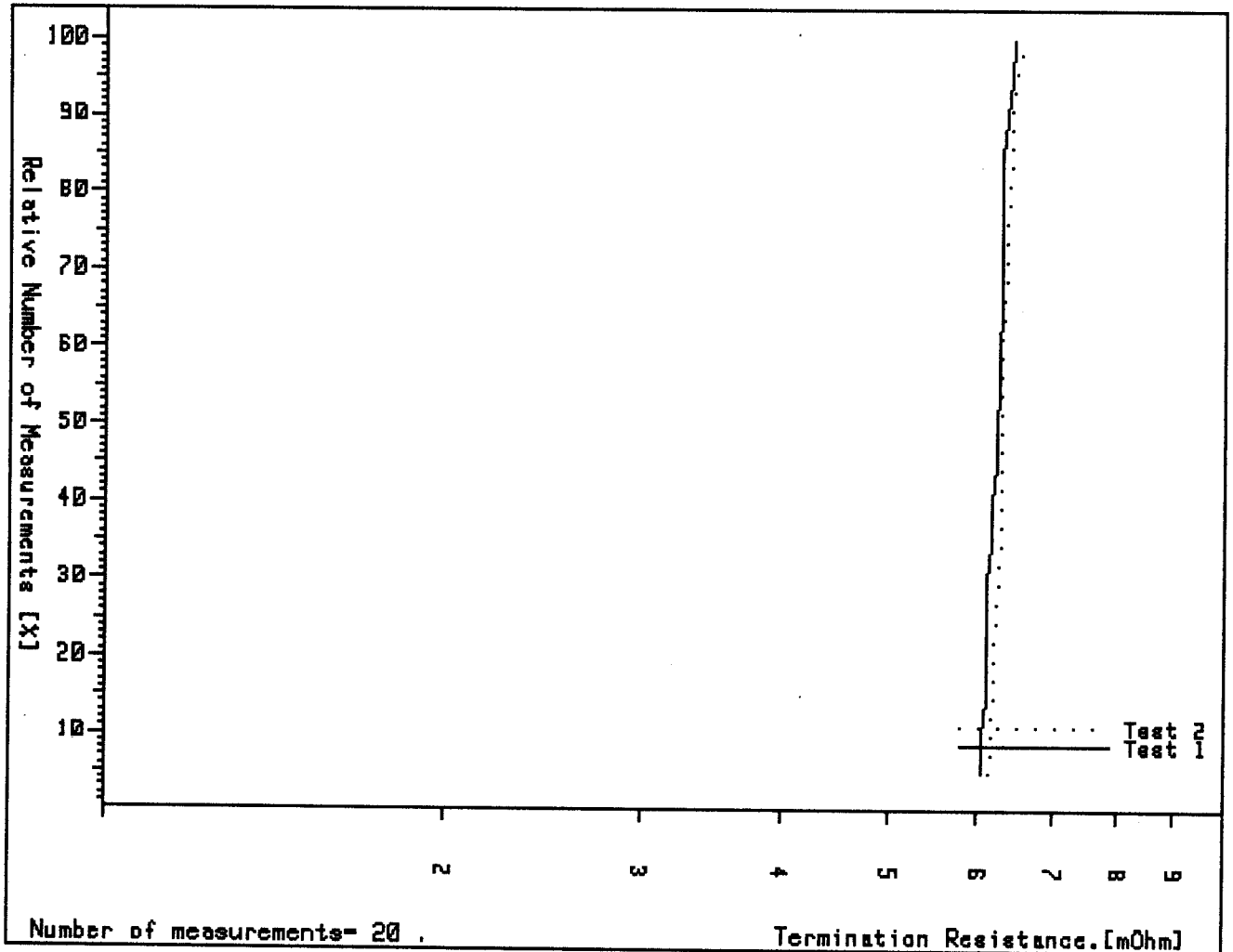
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Product: MicroMaTch. FTE-MOW. (93.07.12)  
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Test 1 : Termination Resistance Initial.  
Test 2 : Climatic Sequence.  
Group : 1  
Lot : 5  
-----

----- All values in milliOhms -----

	Test 1	Test 2	delta R
Max. :	6,44	6,57	0,27
Min. :	6,04	6,13	-0,14
Mean :	6,22	6,30	0,08
StDv :	0,11	0,10	0,11

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Termination Resistances in milliOhms.

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Product Tested: MicroMaTch. FTE-MOW. (93.07.12)

Col. Group	Lot	Test
-1-: 1	5	Termination Resistance Initial.
-2-: 1	5	Climatic Sequence.

	-1-	-2-
01	6,04	6,19
02	6,11	6,25
03	6,30	6,57
04	6,05	6,13
05	6,17	6,43
06	6,11	6,28
07	6,26	6,40
08	6,11	6,18
09	6,21	6,29
10	6,10	6,30
11	6,28	6,31
12	6,17	6,30
13	6,28	6,29
14	6,29	6,40
15	6,39	6,37
16	6,25	6,23
17	6,34	6,34
18	6,23	6,33
19	6,44	6,30
20	6,29	6,21

Max.:	6,44	6,57
Min.:	6,04	6,13
Mean:	6,22	6,30

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**TESTGROUP 2: Engaging and Separating Forces.**

Testlot	Engaging force		Seperating force	
	Initial---Final		Initial---Final	
2-1	37	21	38	23
2-2	35	19	26	21
2-3	41	21	30	19
2-4	40	19	34	24
2-5	42	21	34	24

Values are given in NEWTONS / connector.

Note: Tested connectors were 16 position connectors.

**Requirement:**

Maximum Engaging force : 16x5 = 80 Newton.

Minimum Separating force : 16x1 = 16 Newton.



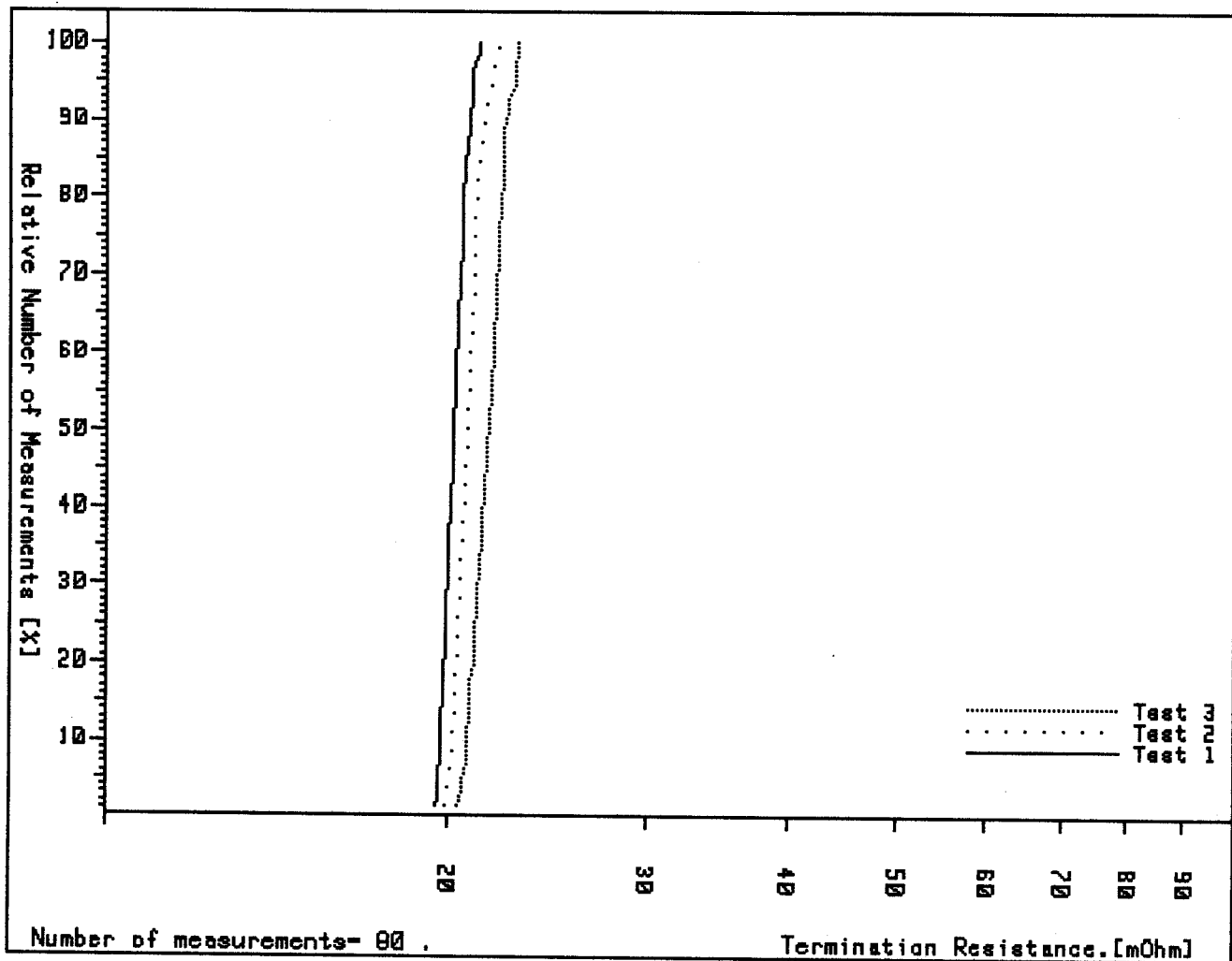
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 Product: Micro-MaTch. FTE-MOW.  
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Test 1 : Initial.  
 Test 2 : Mechanical Operation.(20x by hand)  
 Test 3 : Damp Heat Cyclic.( 6 Cycles 25/55°C )  
 Group : 2  
 Lot : 1 - 5

----- All values in milliOhms -----

	Test 1	Test 2	delta R	Test 3	delta R
Max. :	21,32	22,20	1,47	23,11	2,87
Min. :	19,58	19,93	0,08	20,40	0,40
Mean :	20,29	20,86	0,57	21,74	1,44
StDv :	0,44	0,52	0,27	0,67	0,56

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Termination Resistances in milliOhms.

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Product Tested: Micro-MaTch. FTE-MOW.

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Col. Group	Lot	Test
-1-: 2	1	Initial.
-2-: 2	1	Mechanical Operation.(20x by hand)
-3-: 2	1	Damp Heat Cyclic.( 6 Cycles 25/55°C )

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	-1-	-2-	-3-
01	19,90	20,28	20,88
02	20,12	20,67	22,67
03	20,11	20,26	20,87
04	20,48	21,45	22,11
05	20,37	20,87	21,21
06	20,36	21,28	22,39
07	19,77	20,22	20,40
08	20,24	20,82	20,97
09	20,52	20,98	21,20
10	21,32	22,10	22,59
11	20,18	20,65	20,82
12	20,01	21,10	21,28
13	20,41	20,89	21,49
14	20,25	21,72	23,11
15	20,04	20,67	21,46
16	20,64	21,43	22,03

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Max.:	21,32	22,10	23,11
Min.:	19,77	20,22	20,40
Mean:	20,29	20,96	21,59

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Termination Resistances in milliOhms.

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Product Tested: Micro-MaTch. FTE-MOW.

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Col. Group	Lot	Test
-1-: 2	2	Initial.
-2-: 2	2	Mechanical Operation.(20x by hand)
-3-: 2	2	Damp Heat Cyclic.( 6 Cycles 25/55°C )

-----

	-1-	-2-	-3-
01	19,79	20,46	20,86
02	20,78	22,06	23,02
03	19,77	20,42	21,10
04	20,61	21,62	21,89
05	20,77	21,13	21,67
06	20,06	21,25	21,93
07	19,75	20,32	20,55
08	20,32	20,90	22,22
09	21,00	21,35	21,77
10	21,32	22,20	22,98
11	21,05	21,55	22,01
12	19,71	20,39	21,17
13	20,32	20,87	21,22
14	20,30	21,10	22,33
15	19,91	20,62	21,44
16	19,82	20,52	22,43

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Max.:	21,32	22,20	23,02
Min.:	19,71	20,32	20,55
Mean:	20,33	21,05	21,79

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\*\*\*\*\*  
Termination Resistances in milliOhms.

\*\*\*\*\*  
Product Tested: Micro-MaTch. FTE-MOW.

Col. Group	Lot	Test
-1-: 2	3	Initial.
-2-: 2	3	Mechanical Operation.(20x by hand)
-3-: 2	3	Damp Heat Cyclic.( 6 Cycles 25/55°C )

	-1-	-2-	-3-
01	19,96	20,76	22,22
02	20,09	20,53	21,88
03	19,61	20,41	21,63
04	20,64	21,16	22,92
05	20,55	21,12	21,61
06	20,65	21,08	22,00
07	19,87	20,84	21,57
08	19,83	20,35	21,33
09	21,08	21,51	22,13
10	21,16	21,90	22,40
11	20,08	20,79	21,12
12	20,36	20,91	22,08
13	20,27	21,08	22,27
14	20,26	20,84	21,46
15	20,04	20,90	22,30
16	20,44	20,52	20,84

Max.:	21,16	21,90	22,92
Min.:	19,61	20,35	20,84
Mean:	20,31	20,92	21,86

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\*\*\*\*\*  
 Termination Resistances in milliOhms.  
 \*\*\*\*\*  
 Product Tested: Micro-MaTch. FTE-MOW.

Col. Group	Lot	Test			
-1-: 2	4	Initial.			
-2-: 2	4	Mechanical Operation.(20x by hand)			
-3-: 2	4	Damp Heat Cyclic.( 6 Cycles 25/55°C )			
			-1-	-2-	-3-
01	19,92	20,75	21,91		
02	19,83	20,35	21,38		
03	19,62	20,10	20,70		
04	20,41	20,98	22,18		
05	21,03	21,84	22,53		
06	19,76	20,05	20,59		
07	19,97	20,56	20,91		
08	19,65	19,99	21,18		
09	20,92	21,27	22,19		
10	20,77	21,16	22,02		
11	20,64	20,99	21,54		
12	19,61	20,12	21,18		
13	20,64	21,34	22,36		
14	20,01	20,31	20,89		
15	20,44	21,17	21,95		
16	19,58	20,06	21,02		
Max.:	21,03	21,84	22,53		
Min.:	19,58	19,99	20,59		
Mean:	20,17	20,69	21,53		





\*\*\*\*\*  
 Termination Resistances in milliOhms.  
 \*\*\*\*\*  
 Product Tested: Micro-MaTch. FTE-MOW.  
 -----

Col. Group	Lot	Test		
-1-: 2	5	Initial.		
-2-: 2	5	Mechanical Operation. (20x by hand)		
-3-: 2	5	Damp Heat Cyclic. ( 6 Cycles 25/55°C )		
		-1-	-2-	-3-
01	19,94	20,35	22,19	
02	20,21	20,53	22,88	
03	20,20	20,51	21,64	
04	20,61	20,75	21,57	
05	20,84	21,17	21,91	
06	20,30	20,55	22,42	
07	20,20	20,34	20,96	
08	20,61	20,80	21,44	
09	20,74	21,00	21,72	
10	20,95	21,29	22,41	
11	20,88	21,21	23,08	
12	19,76	19,93	20,58	
13	20,52	21,02	22,13	
14	20,08	20,42	22,46	
15	20,15	20,76	21,81	
16	19,94	20,20	21,36	
Max.:	20,95	21,29	23,08	
Min.:	19,76	19,93	20,58	
Mean:	20,37	20,68	21,91	

\*\*\*\*\*

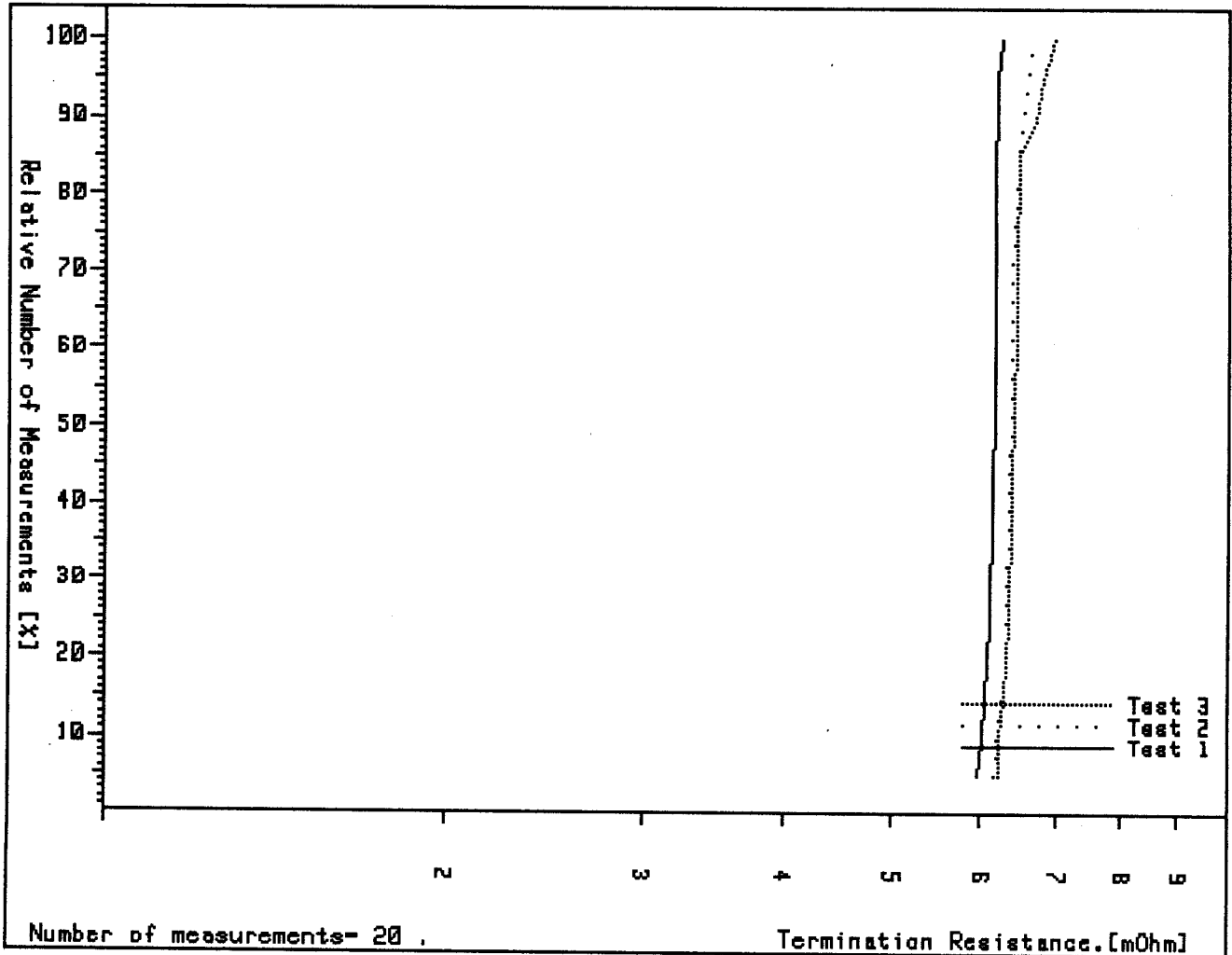


Product: MicroMaTch. FTE-MOW. (93.07.12)

Test 1 : Termination Resistance Initial.  
 Test 2 : Thermal Shock. -40°C / +105°C. 10 Cycles.  
 Test 3 : Vibration.  
 Group : 3  
 Lot : 1

----- All values in milliOhms -----

	Test 1	Test 2	delta R	Test 3	delta R
Max. :	6,25	6,63	0,45	6,97	0,79
Min. :	5,96	6,17	0,17	6,21	0,17
Mean :	6,14	6,38	0,24	6,44	0,31
StDv :	0,07	0,11	0,08	0,18	0,16





\*\*\*\*\*  
 Termination Resistances in milliOhms.  
 \*\*\*\*\*  
 Product Tested: MicroMaTch. FTE-MOW. (93.07.12)  
 -----

Col. Group	Lot	Test
-1-: 3	1	Termination Resistance Initial.
-2-: 3	1	Thermal Shock. -40°C / +105°C. 10 Cycles.
-3-: 3	1	Vibration.

-----

	-1-	-2-	-3-
01	6,03	6,20	6,21
02	6,02	6,31	6,35
03	6,13	6,40	6,44
04	6,11	6,50	6,79
05	6,16	6,36	6,37
06	5,96	6,17	6,23
07	6,20	6,43	6,44
08	6,07	6,26	6,28
09	6,14	6,31	6,31
10	6,15	6,38	6,47
11	6,20	6,38	6,41
12	6,18	6,46	6,47
13	6,17	6,34	6,35
14	6,18	6,37	6,41
15	6,17	6,39	6,39
16	6,12	6,32	6,37
17	6,17	6,39	6,44
18	6,17	6,36	6,45
19	6,25	6,60	6,71
20	6,18	6,63	6,97

-----

Max.:	6,25	6,63	6,97
Min.:	5,96	6,17	6,21
Mean:	6,14	6,38	6,44

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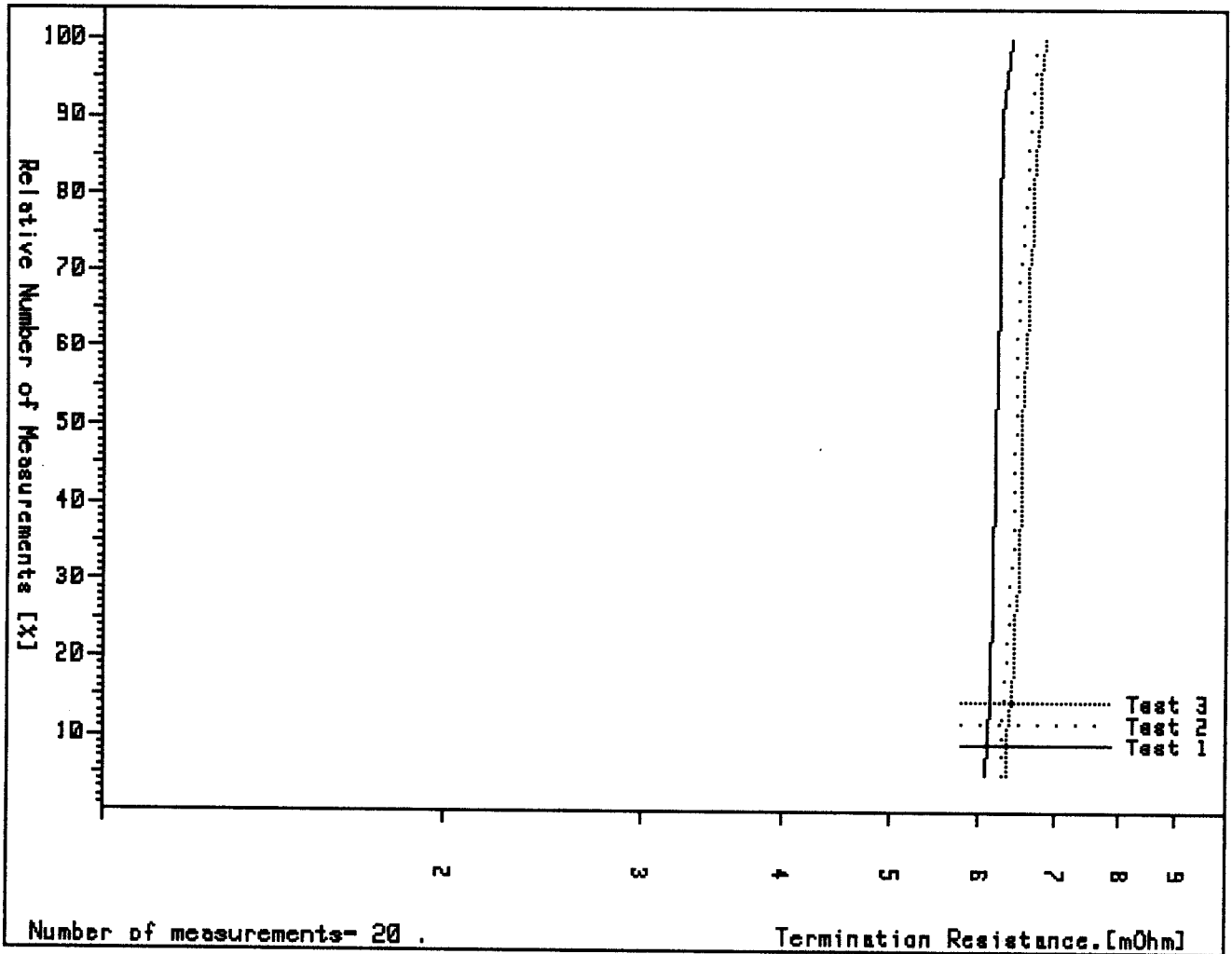


Product: MicroMaTch. FTE-MOW. (93.07.12)

Test 1 : Termination Resistance Initial.  
 Test 2 : Thermal Shock. -40°C / +105°C. 10 Cycles.  
 Test 3 : Vibration.  
 Group : 3  
 Lot : 2

All values in milliOhms

	Test 1	Test 2	delta R	Test 3	delta R
Max. :	6,40	6,73	0,47	6,88	0,58
Min. :	6,07	6,28	0,15	6,33	0,21
Mean :	6,21	6,48	0,27	6,58	0,37
StDv :	0,08	0,14	0,09	0,15	0,12





\*\*\*\*\*  
 Termination Resistances in milliOhms.  
 \*\*\*\*\*  
 Product Tested: MicroMaTch. FTE-MOW. (93.07.12)  
 -----

Col. Group	Lot	Test
-1-: 3	2	Termination Resistance Initial.
-2-: 3	2	Thermal Shock. -40°C / +105°C. 10 Cycles.
-3-: 3	2	Vibration.

-----

	-1-	-2-	-3-
01	6,07	6,32	6,55
02	6,18	6,45	6,65
03	6,30	6,66	6,88
04	6,15	6,47	6,51
05	6,29	6,49	6,59
06	6,20	6,49	6,63
07	6,25	6,57	6,68
08	6,16	6,36	6,40
09	6,26	6,43	6,53
10	6,11	6,28	6,36
11	6,25	6,72	6,81
12	6,12	6,28	6,33
13	6,22	6,36	6,43
14	6,17	6,51	6,57
15	6,34	6,62	6,71
16	6,20	6,39	6,49
17	6,24	6,47	6,53
18	6,21	6,63	6,72
19	6,40	6,73	6,80
20	6,19	6,43	6,45

-----

Max.:	6,40	6,73	6,88
Min.:	6,07	6,28	6,33
Mean:	6,21	6,48	6,58

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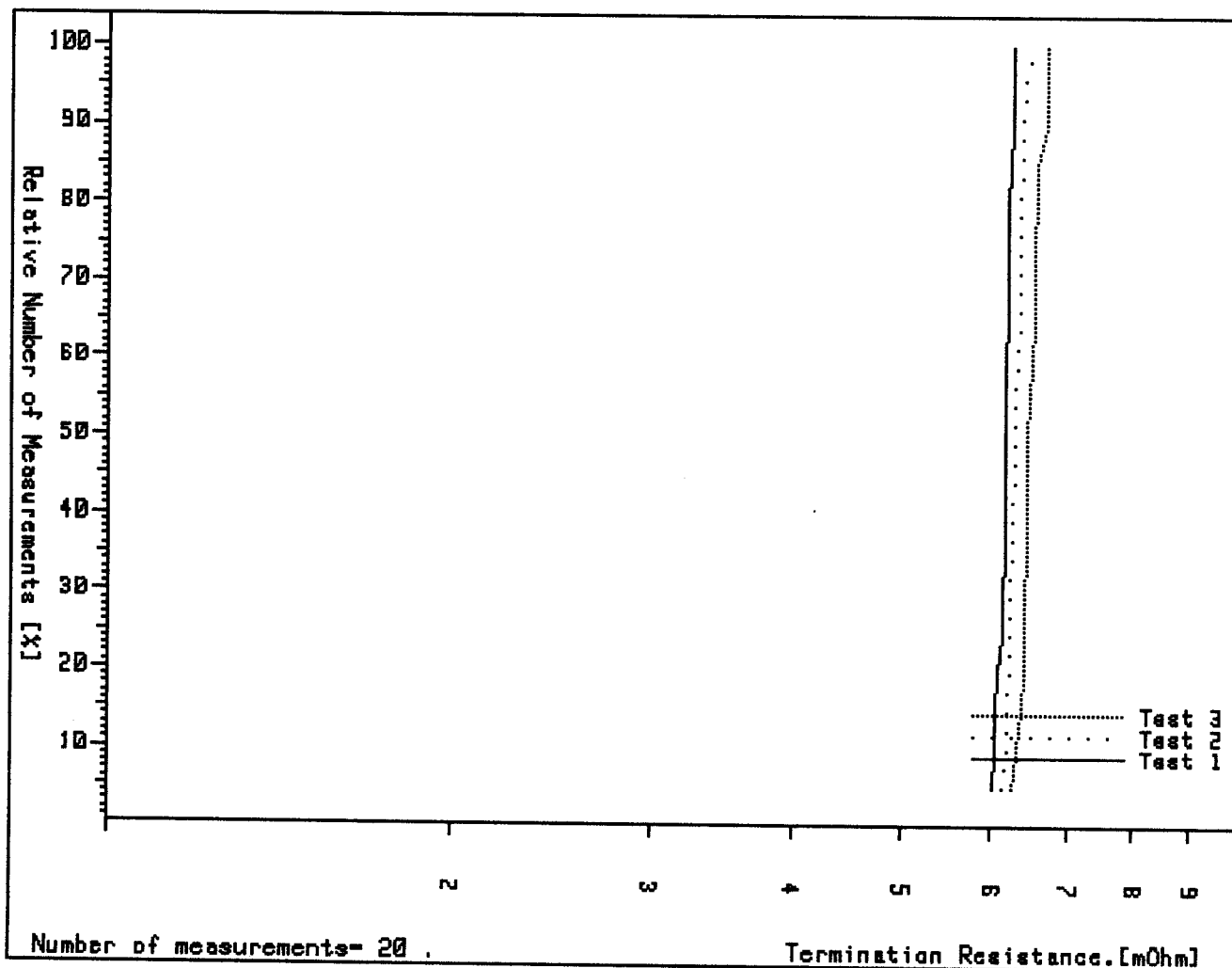
-----  
 Product: MicroMaTch. FTE-MOW. (93.07.12)  
 -----

Test 1 : Termination Resistance Initial.  
 Test 2 : Thermal Shock. -40°C / +105°C. 10 Cycles.  
 Test 3 : Vibration.  
 Group : 3  
 Lot : 3

----- All values in milliohms -----

	Test 1	Test 2	delta R	Test 3	delta R
Max. :	6,27	6,49	0,25	6,71	0,52
Min. :	6,02	6,14	0,06	6,26	0,21
Mean :	6,16	6,30	0,13	6,49	0,33
StDv :	0,07	0,09	0,05	0,12	0,09

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\*\*\*\*\*

Termination Resistances in milliOhms.

\*\*\*\*\*

Product Tested: MicroMaTch. FTE-MOW. (93.07.12)

Col. Group	Lot	Test
-1-: 3	3	Termination Resistance Initial.
-2-: 3	3	Thermal Shock. -40°C / +105°C. 10 Cycles.
-3-: 3	3	Vibration.

	-1-	-2-	-3-
01	6,02	6,27	6,54
02	6,20	6,42	6,54
03	6,25	6,36	6,47
04	6,05	6,14	6,26
05	6,17	6,34	6,41
06	6,06	6,18	6,40
07	6,27	6,49	6,69
08	6,06	6,20	6,32
09	6,20	6,34	6,49
10	6,17	6,31	6,44
11	6,22	6,37	6,57
12	6,17	6,36	6,57
13	6,20	6,26	6,45
14	6,14	6,24	6,42
15	6,15	6,22	6,39
16	6,17	6,30	6,43
17	6,16	6,22	6,43
18	6,18	6,28	6,69
19	6,25	6,35	6,71
20	6,19	6,29	6,54

Max.:	6,27	6,49	6,71
Min.:	6,02	6,14	6,26
Mean:	6,16	6,30	6,49

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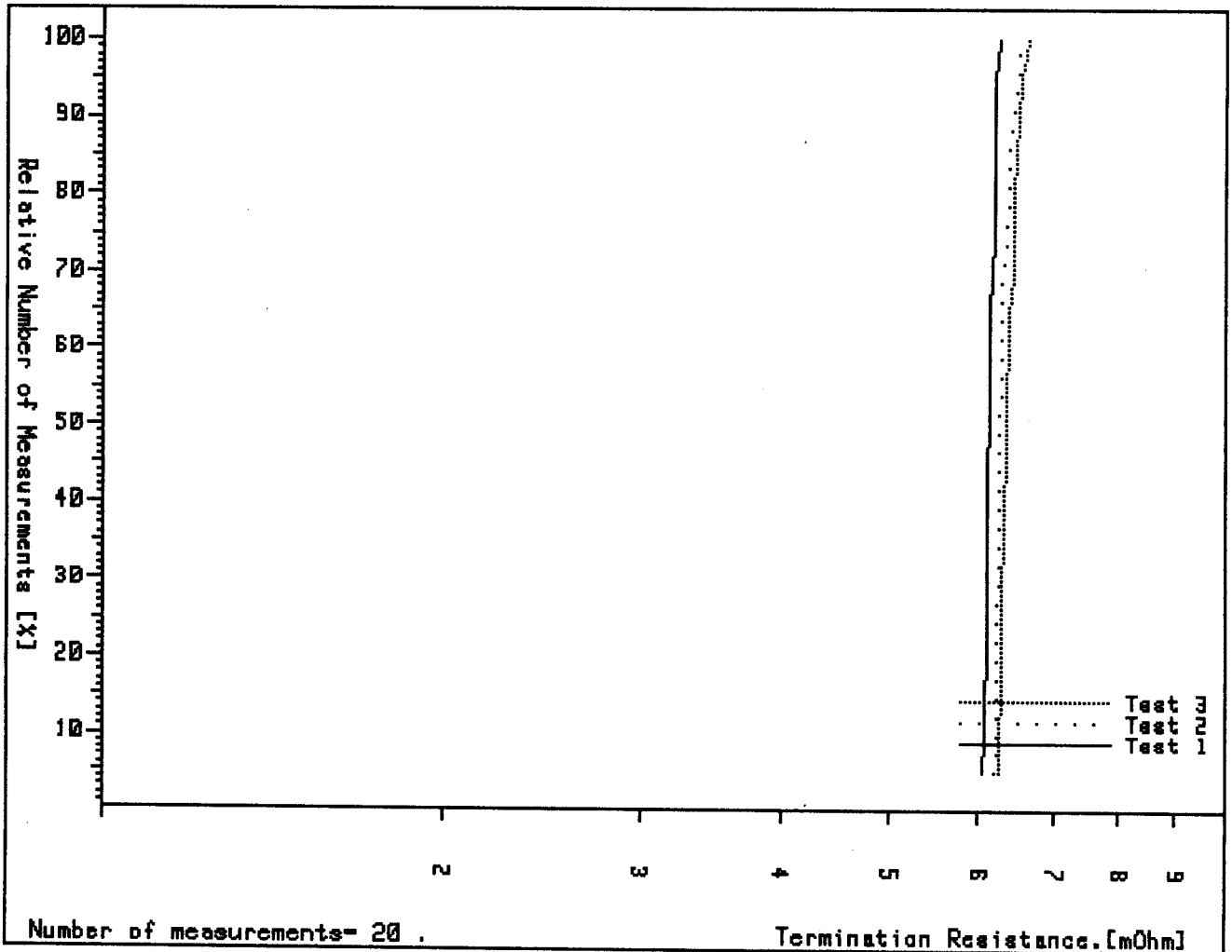
-----  
 Product: MicroMaTch. FTE-MOW. (93.07.12)  
 -----

Test 1 : Termination Resistance Initial.  
 Test 2 : Thermal Shock. -40°C / +105°C. 10 Cycles.  
 Test 3 : Vibration.  
 Group : 3  
 Lot : 4

----- All values in milliOhms -----

	Test 1	Test 2	delta R	Test 3	delta R
Max. :	6,25	6,50	0,38	6,62	0,41
Min. :	6,05	6,20	0,05	6,26	0,11
Mean :	6,14	6,30	0,17	6,38	0,24
StDv :	0,05	0,09	0,07	0,10	0,09

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Termination Resistances in milliOhms.

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Product Tested: MicroMaTch. FTE-MOW. (93.07.12)

Col. Group	Lot	Test
-1-: 3	4	Termination Resistance Initial.
-2-: 3	4	Thermal Shock. -40°C / +105°C. 10 Cycles.
-3-: 3	4	Vibration.

	-1-	-2-	-3-
01	6,09	6,20	6,30
02	6,11	6,49	6,52
03	6,19	6,29	6,35
04	6,09	6,30	6,33
05	6,25	6,50	6,62
06	6,09	6,30	6,36
07	6,20	6,35	6,44
08	6,10	6,24	6,28
09	6,09	6,23	6,26
10	6,12	6,27	6,37
11	6,20	6,25	6,31
12	6,05	6,23	6,44
13	6,16	6,28	6,37
14	6,12	6,26	6,47
15	6,15	6,23	6,30
16	6,11	6,22	6,29
17	6,20	6,39	6,53
18	6,19	6,44	6,44
19	6,13	6,37	6,36
20	6,10	6,26	6,27

Max.:	6,25	6,50	6,62
Min.:	6,05	6,20	6,26
Mean:	6,14	6,30	6,38

\*\*\*\*\*



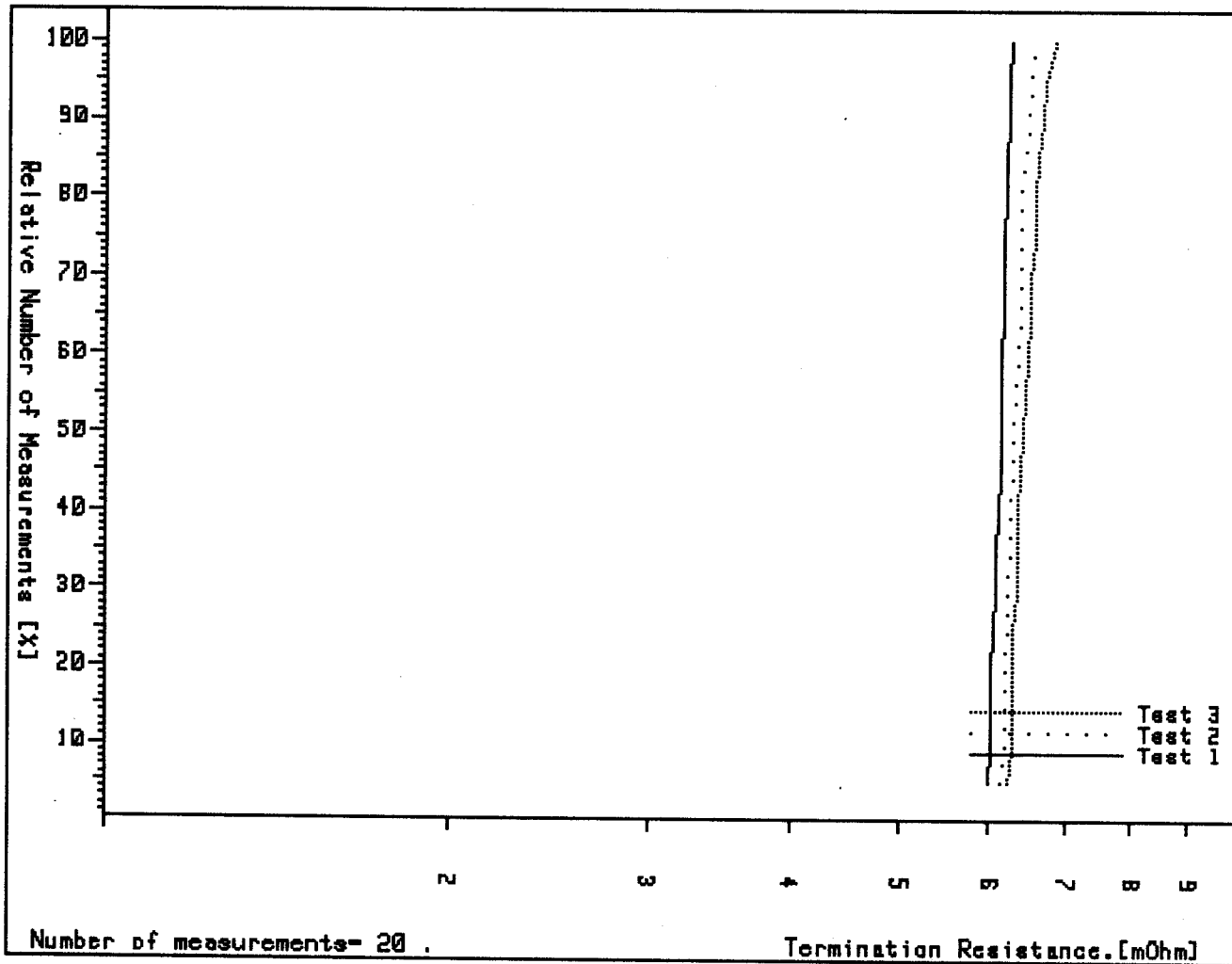
-----  
 Product: MicroMaTch. FTE-MOW. (93.07.12)  
 -----

Test 1 : Termination Resistance Initial.  
 Test 2 : Thermal Shock. -40°C / +105°C. 10 Cycles.  
 Test 3 : Vibration.  
 Group : 3  
 Lot : 5

----- All values in milliOhms -----

	Test 1	Test 2	delta R	Test 3	delta R
Max. :	6,26	6,56	0,37	6,84	0,58
Min. :	5,98	6,13	0,07	6,23	0,16
Mean :	6,12	6,32	0,20	6,45	0,33
StDv :	0,08	0,12	0,08	0,16	0,14

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Termination Resistances in milliOhms.

\*\*\*\*\*

Product Tested: MicroMaTch. FTE-MOW. (93.07.12)

Col. Group	Lot	Test
-1-: 3	5	Termination Resistance Initial.
-2-: 3	5	Thermal Shock. -40°C / +105°C. 10 Cycles.
-3-: 3	5	Vibration.

	-1-	-2-	-3-
01	5,98	6,24	6,56
02	6,14	6,37	6,59
03	6,15	6,32	6,50
04	6,00	6,28	6,34
05	6,16	6,30	6,39
06	6,13	6,50	6,56
07	6,23	6,37	6,48
08	6,07	6,24	6,35
09	6,14	6,21	6,29
10	6,18	6,38	6,42
11	6,05	6,13	6,23
12	6,06	6,19	6,28
13	6,16	6,27	6,34
14	6,02	6,19	6,28
15	6,11	6,43	6,65
16	6,02	6,22	6,29
17	6,22	6,34	6,43
18	6,17	6,39	6,51
19	6,26	6,56	6,84
20	6,18	6,49	6,70

Max.:	6,26	6,56	6,84
Min.:	5,98	6,13	6,23
Mean:	6,12	6,32	6,45

\*\*\*\*\*

**TESTGROUP: 4.**

Solderability with solderbath at 235°C.  
In accordance with IEC 68-2-20, test Ta.  
Ageing used: Dry Heat for 16 hours at 155°C.

No dewetting was detected on the functional area.

5 Test samples were tested.

**TESTGROUP: 5.**

Resistance to soldering heat with solderbath at 260°C.  
In accordance with IEC 68-2-20, test Tb, method 1A.  
Duration: 5 Seconds.

No functional damage was detected.

5 Test samples were tested.



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All values represented in NEWTONS.

\*\*\*\*\*

Product Tested: Micro-MaTch. MOW. (93.07.12)

Col. Group	Lot	Test
-1-: INI	1-5	Axial tensile strength. (Test group: 6.)
-2-: FINAL	1-5	Axial tensile strength. (Test group: 6.)
	-1-	-2-
01	343	346
02	375	267
03	369	333
04	360	330
05	375	308
Max.:	375	346
Min.:	343	267
Mean:	364,4	316,8

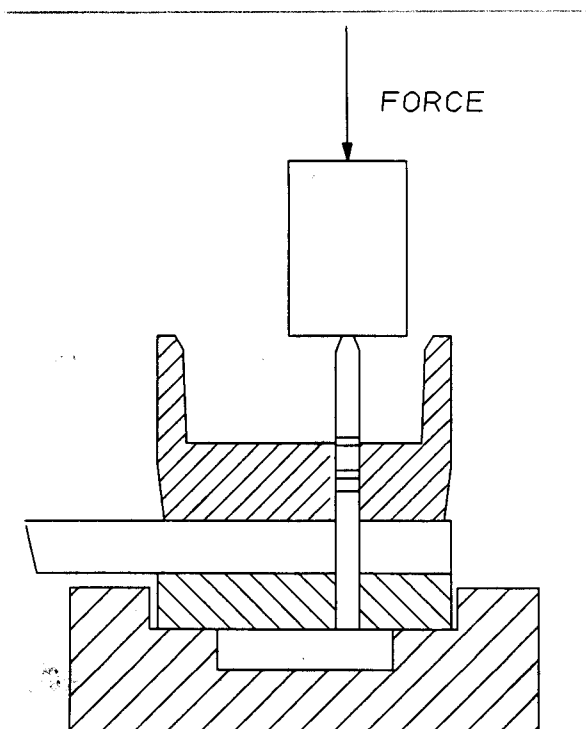
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**TESTGROUP 7: Contact Retention in Housing.**

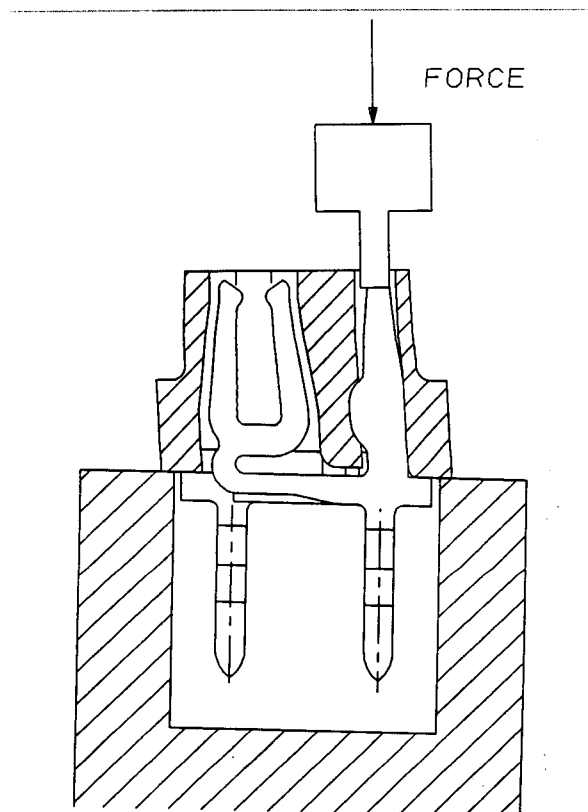
During 1 minute a force of 10 Newtons was placed on the individual contacts of the Female connector and the Male connector which were terminated onto ribbon cable.

5 Test samples were tested.

No dislodge of the contacts was observed.



Contact retention in housing Male connector.



Contact retention in housing Female connector.

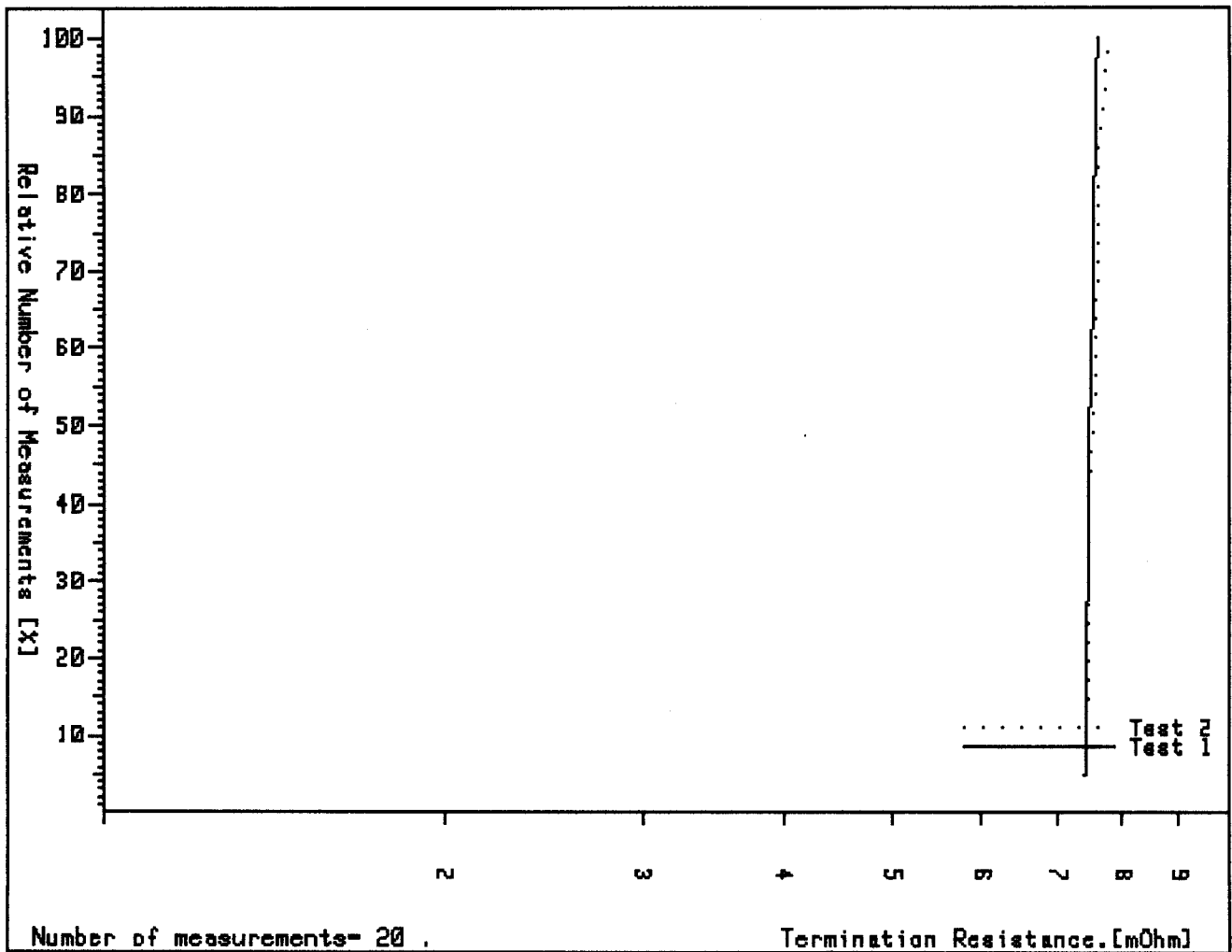


Product: MicroMaTch. MOB-FTE. (93.07.11).

Test 1 : Termination Resistance Initial.  
 Test 2 : 500 Hours Heat Age and Current cycling.  
 Group : 8  
 Lot : 1

All values in milliOhms

	Test 1	Test 2	delta R
Max. :	7,59	7,75	0,19
Min. :	7,42	7,40	-0,04
Mean :	7,50	7,54	0,05
StDv :	0,06	0,10	0,06





\*\*\*\*\*  
 Termination Resistances in milliOhms.  
 \*\*\*\*\*  
 Product Tested: MicroMaTch. MOB-FTE. (93.07.11).  
 -----

Col. Group	Lot	Test
-1-: 8	1	Termination Resistance Initial.
-2-: 8	1	500 Hours Heat Age and Current cycling.

-----

	-1-	-2-
01	7,45	7,47
02	7,48	7,46
03	7,46	7,47
04	7,57	7,69
05	7,55	7,56
06	7,42	7,46
07	7,43	7,44
08	7,47	7,44
09	7,47	7,50
10	7,43	7,42
11	7,44	7,40
12	7,57	7,61
13	7,49	7,56
14	7,59	7,72
15	7,53	7,59
16	7,54	7,59
17	7,44	7,52
18	7,50	7,62
19	7,54	7,57
20	7,56	7,75

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Max.:	7,59	7,75
Min.:	7,42	7,40
Mean:	7,50	7,54

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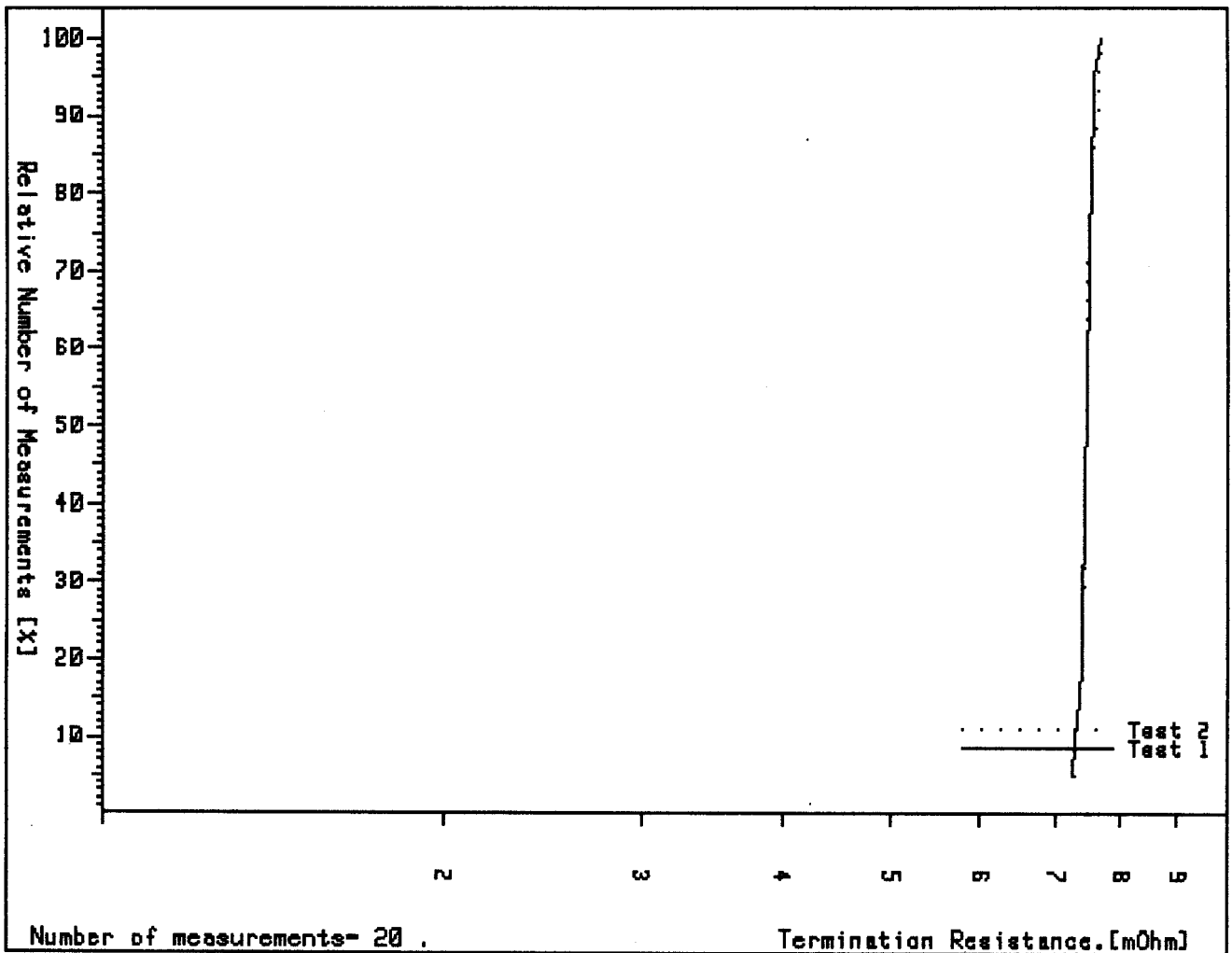


Product: MicroMatCh. MOB-FTE. (93.07.11).

Test 1 : Termination Resistance Initial.  
 Test 2 : 500 Hours Heat Age and Current cycling.  
 Group : 8  
 Lot : 2

All values in milliohms

	Test 1	Test 2	delta R
Max. :	7,69	7,71	0,09
Min. :	7,25	7,27	-0,12
Mean :	7,45	7,46	0,01
StDv :	0,10	0,11	0,06





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Termination Resistances in milliOhms.

\*\*\*\*\*

Product Tested: MicroMaTch. MOB-FTE. (93.07.11).

Col. Group	Lot	Test
-1-: 8	2	Termination Resistance Initial.
-2-: 8	2	500 Hours Heat Age and Current cycling.
	-1-	-2-
01	7,44	7,41
02	7,51	7,49
03	7,53	7,41
04	7,36	7,45
05	7,39	7,40
06	7,25	7,35
07	7,42	7,38
08	7,42	7,47
09	7,38	7,28
10	7,44	7,45
11	7,48	7,45
12	7,58	7,64
13	7,54	7,53
14	7,69	7,71
15	7,27	7,27
16	7,55	7,64
17	7,49	7,46
18	7,37	7,41
19	7,42	7,42
20	7,47	7,54
Max.:	7,69	7,71
Min.:	7,25	7,27
Mean:	7,45	7,46

\*\*\*\*\*

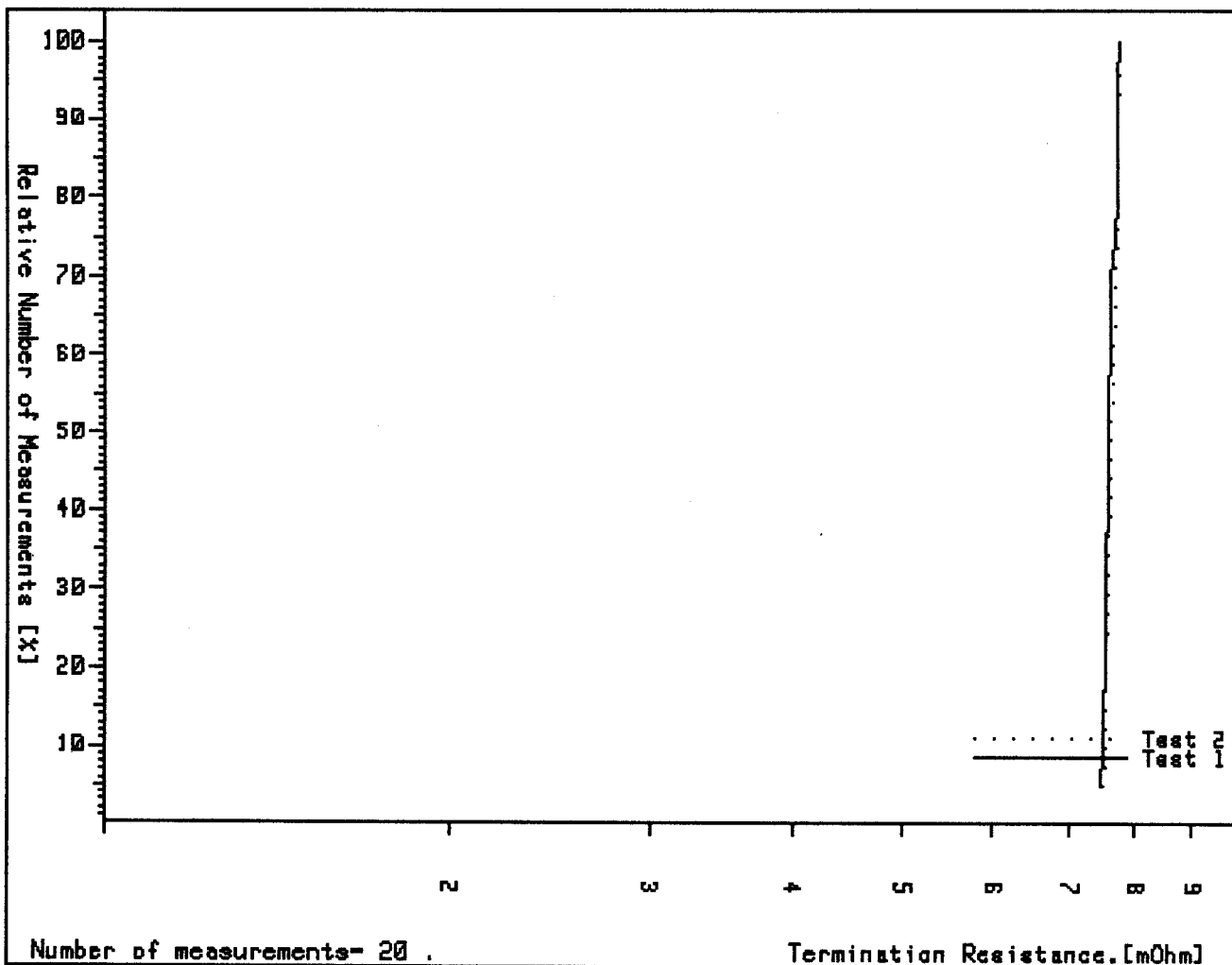


Product: MicroMaTch. MOB-FTE. (93.07.11).

Test 1 : Termination Resistance Initial.  
 Test 2 : 500 Hours Heat Age and Current cycling.  
 Group : 8  
 Lot : 3

----- All values in milliohms -----

	Test 1	Test 2	delta R
Max. :	7,74	7,75	0,18
Min. :	7,45	7,51	-0,04
Mean :	7,60	7,63	0,03
StDv :	0,09	0,08	0,05





\*\*\*\*\*

Termination Resistances in milliOhms.

\*\*\*\*\*

Product Tested: MicroMaTch. MOB-FTE. (93.07.11).

Col. Group	Lot	Test
-1-: 8	3	Termination Resistance Initial.
-2-: 8	3	500 Hours Heat Age and Current cycling.
	-1-	-2-
01	7,71	7,73
02	7,58	7,65
03	7,62	7,64
04	7,55	7,57
05	7,72	7,68
06	7,59	7,61
07	7,48	7,52
08	7,52	7,55
09	7,45	7,51
10	7,55	7,62
11	7,53	7,57
12	7,70	7,70
13	7,72	7,75
14	7,68	7,71
15	7,54	7,53
16	7,57	7,75
17	7,58	7,56
18	7,60	7,68
19	7,51	7,59
20	7,74	7,72

-----

Max.:	7,74	7,75
Min.:	7,45	7,51
Mean:	7,60	7,63

\*\*\*\*\*

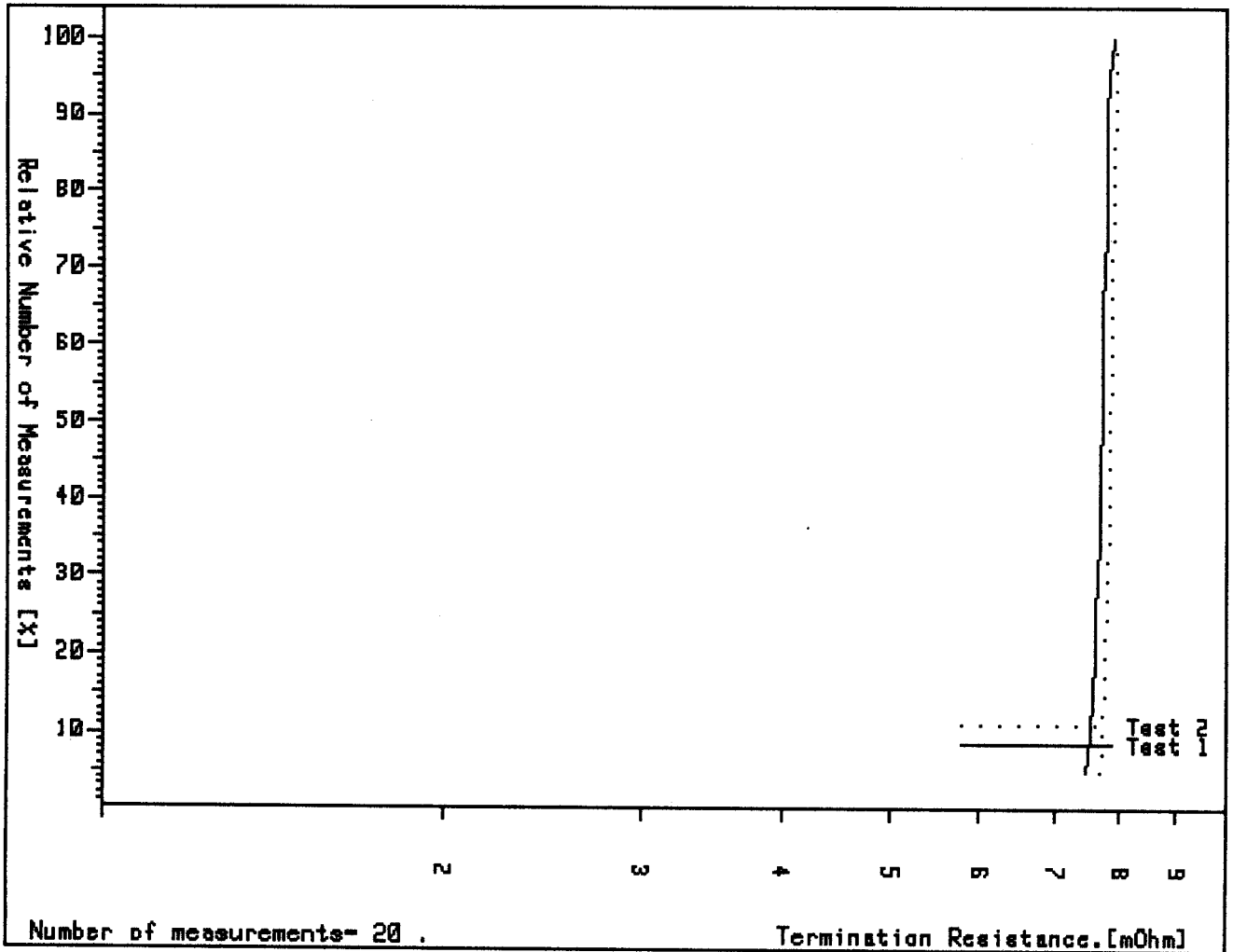


Product: MicroMaTch. MOB-FTE. (93.07.11).

Test 1 : Termination Resistance Initial.  
Test 2 : 500 Hours Heat Age and Current cycling.  
Group : 8  
Lot : 4

All values in milliohms

	Test 1	Test 2	delta R
Max. :	7,92	7,96	0,26
Min. :	7,47	7,67	0,03
Mean :	7,70	7,85	0,14
StDv :	0,11	0,08	0,07





\*\*\*\*\*

Termination Resistances in milliOhms.

\*\*\*\*\*

Product Tested: MicroMaTch. MOB-FTE. (93.07.11).

Col. Group	Lot	Test
-1-: 8	4	Termination Resistance Initial.
-2-: 8	4	500 Hours Heat Age and Current cycling.

	-1-	-2-
01	7,47	7,67
02	7,55	7,76
03	7,64	7,74
04	7,69	7,89
05	7,72	7,83
06	7,61	7,86
07	7,69	7,78
08	7,74	7,83
09	7,79	7,86
10	7,84	7,88
11	7,60	7,77
12	7,79	7,92
13	7,73	7,84
14	7,71	7,96
15	7,72	7,85
16	7,81	7,96
17	7,81	7,88
18	7,92	7,96
19	7,68	7,90
20	7,55	7,81

Max.:	7,92	7,96
Min.:	7,47	7,67
Mean:	7,70	7,85

\*\*\*\*\*



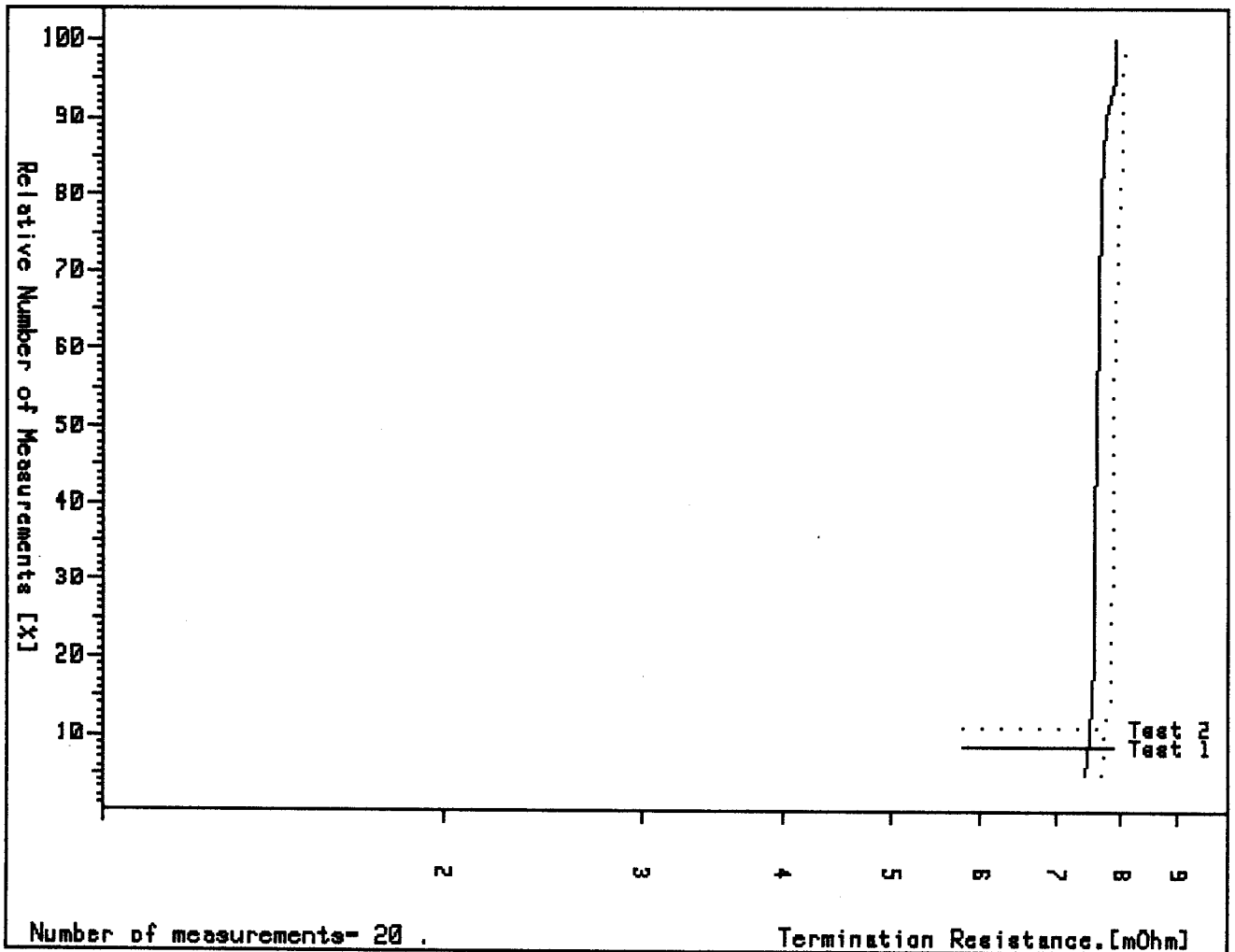
-----  
 Product: MicroMaTch. MOB-FTE. (93.07.11).  
 -----

Test 1 : Termination Resistance Initial.  
 Test 2 : 500 Hours Heat Age and Current cycling.  
 Group : 8  
 Lot : 5

----- All values in milliOhms -----

	Test 1	Test 2	delta R
Max. :	7,92	8,08	0,46
Min. :	7,44	7,67	0,10
Mean :	7,64	7,90	0,26
StDv :	0,12	0,10	0,11

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\*\*\*\*\*  
 Termination Resistances in milliOhms.  
 \*\*\*\*\*  
 Product Tested: MicroMaTch. MOB-FTE. (93.07.11).  
 -----

Col. Group	Lot	Test
-1-: 8	5	Termination Resistance Initial.
-2-: 8	5	500 Hours Heat Age and Current cycling.
	-1-	-2-
01	7,49	7,70
02	7,61	7,83
03	7,65	7,94
04	7,44	7,87
05	7,53	7,91
06	7,56	7,89
07	7,56	7,67
08	7,69	7,83
09	7,56	7,88
10	7,61	7,89
11	7,61	7,82
12	7,92	8,02
13	7,71	7,86
14	7,90	8,02
15	7,65	8,00
16	7,76	8,08
17	7,57	7,87
18	7,68	7,96
19	7,55	8,01
20	7,65	7,86
Max.:	7,92	8,08
Min.:	7,44	7,67
Mean:	7,64	7,90

\*\*\*\*\*



**TESTGROUP 9:**

Insulation resistance connector assembly:

All tested connector assemblies had an insulation resistance of > 1000 Mohm initial, after climatic sequence and after rapid change of temperature.

5 Test samples were tested.

Voltage proof:

All tested connector assemblies passed the voltage proof test successful initial, after climatic sequence and rapid change of temperature.

Note 1: Connector assembly: 1 Female connector +  
1 Male connector +  
1 Ribboncable.

Note 2: For measurement purposes the ribboncable was one end splitted into even and odd conductors.  
The even conductors were soldered together and the odd conductors were soldered together.

The even conductors were used as one termination and the odd conductors were used as the other termination of the testvoltage for insulation resistance measurement and the testvoltage for voltage proof tests.

5 Test samples were tested.