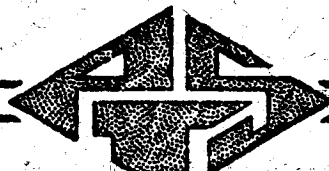


Pan Technical Systems, Inc.



N 66-16206

FACILITY FORM 802

(ACCESSION NUMBER)	(THRU)
481	1
(PAGES)	(CODE)
CP 69903	09
(NASA CR OR TMX OR AD NUMBER)	(CATEGORY)

GPO PRICE \$

CFSTI PRICE(S) \$

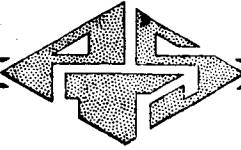
Hard copy (HC) 7.81

Microfiche (MF) 2.50

ff 653 July 65

Montrose, California

Pan Technical Systems,



. Inc.

CITRUS 6-5111
CHAPMAN 5-7271

3722 PARK PLACE
MONTROSE, CALIFORNIA

17 September 1965



ELECTRONIC COMPONENT PARTS
RELIABILITY EVALUATION TEST
CERAMIC CAPACITORS
TUBULAR AND FLAT
TEST PROCEDURE No. 152.20-02

108

FINAL REPORT
ON
ELECTRONIC COMPONENT PARTS
RELIABILITY EVALUATION TEST
CERAMIC CAPACITORS
TUBULAR AND FLAT
TEST PROCEDURE No. 152.20-02

TO
JET PROPULSION LABORATORY

17 SEPTEMBER 1965

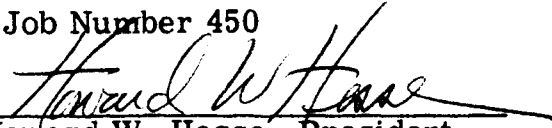
By


Henry F. Schoemehl

on

Contract Number 951040

Job Number 450

Approved By 
Howard W. Hesse, President

PAN TECHNICAL SYSTEMS, INC.

This work was performed for the Jet Propulsion Laboratory, California Institute of Technology, pursuant to a subcontract issued under Prime Contract NAS7-100 between the California Institute of Technology and the United States of America represented by the National Aeronautics and Space Administration.

CONTENTS

- I. ABSTRACT**
 - IDEP REPORTS**
- II. INTRODUCTION**
- III. DESCRIPTION OF TEST ITEMS**
- IV. TEST DESIGN**
- V. MEASUREMENT PROCEDURE**
- VI. ENVIRONMENTAL TEST PROCEDURES**
- VII. LIFE TEST PROCEDURE**
- VII. DATA RECORDING AND VERIFICATION PROCEDURES**
- IX. TEST RESULTS**
- X. DESCRIPTION OF PARAMETER CHANGES WITH ENVIRONMENTAL AND LIFE TESTS**
- XI. RELIABILITY ESTIMATES AND COMPARISONS**
- XII. CONCLUSIONS**
 - Appendix I - Catastrophic Failures**
 - Appendix II - Parametric Failures**
 - Appendix III - Computed Statistics Sheets**
 - Appendix IV - Tabulating Codes and Serial Number Cross Reference List**

I. ABSTRACT
GENERAL

This report describes the tests performed and results obtained in evaluation of 10 types of Miniature Ceramic Capacitors not currently covered by Military Specifications to a series of environmental and operating stresses. All of these capacitors represent "advanced state-of-the-art" parts with respect to size vs. capacitance value. The purpose of the test is shown below:

1. To accurately determine the suitability of these types of parts for spacecraft applications.
2. To determine differences, if any, in reliability between various manufacturers, both as a function of environmental stresses and electrical and thermal stress levels.
3. To determine the validity of a Screen or Burn-In on subsequent parts performance.
4. To determine or verify the existence of temperature and voltage acceleration factors during life testing.
5. To develop, in addition to attributes data, information such as "passed" or "failed" statistical data relating to the parametric behavior of the parts throughout the test series.

The IDEP summary sheets listed as Section II of this abstract provide an account of this test insofar as parts tested, tests performed and results obtained based upon catastrophic failures alone. In addition, the following data is presented for parametric failures, which are defined as follows:

- (a) Capacitance - Initial Measurements in excess of $\pm 30\%$ of nominal value, or a change of 15% between successive readings.
- (b) Dissipation Factor - Initial Measurements in excess of 110% of a manufacturer's limit, or a change in consecutive readings of 100% or greater, or a post environmental reading of 125% of a manufacturers specification.

- (c) Insulation Resistance - Initial Measurements of less than 1000 megohms, or a change greater than 1000 x between two consecutive readings or a post environmental limit of less than 10 megohms.

FAILURE CHART

	Screen	Vib- ration	Mech Shock	Therm Shock	Moist Res	Life	Total Fail	Life Only	Total
Aerovox MC605104K	0	0	0	0	0	0	0	1	1
CER CK2R104K	3	7	1	0	1	24	36	8	8
Gulton CK16M104K	1	1	0	0	0	2	4	3	3
Gulton CN05M105K	3	2	0	1	1	29	36	9	9
King KC80BW104K	1	0	0	0	1	1	3	2	2
Scionics SCM30D104K	3	5	1	0	21	56	86	10	10
EMC EK200R104K	9	3	4	2	0	15	33	6	6
Vitramon VL02BK103K	0	8	1	7	0	17	33	7	7
Vitramon VK30BX104K	0	1	0	0	0	14	15	5	5
Westcap B758BX104K	0	2	1	0	4	4	11	4	4

The above chart demonstrates definite differences between manufacturers.

The computed failure rates, based upon all life test groups ranges from .78% per 1000 hours (90% confidence) for Aerovox parts to 41% per 100 hours (90% confidence) for Scionics parts with other manufacturers falling between.

The current screening specification for these types of parts is shown to be inadequate for reliability prediction.

Complete data is developed for Temperature Coefficients of all parameters as well as values of Destructive Voltage Breakdown.

GENERAL REPORT SUMMARY SHEET

1. COMPONENT/PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2. PROGRAM OR WEAPON SYSTEM Mariner		3. TEST COMPL. 7 30 85	
4. ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors Tubular and Flat		5. ORIGINATOR'S REPORT NO.		DAY MO. YR.	
		6. TEST TYPE, ETC. Evaluation to JPL Requirements		REPT. COMPL. 8 30 85	
7. THIS TEST (SUPERSEDES) (SUPPLEMENT) REPORT NO. Supplements 152, 20-50, 40-E4					

8. OUTLINE TABLE OF CONTENTS, SUMMARY, OR EQUIPMENT DESCRIPTION:

SUMMARY:

This report gives the results of testing 10 types of Tubular and Flat Ceramic Capacitors from eight manufacturers.

170 parts of each type were divided into five groups and subjected to a series of tests which were identical for each type tested. Group I testing consisted of a burn-in followed by a series of environmental exposures. Group II was subjected to the same environmental exposures but not "burned-in". Group III was used for determination of Temperature Stability and Terminal Strength. Group IV was subjected to a high voltage breakdown test. Group V was subjected only to the initial measurements and life test.

At the conclusion of the above, Groups I, II and V were combined to form a 6 cellmaster operating at two temperature and three voltage levels.

TABLE OF CONTENTS

Summary

Description of Test Plan

Capacitors tested

Design of Experiment

Test Procedures and Measuring Equipment

Definition of Failures

Results by Manufacturers

Aerovox -01

Chem-Electro -02

Gulton -03

Gulton -04

King Electronics -05

Scionics -06

Electro Materials -07

Vitramor -08

Vitramor -09

West -10

REPRODUCTION OF QUALITY OF THIS MATERIAL



REPORT SUMMARY SHEET

1 of 2

1. COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2. PROGRAM OR WEAPON SYSTEM Mariner		3. TEST COMPL. DAY MO YR 7 30 65	
4. ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5. ORIGINATOR'S REPORT NO. 152.20-02		REPT. COMPL. DAY MO YR 8 30 65	
6. TEST TYPE, ETC. Evaluation to JPL Requirements					

 7. THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO: **Supplements 152.20.50.40-E4**

ITEM	8A. PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO.	11. IND./GOV. STD. NO.	12. TOTAL TESTED
1	Capacitor 0.1 mfd +10% 50V Radial Lead Flat Ceramic	Aerovox	MC605104RK		170
2					
3					
4					

(OVER)

13. INTERNAL SPECS. ETC. REQ'D TO UTILIZE REPT. ENCL		SENT WITH REPORT NO.		14. MIL. SPECS./STDS. REFERENCED IN 15C	
A JPL Test Procedure				D MIL-STD-202C	
B 152.20-02				E	
C				F	

ITEM	15A. TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO TESTED	G NO FAILED
all	Visual Inspection	X	JPL 152.20-02	Examine for Defects 3X Magnification	170	0
all	Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	0
I	Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	50	0
II	Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	100	0
II	Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows/ Axis	100	0
II	Thermal Shock	X	"	-55°C to +125°C 10 Cycles	100	0
II	Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	100	0
II V	Life	X	"	2000 Hours @ 50V @ 85°C	75	0
II V	Life	X	"	2000 Hours @ 50V @ 125°C	15	0

(OVER)

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

- Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.
- Failure definition is open, short or inability to sustain voltage on Life Test.

(OVER)

17. TESTED BEYOND VENDOR CATALOG SPECIFICATIONS ☒	18. VENDOR INFORMED OF TEST RESULT BY: LETTER ☐ CY OF REPLY ☒ ORAL ☐	19. SIGNED	20. CONTRACTOR Pan Technical Systems, Inc	SUBCONTRACTOR

21. REPT. NO. 152.20.50.40-E4-01C

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

(3)

(3) Tested to Destruction values of breakdown voltage ranged from 740 volts to 2500 volts.

21. REPT

NO: 152.20.50.40-F4-01C

REPORT SUMMARY SHEET

1 of 2

1. COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2. PROGRAM OR WEAPON SYSTEM Mariner		3. DAY MO. YR. TEST COMPL 7 30 65 REPT COMPL 8 30 65	
4. ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5. ORIGINATOR'S REPORT NO. 152.20-02		6. TEST TYPE, ETC. Evaluation to JPL Requirements	

7. THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO: Supplements 152.20.50.40-E4					
8A. PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO.	11. IND. GOV. STD. NO.	12. TOTAL TESTED	
1. Radial lead flat Ceramic Capacitor 0.1 mfg $\pm 10\%$ 200V	Chem-Electro Research	CK2R104K		170	
2.					
3.					
4.					

13. INTERNAL SPECS. ETC. REQ'D TO UTILIZE REPT	ENCL	SENT WITH REPORT NO.	14. MIL. SPECS./STDS. REFERENCED IN 15C
A. JPL Test Procedure			D. MIL-STD-202C
B. 152.20-02			E.
C.			F.

15A. TEST OR ENVIRONMENT	C. PER SPEC	D. SPEC. PARAGRAPH/METHOD/CONDITION	E. TEST LEVELS, DURATION AND OTHER DETAILS	F. NO. TESTED	G. NO. FAILED
all Visual Inspection	X	JPL 152.20-02	Examine for Defects 3X Magnification	170	0
all Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	0
I Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	50	3
II Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	97	7
III Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows/ Axis	90	1
II Thermal Shock	X	"	-55°C to +125°C 10 Cycles	89	0
II Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	89	1
II V Life	X	"	2000 Hours @ 50V @ 85°C	71	11
II V Life	X	"	2000 Hours @ 50V @ 125°C	15	3

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.

(2) Failure definition is open, short or inability to sustain voltage on Life Test.

17. TESTED BEYOND VENDOR CATALOG SPECIFICATIONS	YES ☒ NO ☐	18. VENDOR INFORMED OF TEST RESULT BY LETTER ☐ ORAL ☒	19. SIGNED	20. CONTRACTOR	SUBCONTRACTOR
					Pan Technical Systems, Inc.

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

QTY	8A PART TYPE, SIZE, RATING, LOT, ETC
10	RESISTOR 10K OHM 1% 1/4W
10	CAPACITOR 100UF 50V
10	TRANSISTOR 2N2222
10	DIP SW 1P
10	LED RED
10	BATTERY 9V
10	RELAY 12VDC
10	DIODE 1N4148
10	IC 74LS00
10	IC 74LS04
10	IC 74LS161
10	IC 74LS162
10	IC 74LS163
10	IC 74LS164
10	IC 74LS165
10	IC 74LS166
10	IC 74LS167
10	IC 74LS168
10	IC 74LS169
10	IC 74LS170
10	IC 74LS171
10	IC 74LS172
10	IC 74LS173
10	IC 74LS174
10	IC 74LS175
10	IC 74LS176
10	IC 74LS177
10	IC 74LS178
10	IC 74LS179
10	IC 74LS180
10	IC 74LS181
10	IC 74LS182
10	IC 74LS183
10	IC 74LS184
10	IC 74LS185
10	IC 74LS186
10	IC 74LS187
10	IC 74LS188
10	IC 74LS189
10	IC 74LS190
10	IC 74LS191
10	IC 74LS192
10	IC 74LS193
10	IC 74LS194
10	IC 74LS195
10	IC 74LS196
10	IC 74LS197
10	IC 74LS198
10	IC 74LS199
10	IC 74LS200
10	IC 74LS201
10	IC 74LS202
10	IC 74LS203
10	IC 74LS204
10	IC 74LS205
10	IC 74LS206
10	IC 74LS207
10	IC 74LS208
10	IC 74LS209
10	IC 74LS210
10	IC 74LS211
10	IC 74LS212
10	IC 74LS213
10	IC 74LS214
10	IC 74LS215
10	IC 74LS216
10	IC 74LS217
10	IC 74LS218
10	IC 74LS219
10	IC 74LS220
10	IC 74LS221
10	IC 74LS222
10	IC 74LS223
10	IC 74LS224
10	IC 74LS225
10	IC 74LS226
10	IC 74LS227
10	IC 74LS228
10	IC 74LS229
10	IC 74LS230
10	IC 74LS231
10	IC 74LS232
10	IC 74LS233
10	IC 74LS234
10	IC 74LS235
10	IC 74LS236
10	IC 74LS237
10	IC 74LS238
10	IC 74LS239
10	IC 74LS240
10	IC 74LS241
10	IC 74LS242
10	IC 74LS243
10	IC 74LS244
10	IC 74LS245
10	IC 74LS246
10	IC 74LS247
10	IC 74LS248
10	IC 74LS249
10	IC 74LS250
10	IC 74LS251
10	IC 74LS252
10	IC 74LS253
10	IC 74LS254
10	IC 74LS255
10	IC 74LS256
10	IC 74LS257
10	IC 74LS258
10	IC 74LS259
10	IC 74LS260
10	IC 74LS261
10	IC 74LS262
10	IC 74LS263
10	IC 74LS264
10	IC 74LS265
10	IC 74LS266
10	IC 74LS267
10	IC 74LS268
10	IC 74LS269
10	IC 74LS270
10	IC 74LS271
10	IC 74LS272
10	IC 74LS273
10	IC 74LS274
10	IC 74LS275
10	IC 74LS276
10	IC 74LS277
10	IC 74LS278
10	IC 74LS279
10	IC 74LS280
10	IC 74LS281
10	IC 74LS282
10	IC 74LS283
10	IC 74LS284
10	IC 74LS285
10	IC 74LS286
10	IC 74LS287
10	IC 74LS288
10	IC 74LS289
10	IC 74LS290
10	IC 74LS291
10	IC 74LS292
10	IC 74LS293
10	IC 74LS294
10	IC 74LS295
10	IC 74LS296
10	IC 74LS297
10	IC 74LS298
10	IC 74LS299
10	IC 74LS300
10	IC 74LS301
10	IC 74LS302
10	IC 74LS303
10	IC 74LS304
10	IC 74LS305
10	IC 74LS3

15A	TEST OR ENVIRONMENT

III Temperature Coefficient

IV Voltage Breakdown

(3)

(3) Tested to Destruction values of breakdown voltage ranged from 940volts to 1370 volts.

21. REPT.
NO152. 20. 50. 40-E4-02CH

REPORT SUMMARY SHEET

1 of 2

1 COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2 PROGRAM OR WEAPON SYSTEM Mariner		3. DAY MO YR TEST COMPL 7 30 65 REPT COMPL 8 30 65	
4 ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5 ORIGINATOR'S REPORT NO. 152.20-02		6 TEST TYPE, ETC. Evaluation to JPL Requirements	

7 THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO: Supplements 152.20.50.40-E4					
8A PART TYPE, SIZE, RATING, LOT, ETC	9 VENDOR	10 VENDOR PART NO.	11 IND. GOV. STD. NO.	12 TOTAL TESTED	
1 Radial Lead Flat Ceramic Capacitor 0.1 mfg $\pm 10\%$ 50V	Gulton	CK16M104K		170	
2					
3					
4					

13 INTERNAL SPECS. ETC. REQ'D TO UTILIZE REPT. ENCL	SENT WITH REPORT NO.	14 MIL. SPECS. STDS. REFERENCED IN 15C
A JPL Test Procedure		D MIL-STD-202C
B 152.20-02		E
C		F

15A TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO. TESTED	G NO. FAILED
all Visual Inspection	X	JPL 152.20-02	Examine for Defects 3X Magnification	170	0
all Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	1
I Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	49	0
I II Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	99	1
I II Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows/ Axis	98	1
I II Thermal Shock	X	"	-55°C to +125°C 10 Cycles	97	0
I II Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	97	0
I II V Life	X	"	2000 Hours @ 50V @ 85°C	74	0
I II V Life	X	"	2000 Hours @ 50V @ 125°C	14	2

16 SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.

(2) Failure definition is open, short or inability to sustain voltage on Life Test.

17 TESTED BEYOND VENDOR CATALOG SPECIFICATIONS	18 VENDOR INFORMED OF TEST RESULT BY LETTER ☒ CY OF REPT ☒ ORAL ☐	19 SIGNED	20 CONTRACTOR	SUBCONTRACTOR
				Pan Technical Systems, Inc

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

21 REPT.

NO 152.20.50.40-E4-03CH

7. QTY	8A. PART TYPE, SIZE, RATING, LOT, ETC	9. VENDOR	10. VENDOR PART NO	11. IND GOV STD NO	12. TOTAL TESTED
5	Radial Lead Flat Ceramic Capacitors	Gulton	CK16M104K		170
6					
7					
8					

[illegible]

(3)

16 SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(3) Tested to Destruction values of breakdown voltage ranged from 760 volts to 1260 volts.

21 REPT
NO 152. 20. 50. 40-E4-03CH



REPORT SUMMARY SHEET

1 of 2

1 COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2 PROGRAM OR WEAPON SYSTEM Mariner		3 DAY MO YR TEST COMPL 7 30 65 REPT COMPL 8 30 65	
4 ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5 ORIGINATOR'S REPORT NO 152.20-02		6 TEST TYPE, ETC Evaluation to JPL Requirements	

7 THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO: Supplements 152.20-50.40-E4					
8A PART TYPE, SIZE, RATING, LOT, ETC	9 VENDOR	10 VENDOR PART NO	11 IND GOV STD NO	12 TOTAL TESTED	
1 Axial Lead Flat Ceramic Capacitor 1.0 mfd $\pm 10\%$ 100V	Gulton	CN05M105K		170	
2					
3					
4					

13 INTERNAL SPECS. ETC REQ'D TO UTILIZE REPT ENCL		SENT WITH REPORT NO.		14 MIL. SPECS. / STDS REFERENCED IN 15C	
A JPL Test Procedure				D MIL-STD-202C	
B 152.20-02				E	
C				F	

15A TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH / METHOD / CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO TESTED	G NO FAILED
all Visual Inspection	X	JPL 152.20-02	Examine for Defects 3X Magnification	170	0
all Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	2
I Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	50	3
II Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	97	2
III Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows / Axis	95	0
II Thermal Shock	X	"	-55°C to +125°C 10 Cycles	95	1
II Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	94	1
II V Life	X	"	2000 Hours @ 50V @ 85°C	71	9
II V Life	X	"	2000 Hours @ 50V @ 125°C	14	3

16 SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:	
(1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.	
(2) Failure definition is open, short or inability to sustain voltage on Life Test.	

17 TESTED BEYOND VENDOR CATALOG SPECIFICATIONS	18 VENDOR INFORMED OF TEST RESULT BY LETTER CY OR REPT ORAL	19 SIGNED	20 CONTRACTOR	SUBCONTRACTOR
YES ☒	LETTER ☐ CY OR REPT ☒ ORAL ☐			Pan Technical Systems, Inc

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

8A PART TYPE, SIZE, RATING, LOT, ETC	9. VENDOR	10. VENDOR PART NO	11 IND GOV STD NO	12 TOTAL TESTED
5 Axial Lead Flat Ceramic Capacitor 1.0 mfd $\pm 10\%$ 100V	Gulton	CN05M105K		170
6				
7				
8				

15A TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO TESTED	G NO FAILED
III V Life	X	JPL 152. 20-02	2000 Hours @ 100 V @ 85°C	13	0
Life	X	"	2000 Hours @ 100V @ 125°C	13	3
Life	X	"	2000 Hours @ 200 V @ 85°C	15	6
Life	X	"	2000 Hours @ 200 V @ 125°C	15	8
III Temperature Coefficient	X	"	Capacitance, Dissipation Factor and Insulation Resistance @ -55°C to +145°C	10	0
III Lead Bend and Pull	X	"	5 lb. Pull followed by Bend & 5 - 360° arcs	10	0
IV Voltage Breakdown	X	"	Increase D. C. working Voltage to Destruction	10	10

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(3) Tested to Destruction values of breakdown voltage ranged from 270 volts to 620 volts.



REPORT SUMMARY SHEET

1 of 2

1 COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2 PROGRAM OR WEAPON SYSTEM Mariner		3 TEST COMPL DAY MO YR 7 30 65	
4 ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5 ORIGINATOR'S REPORT NO 152.20-02		REPT COMPL 8 30 65	
		6 TEST TYPE, ETC Evaluation to JPL Requirements			

7 THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO: Supplements 152.20-50.40-E4

8A PART TYPE, SIZE, RATING, LOT, ETC 1 Radial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 20\%$ 50V	9 VENDOR King Electronics	10 VENDOR PART NO KC80BW104K	11 IND GOV STD NO	12 TOTAL TESTED 170
2				
3				
4				(OVER)

13 INTERNAL SPECS ETC REQ'D TO UTILIZE REPT. ENCL A JPL Test Procedure B 152.20-02 C	SENT WITH REPORT NO.	14 MIL-SPECS. STDS. REFERENCED IN ISC D MIL-STD-202C E F

15A ITEM	TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/ METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO TESTED	G NO FAILED
all	Visual Inspection	X	JPL 152.20-02	Examine for Defects 3X Magnification	170	0
all	Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	0
I	Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	50	1
I II	Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	99	0
I II	Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows/ Axis	99	0
I II	Thermal Shock	X	"	-55°C to +125°C 10 Cycles	99	0
I II	Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	99	1
I II V	Life	X	"	2000 Hours @ 50V @ 85°C	73	0
I II V	Life	X	"	2000 Hours @ 50V @ 125°C	15	0

16 SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

- (1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.
- (2) Failure definition is open, short or inability to sustain voltage on Life Test.

17 TESTED BEYOND VENDOR CATALOG SPECIFICATIONS YES ☒ NO ☐	18 VENDOR INFORMED OF TEST RESULT BY: LETTER ☐ CY OF REPT ☒ ORAL ☐	19 SIGNED	20 CONTRACTOR Pan Technical Systems, Inc	SUBCONTRACTOR

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

[illegible]

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(3) Tested to Destruction values of breakdown voltage ranged from 580volts to 1300 volts.

21 REPT NO: 152. 20. 50. 40-E4-05C1



REPORT SUMMARY SHEET

1 of 2

1. COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2. PROGRAM OR WEAPON SYSTEM Mariner		3. TEST COMPL 7 30 65	
4. ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5. ORIGINATOR'S REPORT NO. 152.20-02		DAY MO YR 7 30 65	
		6. TEST TYPE, ETC. Evaluation to JPL Requirements		REPT COMPL 8 30 65	

7. THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO: Supplements 152.20.50.40-E4					
8A. PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO.	11. IND. GOV. STD. NO.	12. TOTAL TESTED	
1. Axial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 10\%$ 50V	Scionics	SCM30D104K		170	
2.					
3.					
4.					

13. INTERNAL SPECS ETC REQ'D TO UTILIZE REPT.	ENCL	SENT WITH REPORT NO.	14. MIL. SPECS./STDS. REFERENCED IN ISC
A. JPL Test Procedure			D. MIL-STD-202C
B. 152.20-02			E.
C.			F.

15A. TEST OR ENVIRONMENT	C. PER SPEC	D. SPEC. PARAGRAPH/METHOD/CONDITION	E. TEST LEVELS, DURATION AND OTHER DETAILS	F. NO. TESTED	G. NO. FAILED
all Visual Inspection	X	JPL 152.20-02	Examine for Defects 3X Magnification	170	0
all Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	0
I Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	50	3
II Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	97	5
III Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows/ Axis	92	1
III Thermal Shock	X	"	-55°C to +125°C 10 Cycles	91	0
II Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	91	21
II V Life	X	"	2000 Hours @ 50V @ 85°C	50	12
II V Life	X	"	2000 Hours @ 50V @ 125°C	13	10

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

- (1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.
- (2) Failure definition is open, short or inability to sustain voltage on Life Test.

17. TESTED BEYOND VENDOR CATALOG SPECIFICATIONS	YES ☒	18. VENDOR INFORMED OF TEST RESULT BY LETTER ☐ CY OF REPLY ☒ ORAL ☐	19. SIGNED	20. CONTRACTOR	SUBCONTRACTOR Pan Technical Systems, Inc

21. REPT.

NO 152.20.50.40-E4-06CF

(OVER)

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

8A	PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO.	11. IND./GOV. STD. NO.	12. TOTAL TESTED
5	Axial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 10\%$ 50V	Scionics	SCM30D104K		170
6					
7					
8					

15A ITEM	TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/ METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO TESTED	G NO FAILED
III V	Life	X	JPL 152. 20-02	2000 Hours @ 100 V @ 85°C	14	7
	Life	X	"	2000 Hours @ 100V @ 125°C	13	11
	Life	X	"	2000 Hours @ 200 V @ 85°C	15	14
	Life	X	"	2000 Hours @ 200 V @ 125°C	15	2
III	Temperature Coefficient	X	"	Capacitance, Dissipation Factor and Insulation Resistance @ -55°C to +145°C	10	0
III	Lead Bend and Pull	X	"	5 lb. Pull followed by Bend & 5 - 360° arcs	10	0
IV	Voltage Breakdown	X	"	Increase D. C. working Voltage to Destruction	10	10

(3)

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(3) Tested to Destruction values of breakdown voltage ranged from 420volts to 1050 volts.

21. REPT.
NO 152. 20. 50. 40-E4-06CR

REPORT SUMMARY SHEET

1 of 2

1 COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2 PROGRAM OR WEAPON SYSTEM Mariner		3 TEST COMPLETION DATE 7 30 65	
4 ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5 ORIGINATOR'S REPORT NO 152.20-02		6 TEST TYPE ETC Evaluation to JPL Requirements	
7 THIS TEST SUPERSEDES (SUPPLEMENTS) REPORT NO: Supplements 152.20.50.40-E4					

8A PART TYPE, SIZE, RATING, LOT, ETC 1 Radial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 10\%$ 200V		9 VENDOR Electro Materials Corp.		10 VENDOR PART NO EK200R104K		11 AND GOV STD NO 170	
2		3		4		5	

12 INTERNAL SPECS ETC REQ'D TO UTILIZE REPT ENCL A JPL Test Procedure B 152.20-02 C		13 SENT WITH REPORT NO		14 MIL SPECS STCS REFERENCED IN ISC D MIL-STD-202C E F	

15A B ITEM	TEST OR ENVIRONMENT	C PER SPEC	D SPEC PARAGRAPH METHOD/CONDITION	E TEST LEVELS DURATION & OTHER DETAILS	F TEST NO	G TEST RESULTS
all	Visual Inspection	X	JPL 152.20-02	Examine for Defects, 3X Magnification	170	0
all	Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	0
I	Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	50	9
I II	Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps, axis	91	3
I II	Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows, Axis	88	4
I II	Thermal Shock	X	"	-55°C to +125°C 10 Cycles	84	2
I H	Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	82	0
I II V	Life	X	"	2000 Hours @ 50V @ 85°C	67	7
I II V	Life	X	"	2000 Hours @ 50V @ 125°C	12	2

16 SUMMARY OF REPORT NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.

(2) Failure definition is open, short or inability to sustain voltage on Life Test.

17 TESTED BEYOND VENDOR CATALOG SPECIFICATIONS YES ☒ NO ☐	18 VENDOR INFORMED OF TEST RESULT BY: LETTER ☐ CY OF REPT ☒ ORAL ☐	19 SIGNED	20 CONTRACTOR Pan Technical Systems, Inc.

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED

(2)

21 REPT NO 152.20.50.40-E4-07C

8. QTY	9A. PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO	11. IND./GOV. STD NO	12. TOTAL TESTED
5	Radial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 10\%$ 200 V	Electro Materials Corp.	EK200R104K		170
6					
7					
8					

[illegible]

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(3) Tested to Destruction values of breakdown voltage ranged from 820volts to 1200 volts.

21. REPT.
NO. 152. 20. 50. 40-E4-07C1



REPORT SUMMARY SHEET

1 of 2

1. COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2. PROGRAM OR WEAPON SYSTEM Mariner		3. DAY MO YR 7 30 65	
4. ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5. ORIGINATOR'S REPORT NO. 152. 20-02		REPT COMPL 8 30 65	
		6. TEST TYPE, ETC Evaluation to JPL Requirements			

7. THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO.: Supplements 152. 20. 50. 40-E4									
8A. PART TYPE, SIZE, RATING, LOT, ETC.		9. VENDOR		10. VENDOR PART NO.		11. IND. GOV. STD. NO.		12. TOTAL TESTED	
1 Radial Lead Tubular Ceramic Capacitor 0.01 mfd $\pm 10\%$ 100V		Vitramon		VL02BK103K V-LAM				170	
2									
3									
4									

13. INTERNAL SPECS ETC. REQ'D TO UTILIZE REPT. ENCL		SENT WITH REPORT NO.		14. MIL. SPECS. STDS. REFERENCED IN ISC	
A JPL Test Procedure				D MIL-STD-202C	
B 152. 20-02				E	
C				F	

15A. TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO. TESTED	G NO. FAILED
all Visual Inspection	X	JPL 152. 20-02	Examine for Defects 3X Magnification	170	0
all Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	0
I Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	50	0
II Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	100	8
III Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows/ Axis	92	1
II Thermal Shock	X	"	-55°C to +125°C 10 Cycles	91	7
II Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	84	0
II V Life	X	"	2000 Hours @ 50V @ 85°C	69	13
II V Life	X	"	2000 Hours @ 50V @ 125°C	14	1

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:					
(1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.					
(2) Failure definition is open, short or inability to sustain voltage on Life Test.					

17. TESTED BEYOND VENDOR CATALOG SPECIFICATIONS		18. VENDOR INFORMED OF TEST RESULT BY: YES LETTER CY OF REPT ORAL		19. SIGNED		20. CONTRACTOR		SUBCONTRACTOR	
☒		☐ ☒ ☐				Pan Technical		Systems, Inc.	

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

8. PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO	11. IND./GOV. STD. NO.	12. TOTAL TESTED
Radial Lead Tubular Ceramic Capacitor 0.01 mfd $\pm 10\%$ 100V	Vitramon	VL02BK103K V-LAM		170

15A. TEST OR ENVIRONMENT	C. PER SPEC	D. SPEC. PARAGRAPH/METHOD/CONDITION	E. TEST LEVELS, DURATION AND OTHER DETAILS	F. NO. TESTED	G. NO. FAILED
Life	X	JPL 152. 20-02	2000 Hours @ 100 V @ 85°C	12	1
Life	X	"	2000 Hours @ 100V @ 125°C	14	1
Life	X	"	2000 Hours @ 200 V @ 85°C	14	0
Life	X	"	2000 Hours @ 200 V @ 125°C	11	1
Temperature Coefficient	X	"	Capacitance, Dissipation Factor and Insulation Resistance @ -55°C to +145°C	10	0
Lead Bend and Pull	X	"	5 lb. Pull followed by Bend & 5 - 360° arcs	10	0
Voltage Breakdown	X	"	Increase D. C. working Voltage to Destruction	10	10

(3)

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(3) Tested to Destruction values of breakdown voltage ranged from 1800 volts to 3600 volts.

21. REPT.
NO: 152. 20. 50. 40-E4-08CH



REPORT SUMMARY SHEET

1 of 2

1. COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2. PROGRAM OR WEAPON SYSTEM Mariner		3. DAY MO YR TEST COMPL 7 30 65 REPT COMPL 8 30 65	
4. ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5. ORIGINATOR'S REPORT NO. 152.20-02		6. TEST TYPE, ETC. Evaluation to JPL Requirements	

7. THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO: Supplements 152.20.50.40-E4					
8A. PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO.	11. IND. GOV. STD. NO.	12. TOTAL TESTED	
1. Radial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 10\%$ 50V	Vitramon	VK30BX104K		170	
2.					
3.					
4.				(OVER)	

13. INTERNAL SPECS ETC REQ'D TO UTILIZE REPT. ENCL		SENT WITH REPORT NO.		14. MIL. SPECS./STDS. REFERENCED IN 15C	
A	JPL Test Procedure			D	MIL-STD-202C
B	152.20-02			E	
C				F	

15A. TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO. TESTED	G NO. FAILED
all Visual Inspection	X	JPL 152.20-02	Examine for Defects 3X Magnification	170	0
all Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	0
I Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	50	0
I II Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	100	1
I II Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows/ Axis	99	0
I II Thermal Shock	X	"	-55°C to +125°C 10 Cycles	99	0
I II Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	99	0
I II V Life	X	"	2000 Hours @ 50V @ 85°C	74	4
I II V Life	X	"	2000 Hours @ 50V @ 125°C	15	2

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:					
(1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown.					
(2) Failure definition is open, short or inability to sustain voltage on Life Test.					
(OVER)					

17. TESTED BEYOND VENDOR CATALOG SPECIFICATIONS	YES ☒	18. VENDOR INFORMED OF TEST RESULT BY	LETTER ☐ CY OF REPT ☒ ORAL ☐	19. SIGNED	20. CONTRACTOR	SUBCONTRACTOR
						Pan Technical Systems, Inc

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

21. REPT. NO 152.20.50.40-E4-09CH

8A	PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO	11 IND GOV. STD NO	12 TOTAL TESTED
5	Radial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 10\%$ 50V	Vitramon	VK30BX104K		170
6					
7					
8					

15A ITEM	TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/ METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO TESTED	G NO FAILED
III V	Life	X	JPL 152. 20-02	2000 Hours @ 100 V @ 85°C	15	3
	Life	X	"	2000 Hours @ 100V @ 125°C	15	3
	Life	X	"	2000 Hours @ 200 V @ 85°C	15	2
	Life	X	"	2000 Hours @ 200 V @ 125°C	15	0
III	Temperature Coefficient	X	"	Capacitance, Dissipation Factor and Insulation Resistance @ -55°C to +145°C	10	0
III	Lead Bend and Pull	X	"	5 lb. Pull followed by Bend & 5 - 360° arcs	10	0
IV	Voltage Breakdown	X	"	Increase D. C. working Voltage to Destruction	10	10

(3)

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

(3) Tested to Destruction values of breakdown voltage ranged from 480volts to 1240 volts.

21 REPT
NO 152. 20. 50. 40-E4-09CH

REPORT SUMMARY SHEET

1. COMPONENT PART NAME PER GENERIC CODE Capacitor, Fixed Ceramic, Lead Mount		2. PROGRAM OR WEAPON SYSTEM Mariner		3. TEST COMPL 7 30 65	
4. ORIGINATOR'S REPORT TITLE Evaluation Test, Ceramic Capacitors, Tubular and Flat		5. ORIGINATOR'S REPORT NO. 152.20-02		DAY MO YR 7 30 65	
		6. TEST TYPE, ETC. Evaluation to JPL Requirements		REPT COMPL 8 30 65	

7. THIS TEST (SUPERSEDES) (SUPPLEMENTS) REPORT NO: Supplements 152.20.50.40-E4					
8A. PART TYPE, SIZE, RATING, LOT, ETC.	9. VENDOR	10. VENDOR PART NO.	11. IND. GOV. STD. NO.	12. TOTAL TESTED	
1. Radial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 10\%$ 75V	Westcap	B758BX104K		170	
2.					
3.					
4.					

13. INTERNAL SPECS. ETC. REQ'D TO UTILIZE REPT.	ENCL	SENT WITH REPORT NO.	14. MIL. SPECS./STDS. REFERENCED IN 15C
A. JPL Test Procedure			D. MIL-STD-202C
B. 152.20-02			E.
C.			F.

15A. TEST OR ENVIRONMENT	C. PER SPEC	D. SPEC. PARAGRAPH/METHOD/CONDITION	E. TEST LEVELS, DURATION AND OTHER DETAILS	F. NO TESTED	G. NO FAILED
all Visual Inspection	X	JPL 152.20-02	Examine for Defects 3X Magnification	170	0
all Initial Measurements	X	"	Capacitance, Dissipation Factor, Insulation Resistance	170	0
I Screen Burn-in	X	"	168 hrs. @ 2 x Rated Voltage @ 125°C	170	0
I II Vibration	X	"	50 - 3000 Cycles, 35g rms 3 axes, 6 sweeps/axis	100	2
I III Shock	X	"	300 g Peak, 1 Millisecond 3 Axes, 10 Blows/Axis	98	1
I II Thermal Shock	X	"	-55°C to +125°C 10 Cycles	97	0
I II Moisture Resistance	X	"	10 Cycles Method 106 MIL-STD-202 Steps 1-6	97	4
I II V Life	X	"	2000 Hours @ 50V @ 85°C	72	3
I II V Life	X	"	2000 Hours @ 50V @ 125°C	14	0

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:	
(1) Test started with 170 specimens divided into groups. Group I - 50 parts, Group II - 50 parts, Group III - 10 parts, Group IV - 10 parts, Group V - 10 parts. Except for removed failures, parts were subjected in equal quantities sequentially to the tests as shown. (2) Failure definition is open, short or inability to sustain voltage on Life Test.	

17. TESTED BEYOND VENDOR CATALOG SPECIFICATIONS	YES ☒ NO ☐	18. VENDOR INFORMED OF TEST RESULT BY: LETTER ☐ CY OF REPLY ☒ ORAL ☐	19. SIGNED	20. CONTRACTOR	SUBCONTRACTOR
					Pan Technical Systems, Inc.

REPRODUCTION OR DISPLAY OF THIS MATERIAL FOR SALES OR PUBLICITY PURPOSES IS PROHIBITED.

(2)

21. REPT NO. 152.20.50.40-E4-10C18

8A PART TYPE, SIZE, RATING, LOT, ETC	9 VENDOR	10 VENDOR PART NO	11 IND GOV STD NO	12 TOTAL TESTED
5 Radial Lead Flat Ceramic Capacitor 0.1 mfd $\pm 10\%$ 75V	Westcap	B758BX104K		170
6				
7				
8				

15A TEST OR ENVIRONMENT	C PER SPEC	D SPEC. PARAGRAPH/METHOD/CONDITION	E TEST LEVELS, DURATION AND OTHER DETAILS	F NO TESTED	G NO FAILED
III V Life	X	JPL 152. 20-02	2000 Hours @ 100 V @ 85°C	13	0
Life	X	"	2000 Hours @ 100V @ 125°C	14	0
Life	X	"	2000 Hours @ 200 V @ 85°C	15	0
Life	X	"	2000 Hours @ 200 V @ 125°C	15	1
III Temperature Coefficient	X	"	Capacitance, Dissipation Factor and Insulation Resistance @ -55°C to +145°C	10	0
III Lead Bend and Pull	X	"	5 lb. Pull followed by Bend & 5 - 360° arcs	10	0
IV Voltage Breakdown	X	"	Increase D. C. working Voltage to Destruction	10	10

(3)

16. SUMMARY OF REPORT, NATURE OF FAILURES AND CORRECTIVE ACTIONS TAKEN:

- (3) Tested to Destruction values of breakdown voltage ranged from 420 volts to 910 volts.

II. INTRODUCTION

This report presents the results of a study of the electrical performance, environmental resistance, and life longevity for Miniature Ceramic Capacitors under various temperature and voltage stress conditions. These capacitors are advanced "state-of-the-art" units wherein higher values of capacitance for a given size are fabricated than are normally offered in currently available Military Grade parts.

The basic purpose of this test is to determine the suitability of these types of capacitors for spacecraft applications. The test included ten types of parts from eight manufacturers in order that a direct comparison of performance can be accomplished.

The test plan, as shown subsequently, was designed to yield, in addition to life test information, the effects, if any, of environmental exposures upon longevity, as well as the effects of an initial screen, or "burn-in" exposure conducted in accordance with JPL Specification 2073-0101D.

Testing was conducted per the following documents:

JPL Test Procedure No. 152.20-02, dated May 13, 1964
entitled, "Test Procedure, Electronic Component Parts
Reliability Evaluation Test, Ceramic Capacitors Tubular
and Flat", as modified by
PTS Proposal 64-6, and
JPL Technical Direction Memorandum #1, dated March
16, 1965

Statistical Data reduction was performed in accordance with JPL Specification 20040.

III. DESCRIPTION OF TEST ITEMS

Table 1 is a complete listing of the parts tested. All parts were furnished to Pan Technical Systems by JPL.

Manufacturer	Part Number	Capacitance MFD tol	D. F. Max.	WVDC @ Max °C	Range (°C)	COEFF (Megohm)	I. R. Min.	Case Size (Max.) & Configuration
Aerovox	MC605104RK	0.10 10%	2%	50	-55 +125	-15% +10%	100K	Radial leads .300 x .300 x .100
Chem-Electro	CK2R104K	0.10 10%	2%	200	-55 +125	+15%	100K	Radial leads .300 x .300 x .100
Gulton	CK16M104K	0.10 10%	2.5%	50	-55 +125	+15%	10K	Radial leads .300 x .300 x .100
Gulton	CN05M105K	1.0 10%	2.5%	100	-55 +125	+15%	0.2K	Axial lead .520 x .370 x .300
King Elect.	KC80BW104K	0.10 20%	2.5%	50	-55 +125	-15% +25%	10K	Radial leads .515 x .515 x .165
Scionics	SCM30D104K	0.10 10%	2.5%	(4) 50	(4) -55 +85	(4) +10%	25K	Axial leads .130 x .380 x .92
EMC	EK200R104K	0.10 10%	2.5%	200 V	-55 +125	+15%	100K	Radial leads .300 x .300 x .100
Vitramon	VL02BK103K V-LAM	0.01 +10%	2.5%	100	-55 +125	-10% +15%	100K	.280 x .100 Tubular, Axial lead
Vitramon	VK30BX104K	0.10 +10%	3.0%	50	-55 +125	-10% +15%	1K	Radial leads .300 x .300 x .100
Westcap	B758BX104K	0.10 +10%	2.5%	75V	-55 +125	+15%	10K	Radial leads .500 x .500 x .150

- 1 - All capacitors meet environmental requirements of MIL-C-11015C
- 2 - Parameters are specified at the test condition specified in this test procedure
- 3 - All capacitors are packaged in molded plastic cases
- 4 - Derate to 25 VDC from 85°C to 150°C, with TC of +15%

TABLE 1

IV. TEST DESIGN

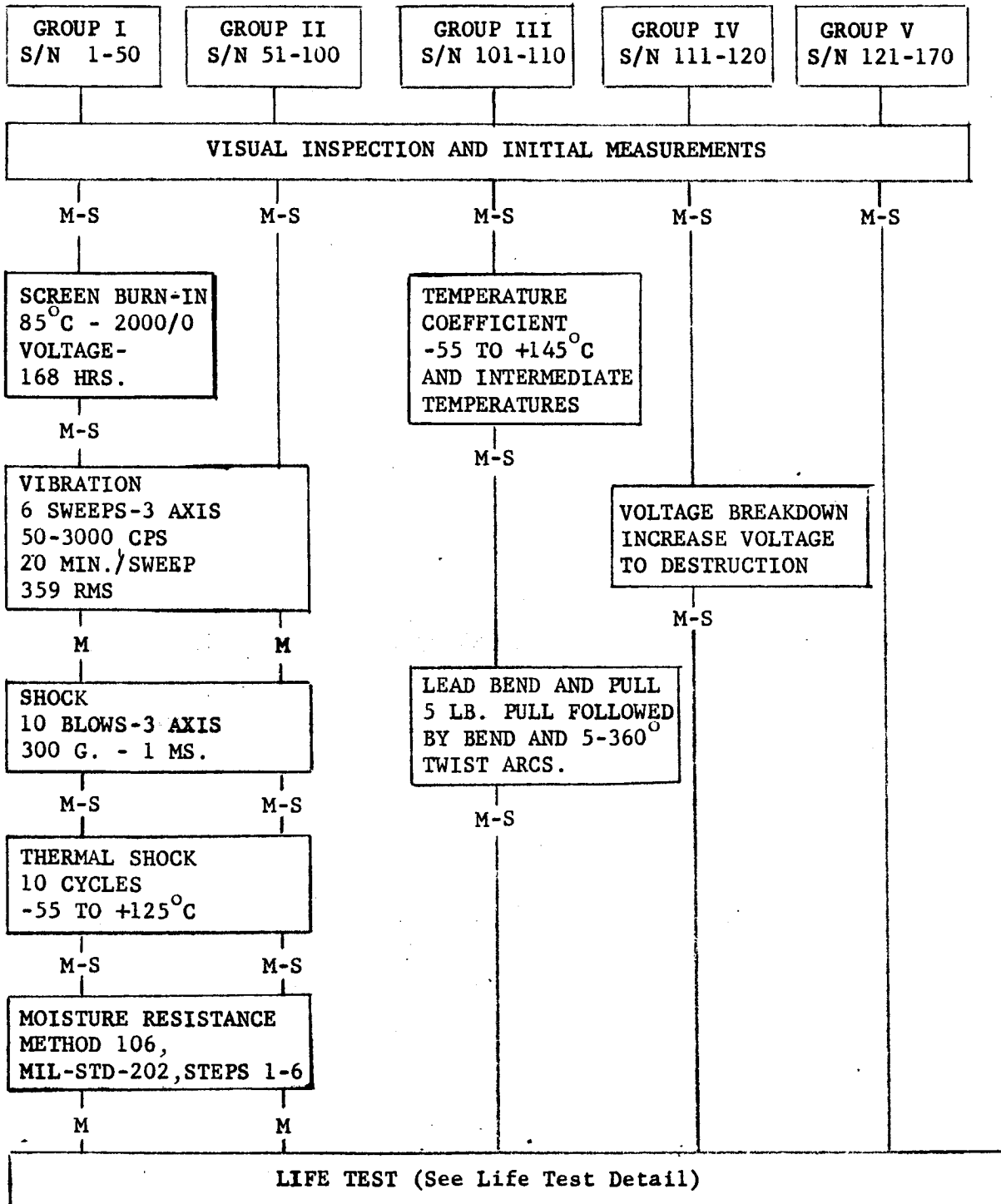
The test design is best described by referring to Figure 1. This test plan was used for each type of part. All tests of different type parts were performed, insofar as possible, in parallel, so that valid comparative results could be obtained.

As shown by Figure 1, the basic sample size for the test was 170 individual parts. These parts were divided into five groups. All parts were subjected to Visual Inspection and Initial Measurements. Group I (50 parts) was subjected to a Screen Test, followed by sequential Environmental Exposures and Life Testing. Group II (50 parts) paralleled Group I except that the Screen Test was omitted. Group III (10 parts) was subjected to Temperature Coefficient and Terminal Strength Tests. Group IV (10 parts) was subjected to a High Voltage Breakdown Test, followed by Failure Analysis (dissection and visual inspection). Group V (50 parts) was subjected only to the Life Test.

In addition to the above, five extra units of each type were supplied as a Control Group. The Control Group was measured prior to conducting measurements at each data point throughout the test series. Data for these measurements is submitted as part of the Test Log.

Following the completion of the Environmental Tests, parts from Groups I, II and V were combined and submitted to a 2 (Temperature) x 3 (Voltage) Matrix Life Test as illustrated by Figure 2. While data submitted is by the combined Groups, i. e. I, II and V, individual part identity was maintained to permit inter-group comparisons if deemed necessary at some future time.

FLOW CHART



M - MEASUREMENT POINT
S - DATA SUBMITTAL POINT

Figure 1

LIFE TEST DETAIL

LIFE TEST MATRIX

TEST VOLTAGE	TEST TEMPERATURE	
	85°C	125°C
50 V.	GROUP I PART NUMBER 1- 25 - GROUP I* 51- 75 - GROUP II 121-145 - GROUP V (75 TOTAL)	GROUP II PART NUMBER 36- 40 86- 90 156-160 (25 TOTAL)
100 V.	GROUP III PART NUMBER 26- 30 76- 80 146-150 (25 TOTAL)	GROUP IV PART NUMBER 41- 45 91- 95 161-165 (25 TOTAL)
200 V.	PART NUMBER 31- 35 81- 85 151-155 (25 TOTAL)	PART NUMBER 46- 50 96-100 166-170 (25 TOTAL)

* REFER TO PRE LIFE GROUPS.

MEASUREMENT AND DATA SUBMITTAL AT 168, 500, 1000 AND 2000 HOURS.

Figure 2

V. MEASUREMENT PROCEDURE

All electrical measurements were made at room ambient conditions of $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$, and a relative humidity of less than 55% except where otherwise noted.

CAPACITANCE AND DISSIPATION FACTOR

For these measurements a General Radio 1608A Impedance Bridge, Serial #221, operated in the C_s (series capacitance) configuration was employed. The 1000 cycle source and selective detector supplied as a part of the bridge were used for excitation and null determination, respectively. The signal level to the bridge arms was maintained at 0.75 ± 0.25 volts.

The manufacturer's rated accuracy for this bridge at 1000 cycles is as follows:

Capacitance - on ranges used, $\pm 0.1\% \pm .005\%$

Dissipation Factor - $\pm 5\% \pm .0005$

Calibration of this bridge is yearly. The calibrating agency was General Radio. The latest calibration was August 20, 1964.

INSULATION RESISTANCE

Insulation Resistance was calculated from Leakage Current Measurements. Readout was accomplished by means of a Hewlett Packard Type 425A Microvolt Ammeter Serial 425-06530. The manufacturer's rated accuracy for this instrument is $\pm 3\%$ of end scale reading. Calibration of this instrument is yearly. Latest calibration was March 9, 1965. The calibrating agency was Hewlett Packard. The electrification source for these tests was a Hewlett Packard 711A Power Supply. Two minutes of polarization was allowed for all readings taken throughout the test series.

VISUAL AND MECHANICAL INSPECTION

All capacitors were examined under 3X magnification for body cracks, nicked leads and other physical defects and indications of poor workmanship. Capacitors were inspected for part designation, nomenclature, legibility and permanence of marking. All comments are presented under "Test Results" as well as a detailed sketch of one capacitor of each type showing all dimensions and manufacturer's information included on the capacitor body.

VI. ENVIRONMENTAL TEST PROCEDURES

CAPACITOR TEMPERATURE COEFFICIENT (T_C)

Group II capacitors were placed in a temperature chamber capable of providing a temperature accuracy of $\pm 3^\circ\text{C}$. Electrical measurements were made at $+25^\circ\text{C}$, -15°C , -55°C , $+25^\circ\text{C}$, $+65^\circ\text{C}$, $+85^\circ\text{C}$, $+125^\circ\text{C}$, $+145^\circ\text{C}$ and $+25^\circ\text{C}$ respectively. The capacitors were allowed to stabilize for one hour at each temperature prior to making measurements of Capacitance and Dissipation Factor.

Prior to making the first measurements fixture leakage on the unloaded fixture was checked and found to be below the level of resolution of the instrumentation employed. Therefore, no corrections were applied to the results for fixture leakage.

VOLTAGE BREAKDOWN TEST

This test consisted of slowly increasing the d. c. voltage applied to the part until destructive breakdown occurred and recording the result. The apparatus used was a Hewlett Packard 412A Vacuum Tube Voltmeter Serial #05485 equipped with a 2 to 1 voltage divider and a filtered DC power supply capable of output voltages in excess of 10,000 volts. The breakdown current was limited with a fast blow $1/2$ ampere fuse in series with each capacitor to prevent total destruction of the test specimen when failure occurred. In the case of the small Vitramon capacitors, the first unit did suffer severe mechanical destruction. Therefore, the $1/2$ ampere fuse specified was reduced to a $1/8$ ampere fast blow fuse. However, the units, for the most part, were still destroyed.

LEAD BEND AND PULL

A five pound weight was applied to the leads of each capacitor in a direction away from the body. The weight was gradually applied over a minimum period of four seconds and maintained for a minimum of 10 seconds. Axial lead capacitors were tested by clamping one lead in a vise and applying weight to the other lead. Radial lead

types were tested by clamping the body in a vise and applying the weight to each lead in a direction perpendicular to and away from the body.

For the Lead Bend Test the leads of each capacitor were bent 90° at a point $1/4$ inch from the body with a radius of curvature of $1/32$ inch. The lead wire was then clamped $3/64$ inch from the bend between the bend and the lead end. The capacitor body was then rotated about the original axis of the bent lead through 360° CW and CCW a total of five times at a rate of approximately five seconds per rotation. The capacitors were then visually inspected under 3X magnification for evidence of breaking and loosening of the lead termination or chipping of the body coating.

SCREEN TEST

Capacitors assigned to Group I were subjected to a Screen Test in accordance with JPL Specification 2073-0101D which included the visual and mechanical inspection above, a solder test, initial measurements and an operational run-in at an ambient temperature of 85°C for 168 hours at 200% rated voltage. JPL General Specification 2073-GEN C was not applicable for this program.

Parts were mounted on the jigs later to be used for Life Testing. (See Life Test Diagram). Units were connected in parallel through 10,000 ohm resistors. The PTS Combined Environmental Chamber was used for the Temperature Environment.

VIBRATION VARIABLE FREQUENCY

All capacitors in Group I and II were subjected to simple harmonic motion having an acceleration of 35 ± 5 G's (RMS) which ranged in frequency from 50 to 3000 cycles. The frequency sweep was 50 to 3000 to 50 at a logarithmic rate of approximately 20 minutes per sweep. This frequency sweep was performed six times in each of the X, Y and Z axes of the parts under test for a total vibration period of six hours.

The capacitors were mounted in channeled "sandwich" arrangement to permit simultaneous clamping of the leads and body. Double sided masking tape was used on the mounting channels for padding and constraint.

The equipment used to perform this test was a Calidyne Shaker System, consisting of a Model 58A Shaker Head and a Model 54 Control Console.

MECHANICAL SHOCK

All capacitors in Groups I and II were subjected to ten (10) shock blows in each of the X, Y and Z axes for a total of 30 blows. Each shock blow was of a half sine wave of 300G +0, -10% and a duration of 1.0 ± 0.5 milliseconds.

The capacitors were mounted in the same fixtures identical to the Vibration Test.

The following equipment was used for this test:

Drop Tester Jolta Model M500 Serial #122

Accelerometer, Endevco Model 2215C, Serial GA76

Oscilloscope, Hewlett Packard Model 150A, Serial #1860

THERMAL SHOCK

All capacitors in Groups I and II were subjected to ten Thermal Shock cycles. Each cycle consisted of 15 minutes at -55°C $+3^{\circ}\text{C}$, -0°C , and 15 minutes at $+125^{\circ}\text{C}$, $+0^{\circ}\text{C}$, -4°C . The transition time between temperatures was held to less than 5 minutes. At the completion of the tenth cycle the capacitors were removed from the chamber and allowed to stabilize overnight before performing further measurements. The chamber used was the PTS Combined Environmental Chamber.

MOISTURE RESISTANCE

All capacitors were subjected to the 10 day Moisture Resistance Test specified in MIL-STD-202C Method 106A-1 except that steps 7a and 7b were not required nor performed. No polarization voltage was required.

A Blue M VP-206A Chamber Serial AB-128 was used for this test. Overnight stabilization was allowed prior to subsequent electrical measurements.

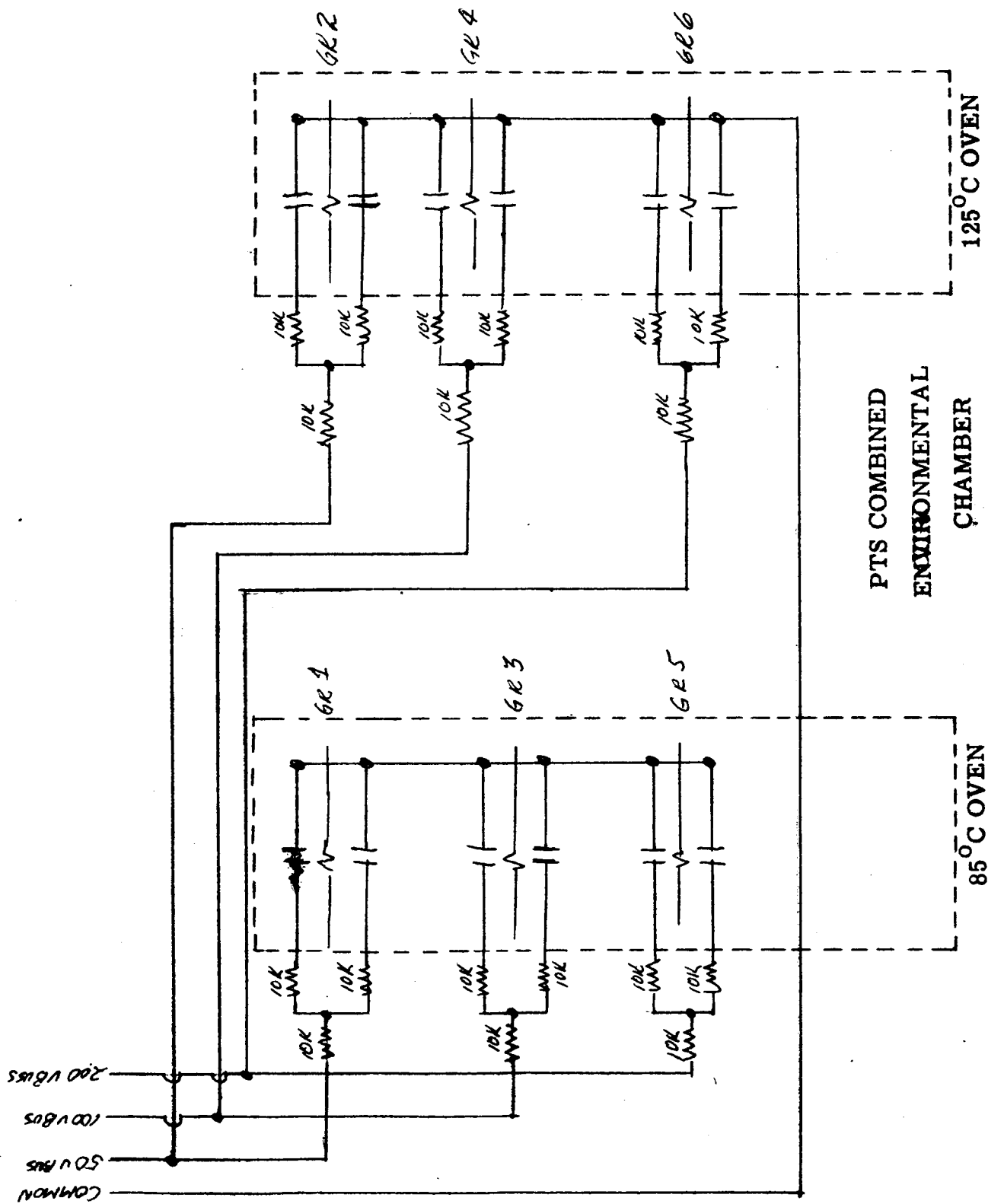
VII. LIFE TEST PROCEDURE

The Life Test Matrix for Groups I, II and V parts is given in Figure 2. The Electrical and Environmental arrangement is given in Figure 3.

Primary monitoring points were monitored daily, except weekends, throughout the test. Secondary monitoring was performed as required to remove failures as determined from primary monitoring.

Parts were mounted in seven test fixtures (approximately 200 per fixture). Wiring was arranged to supply proper voltages to the units under test. A common power source was used for all units to be operated at the same voltage.

Readings were taken at the intervals noted in the flow chart.



- A. Primary monitor points - Daily - 6 per capacitor type
 - B. Secondary monitor points - As required - 150 per capacitor type
- LIFE TEST SETUP (Per Capacitor Type) Figure 3

VIII. DATA RECORDING AND VERIFICATION PROCEDURES

Each of the parts in the test was initially tagged with a five digit serial number. Each group of 175 of each type were numbered sequentially within the number series used. While sequential numbers were not used for all of the parts in the test, no duplicate numbers were employed.

Flow charts and diagrams giving the routing of all parts through the test, complete with serial numbers were constructed. In addition, a master data log book was prepared prior to testing. Initial entries in the log included the identification of the test together with the serial numbers of the parts to be subjected to the test.

Except for failures, parts within a group or subgroup were kept and maintained in numerical order throughout the test series. At the time a failure occurred, all designated blank data entry points following the failure were filled in to eliminate translation of data.

Raw data was then punched into cards.

The following equipment was employed in the data reduction process:

IBM 402	Printer
IBM 602	Calculator
IBM 413	Reproducer, equipped with mark-sensing and end printing devices
IBM 85	Collator
IBM 24	Key Punch
Friden	Square root calculator

Standard PTS developed programming routines were followed in the computation of all statistical data presented on the Computed Statistics Sheets. In addition, special sub-routines were added to identify parametric failures in accordance with the definitions previously presented.

Post parametric failure measurements were retained and separate listings of these are presented in **Appendix II**.

All regular check points were followed for verification of the data in order to insure accuracy.

IX. TEST RESULTS

CATASTROPHIC FAILURES

Catastrophic Failure as defined for the parts listed below are those units exhibiting an open or shorted condition, body cracks or broken leads. It should be noted that catastrophic failures in the computed statistics sheets include parametric or degradation failures, where this list only includes opens, shorts, units which failed to support voltage or mechanically damaged parts.

Appendix 1 is a complete listing of catastrophic failures.

DEGRADATION OR PARAMETRIC FAILURES

Any capacitor exhibiting the characteristics listed below was classified as a degradation failure. Such units were not taken off test at the time of occurrence, however. Data for these units is not included in the statistical analysis but is presented separately.

- (a) Capacitance - Initial Measurements in excess of $\pm 30\%$ of manufacturer's nominal specification, or a change of 15% between two consecutive data points.
- (b) Dissipation Factor - Initial Measurements in excess of $+10\%$ of manufacturer's maximum limit or a change of greater than 100% between consecutive data points or a post environmental reading of $+125\%$ of the manufacturer's maximum specification.
- (c) Insulation Resistance - Initial Measurements of less than 1000 megohms, a change greater than 1000 x between two consecutive readings or a post environmental reading of less than 10 megohms.

The complete list of parametric failures and subsequent parametric data is given in Appendix II.

GROUP III - TEMPERATURE COEFFICIENT & TERMINAL STRENGTH

I. These data and test results are presented in accordance with paragraphs 5. 2. 1 and 5. 2. 2 of JPL Test Procedure 152. 20-02.

A. TEMPERATURE COEFFICIENT

1. Apparatus Used

- a. Capacitance, Dissipation Factor
General Radio Type 1608A Impedance
Bridge, Serial #221
- b. Insulation Resistance
Power Supply - Hewlett Packard, Type
711A, Serial #02162. Millimicro-
ammeter, Hewlett Packard Type 425A,
Serial #06630
- c. Temperature
PTS Combined Environmental Chamber

2. Test Procedure

All Group III capacitors were loaded on a low leakage test jig, which prior to testing had been checked to determine jig leakage over the temperature range. Any leakage was determined to be below the signal to noise ratio of the test setup. Parts were allowed to stabilize one hour. at each temperature. Readings were taken of the Capacitance and Dissipation for all parts followed by Leakage Current measurements.

3. Data Presentation

Capacitance and Dissipation Factor results are presented graphically in Figure III-1-a through III-10-b. These curves are plotted using similar scales to permit ready comparison between manufacturers. The curves also demonstrate

the differences in performance of the various ceramic materials, regardless of capacitor manufacturer.

Insulation Resistance is plotted in Figures III-1-c through III-10-c. These curves indicate the difficulties of determining Insulation Resistance at 25⁰C or below. They do indicate however, that at higher temperatures the data is better, at least, insofar as behavior is concerned. For most parts the Leakage Current appears to be very close to an exponential function of temperature above approximately 25⁰C.

B. TERMINAL STRENGTH (Lead Bend and Pull)

1. Apparatus Used

- a. Five pound dead weight
- b. Sweep second hand watch
- c. Pliers with 1/32" jaw radius
- d. 3X Inspection Glass

2. Test Procedure

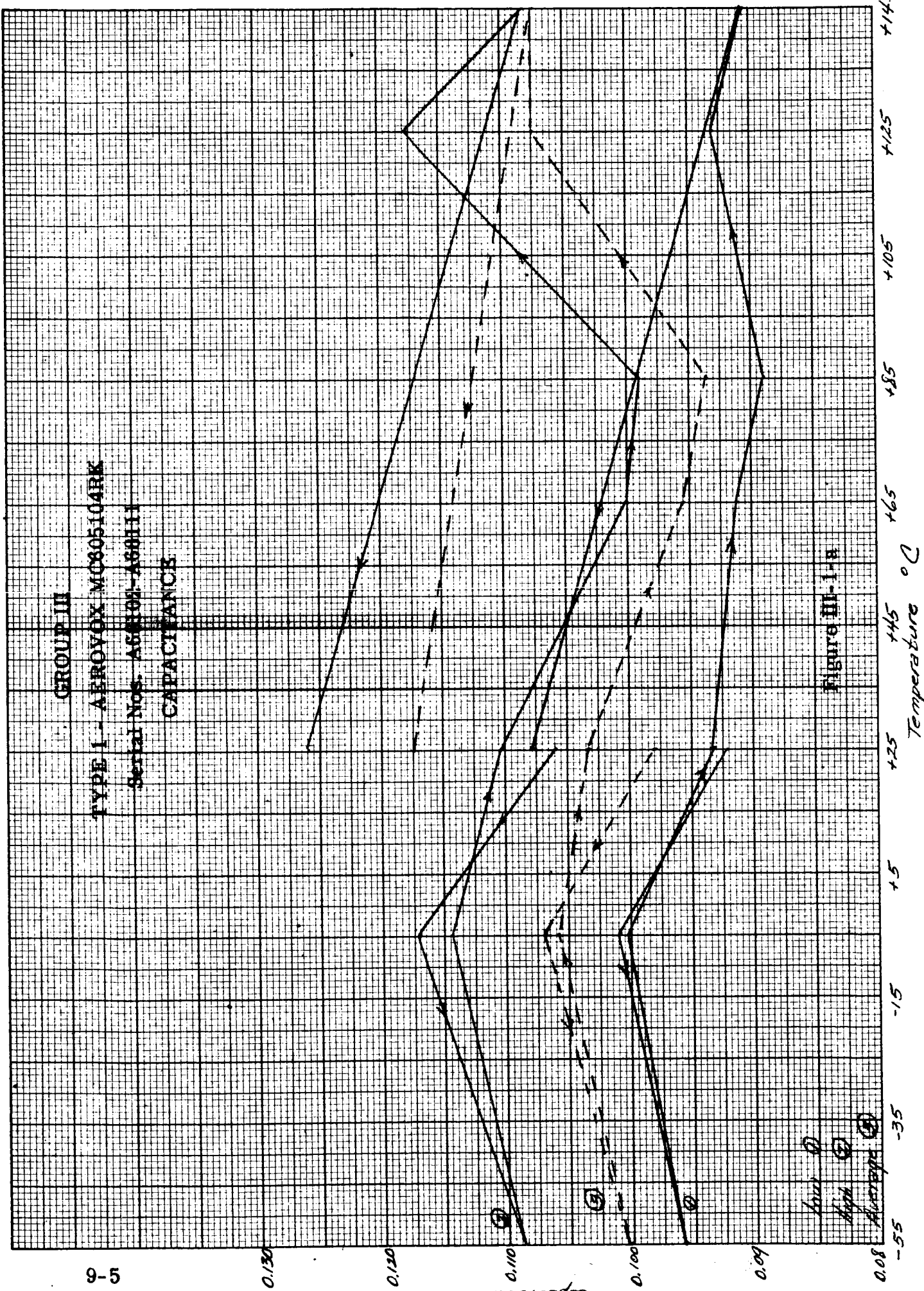
The five pound weight was applied to the leads of each capacitor in a direction away from the body. The weight was gradually applied over a minimum period of four seconds and maintained for a minimum of 10 seconds. Axial lead capacitors were tested by clamping one lead in a vise and applying weight to the other lead. Radial lead types were tested by clamping the body in a vise and applying the weight to each lead in a direction perpendicular and away from the body.

For the lead bend test the leads of each capacitor were bent 90⁰ at a point 1/4 inch from the body

with a radius of curvature of 1/32 inch. The lead wire was then clamped 3/64 inch from the bend between the bend and the lead end. The capacitor body was then rotated about the original axis of the bent lead through 360° CW and CCW a total of five times at a rate of approximately five seconds per rotation. The capacitors were then visually inspected under 3x magnification for evidence of breaking and loosening of the lead termination or chipping of the body coating.

3. Test Results

No leads were fractured and no defects noted.



GROUP III

TYPE 2 - CHEM-ELECTRO RESEARCH CK2R104K

Serial Nos. A68277-A68286

CAPACITANCE

9-6

0.110

0.110

0.10

0.09

0.08

Capacitance mfd.

②

③

④

Low ①

High ③

Average ⑤

Figure III-2-a

Temperature °C

-55

-35

-15

+5

+25

+45

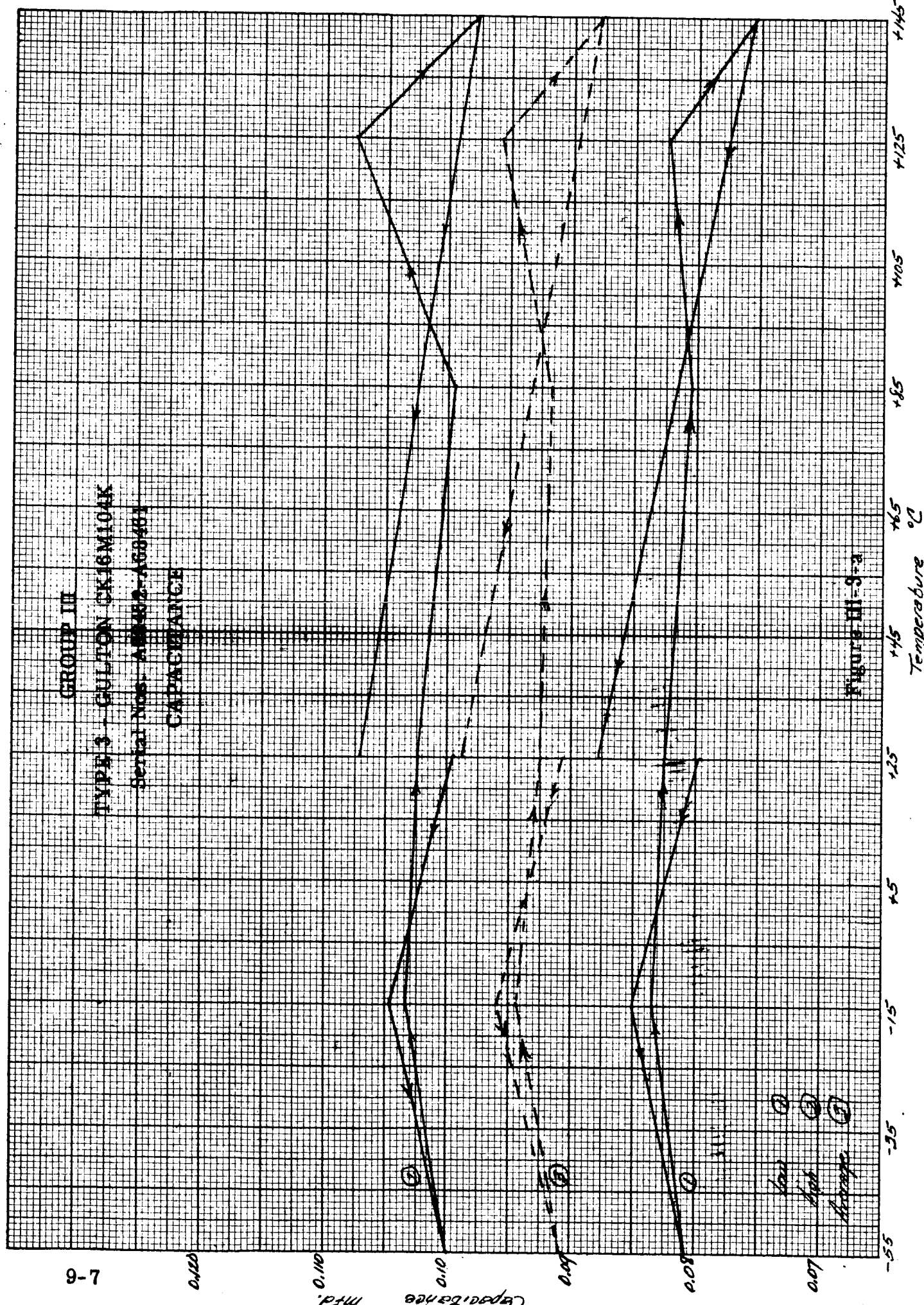
+65

+85

+105

+125

+145



GROUP II

TYPE 4 - BULTON CNOB M105K

Serial Nos. A52027-A08636

CAPACITANCE

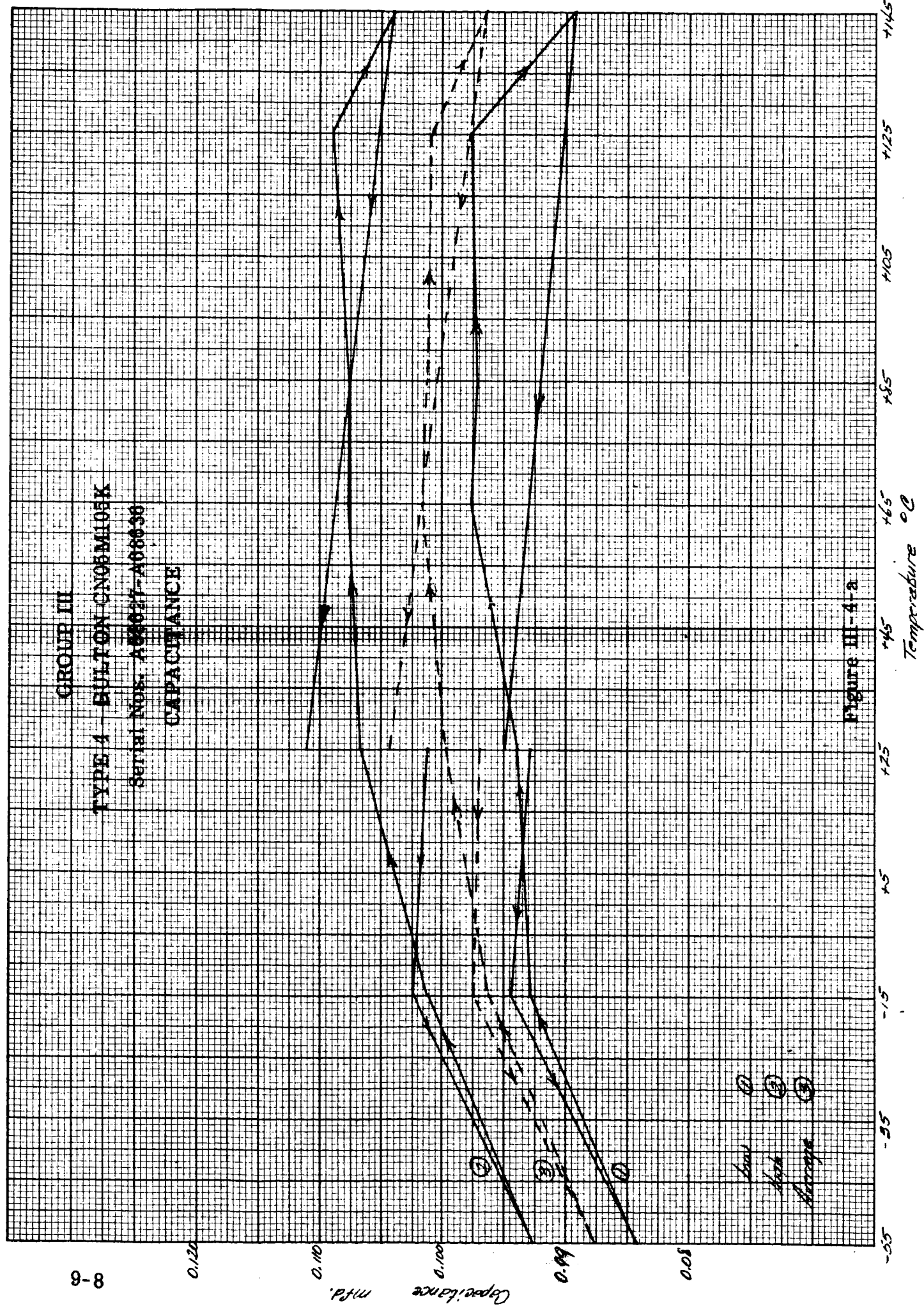


Figure III-4-a

99

GROUP III

TYPE 5 - KING KC80BW104K

Serial Nos. A68802-A68811

CAPACITANCE

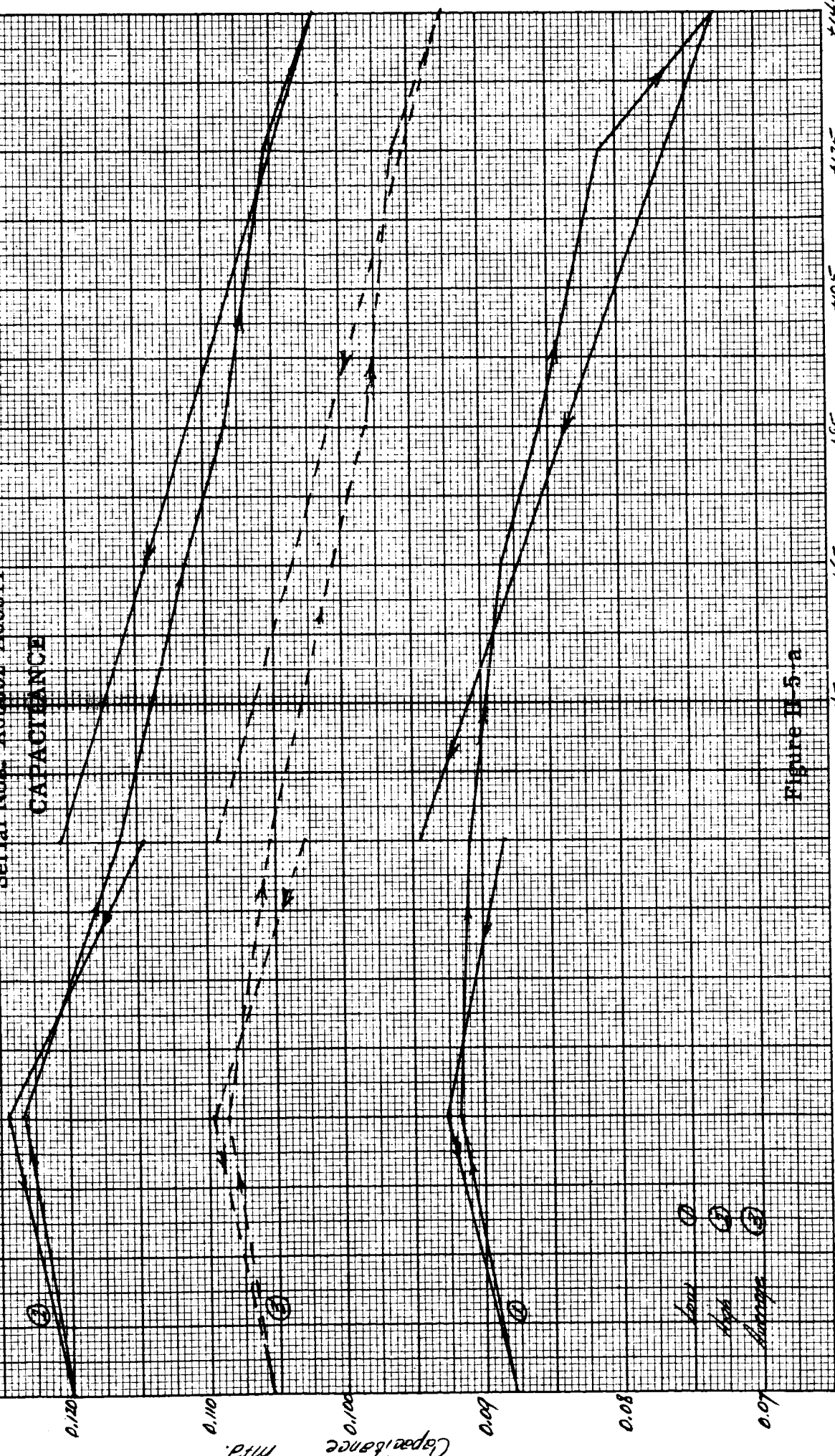


Figure 15-5-a

Temperature °C

9-10

GROHP III

TYPE 6 - SCIONICS SCM30D104K

Serial Nos. A68977-A68986

CAPACITANCE

0.12

0.11

0.10

0.09

0.08

Capacitance mfd

Low
High
Average

-55

-35

-15

+5

+25

+45

+65

+85

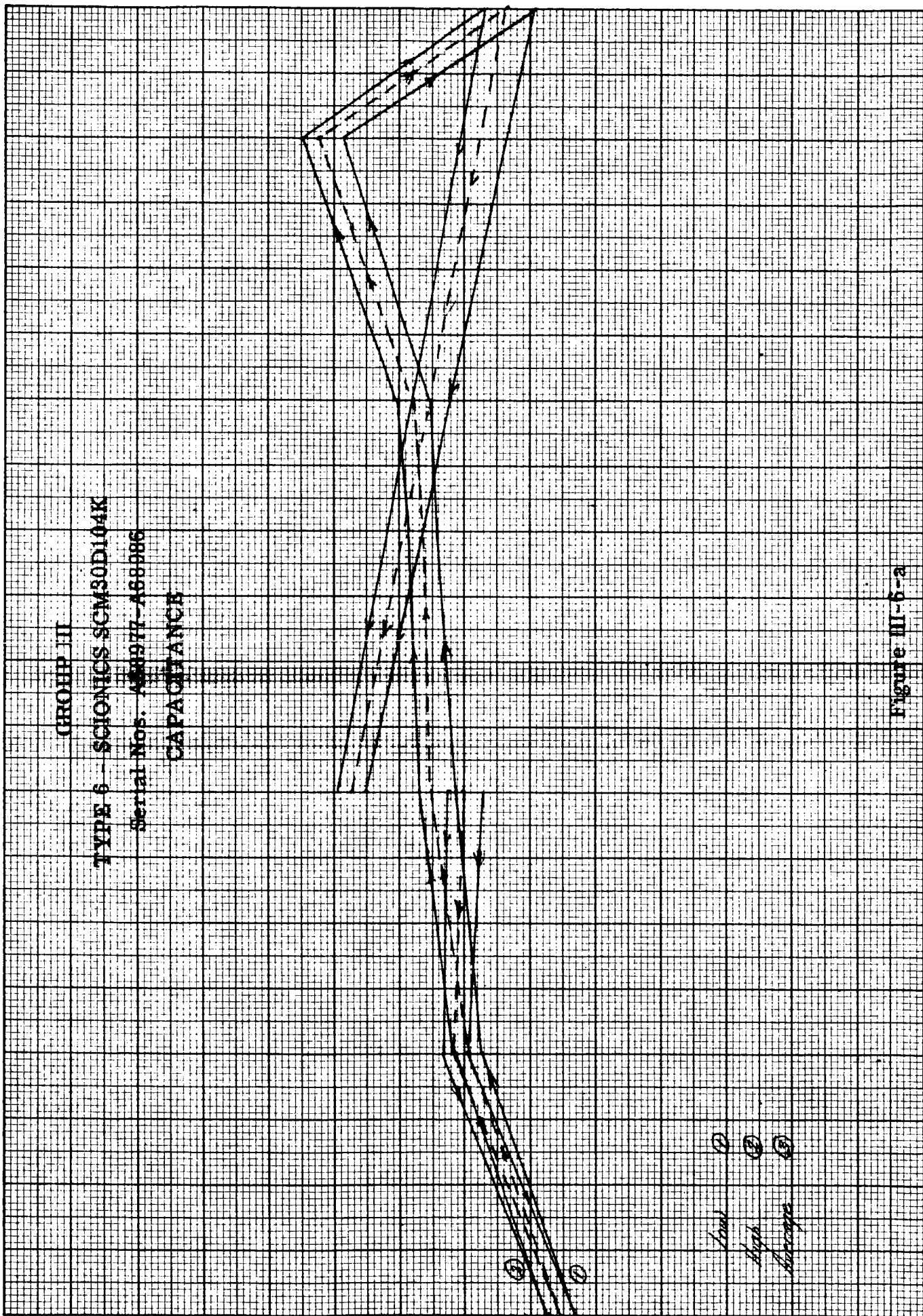
+105

+125

+145

Figure III-5-a

Temperature °C



9-11

0.12

0.10

Capacitance mfd.

0.08

0.06

0.04

0.02

Low
High
Average

-55

-35

-15

+5

+25

+45

+65

+85

+105

+125

+145

Temperature °C

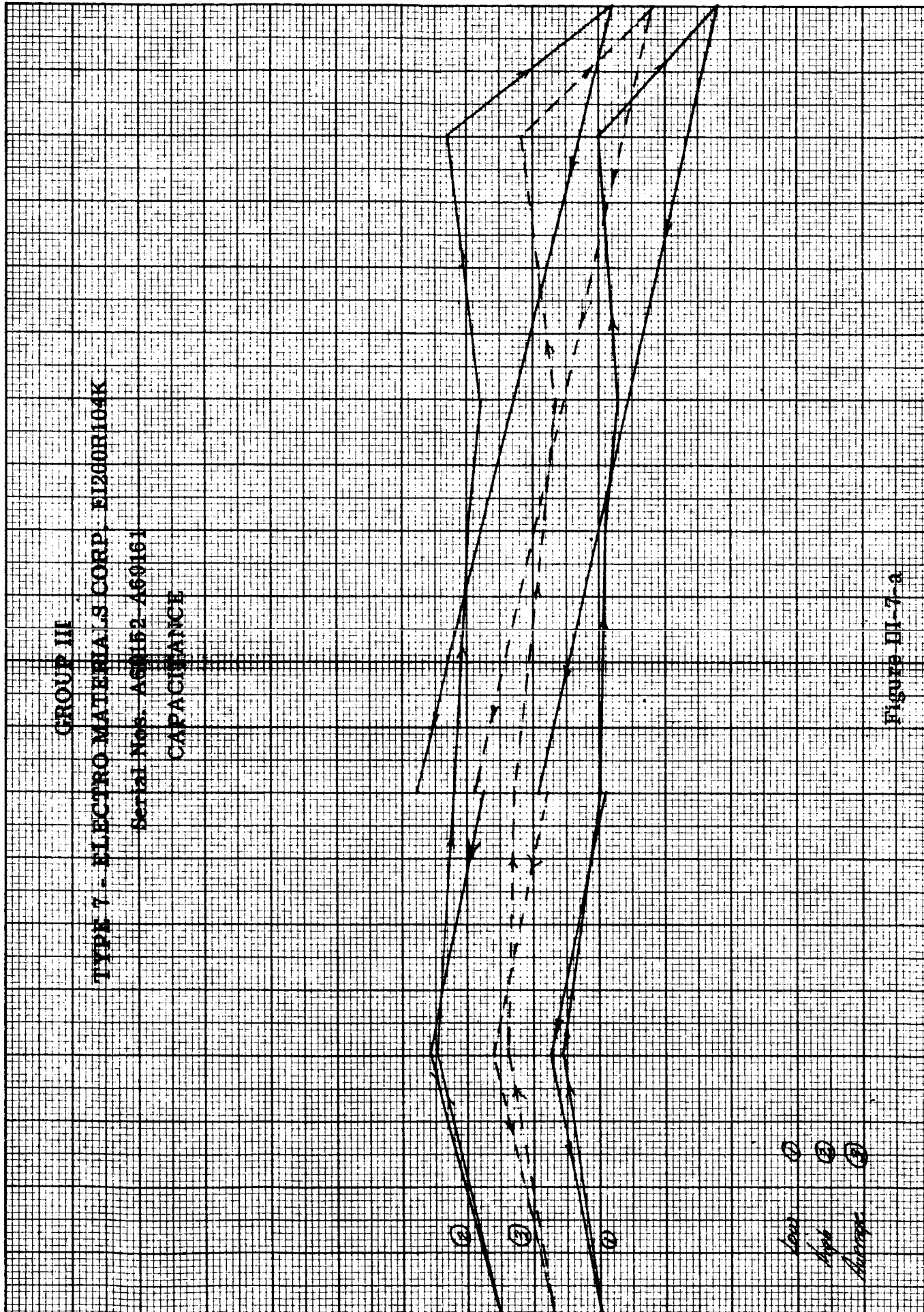
GROUP III

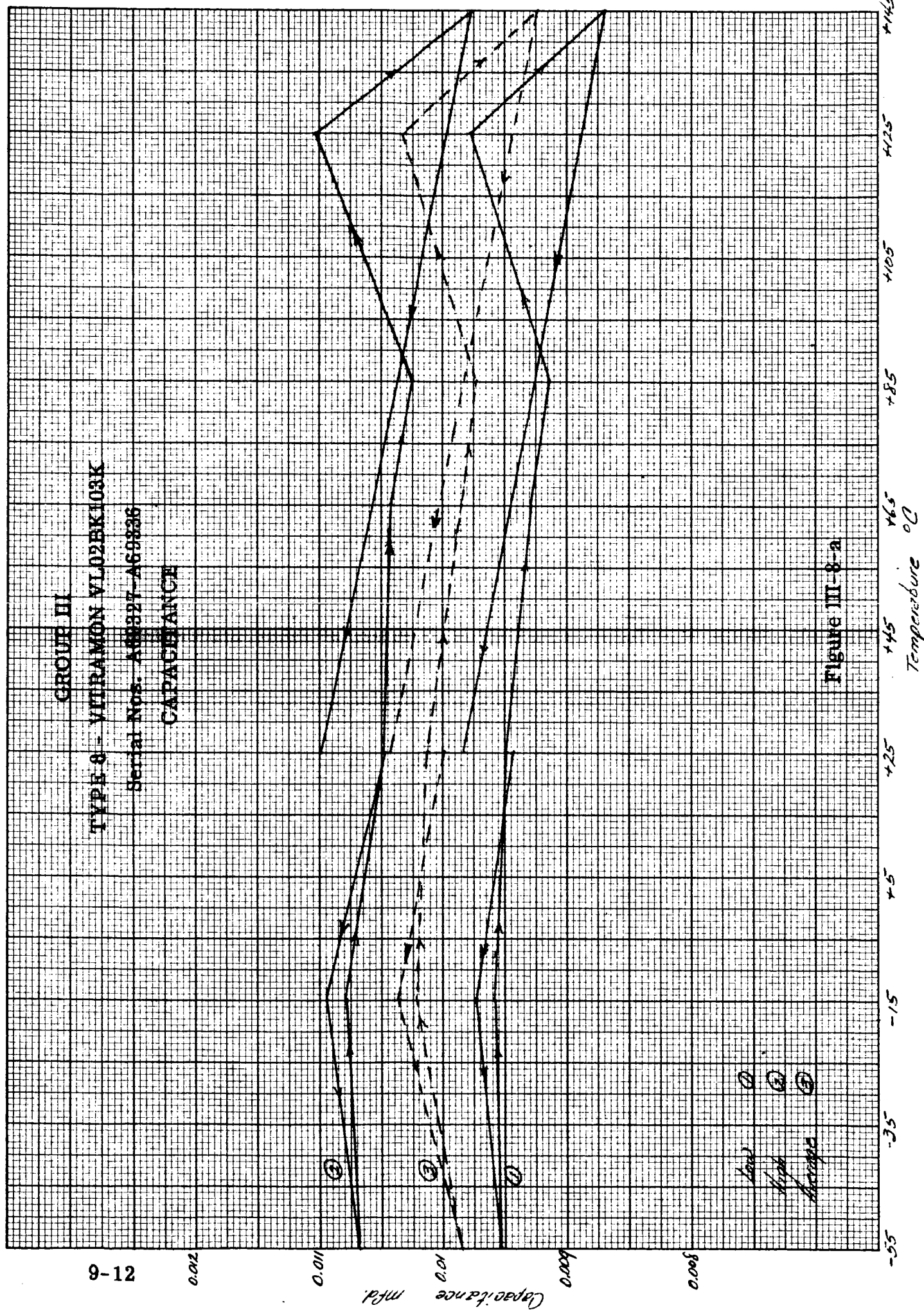
TYPE 7 - ELECTRO MATERIALS CORP. E1260R104K

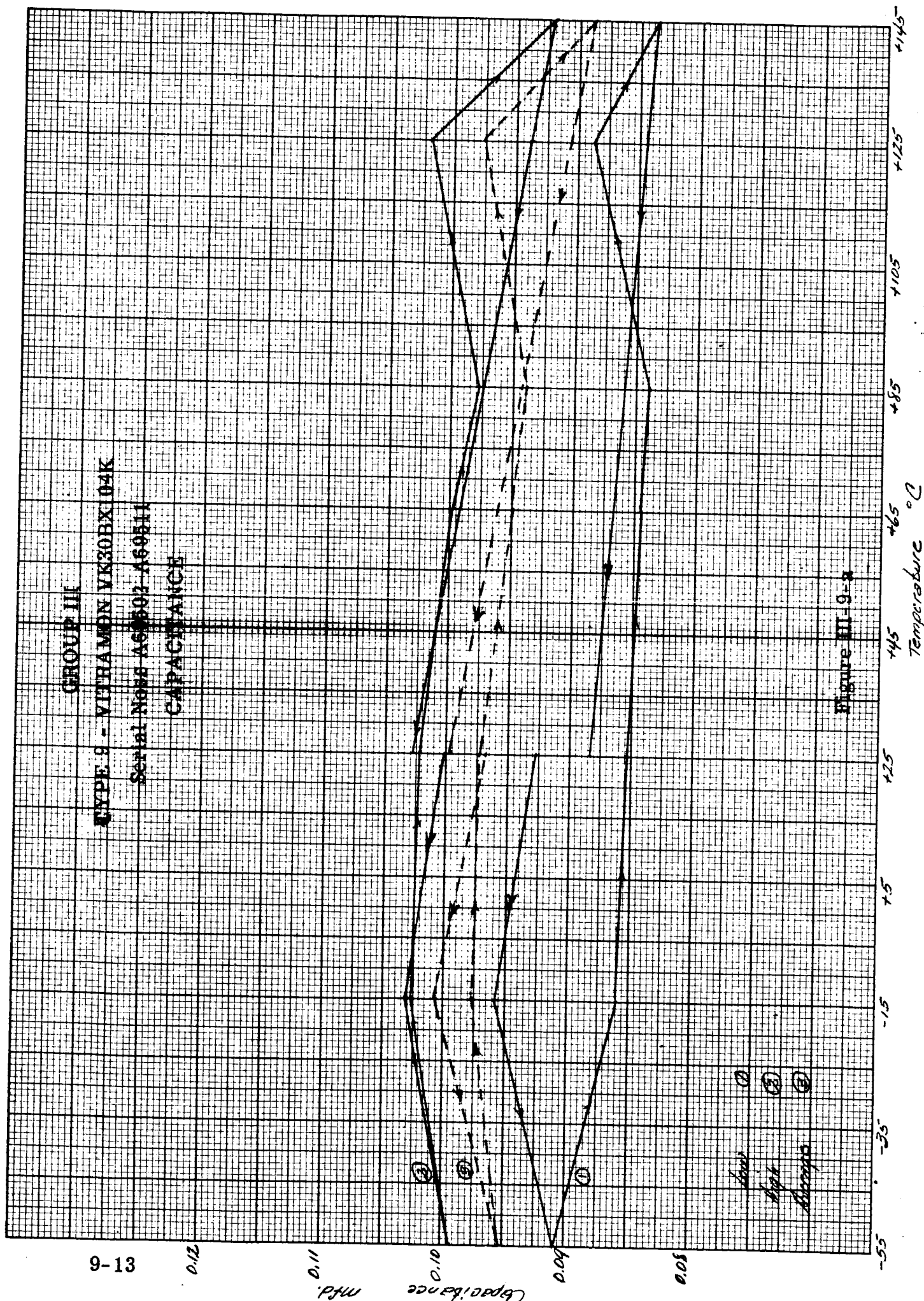
Serial Nos. A69152-A69161

CAPACITANCE

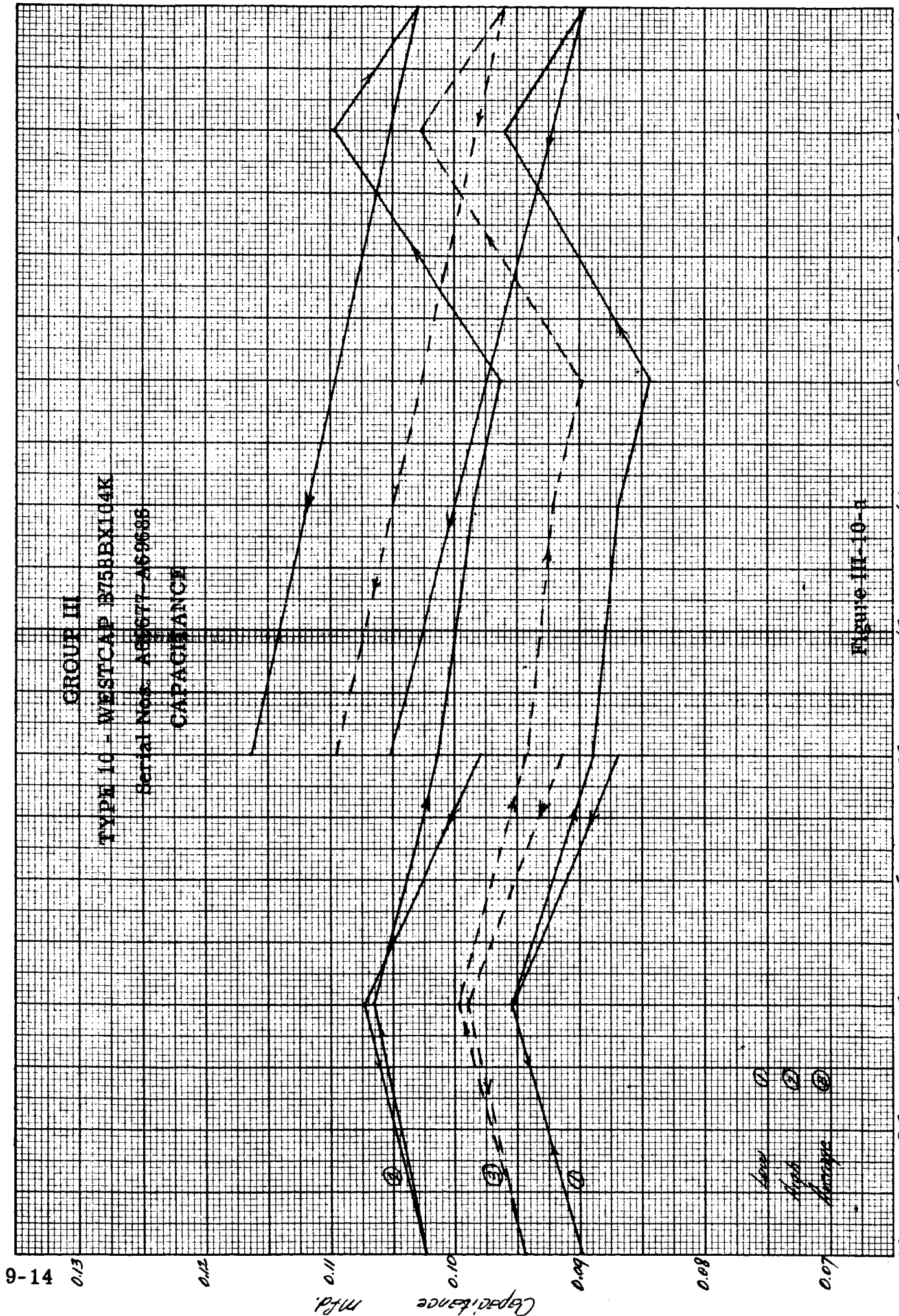
Figure III-7-a







GROUP III
TYPE 10 - WESTCAP 3753BX104K
Serial No. A69677-A69686
CAPACITANCE



GROUP III

TYPE 1 - AEROVOX MC805104RK

Serial Nos. A69102-A68111

DISSIPATION FACTOR

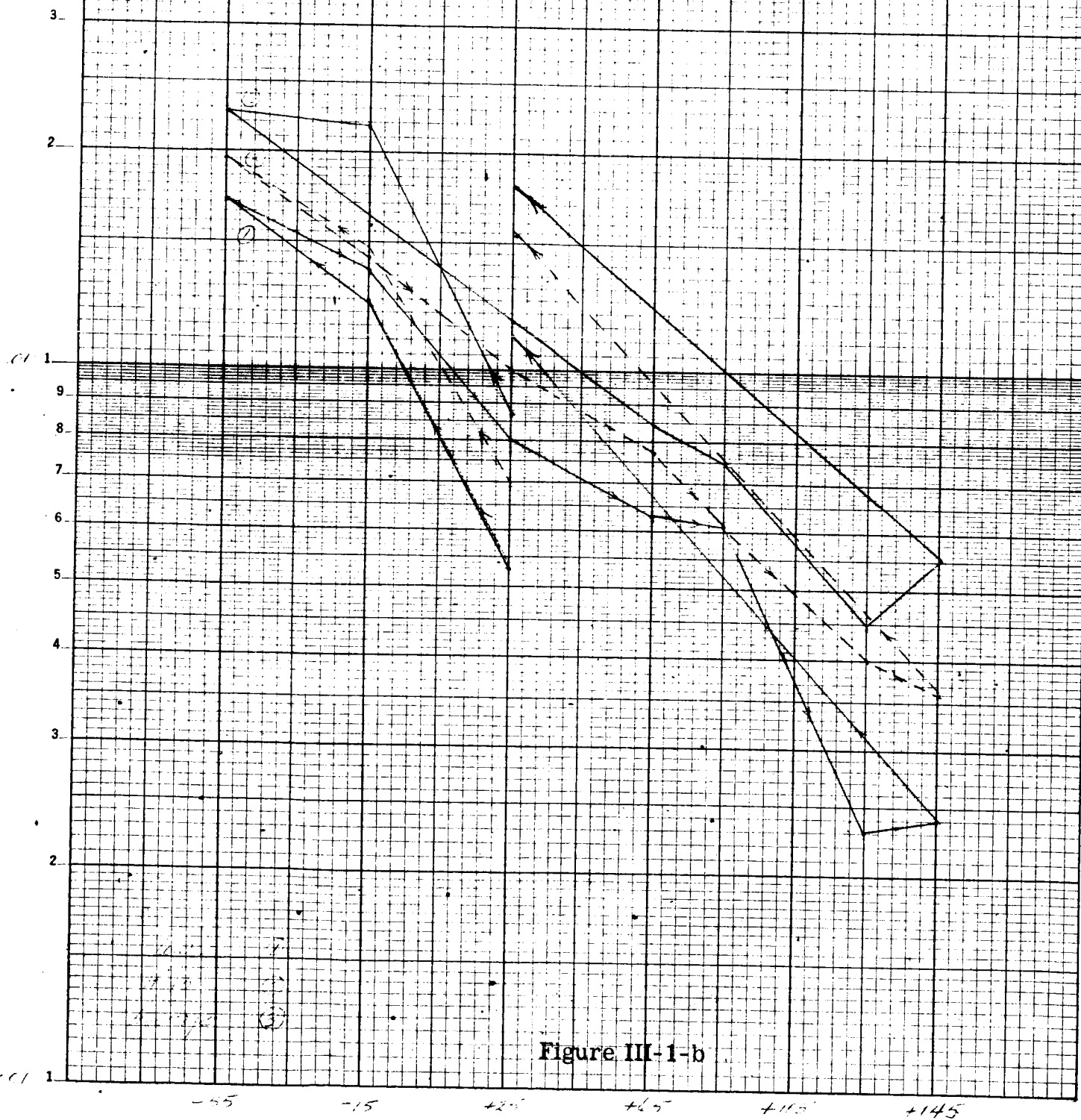
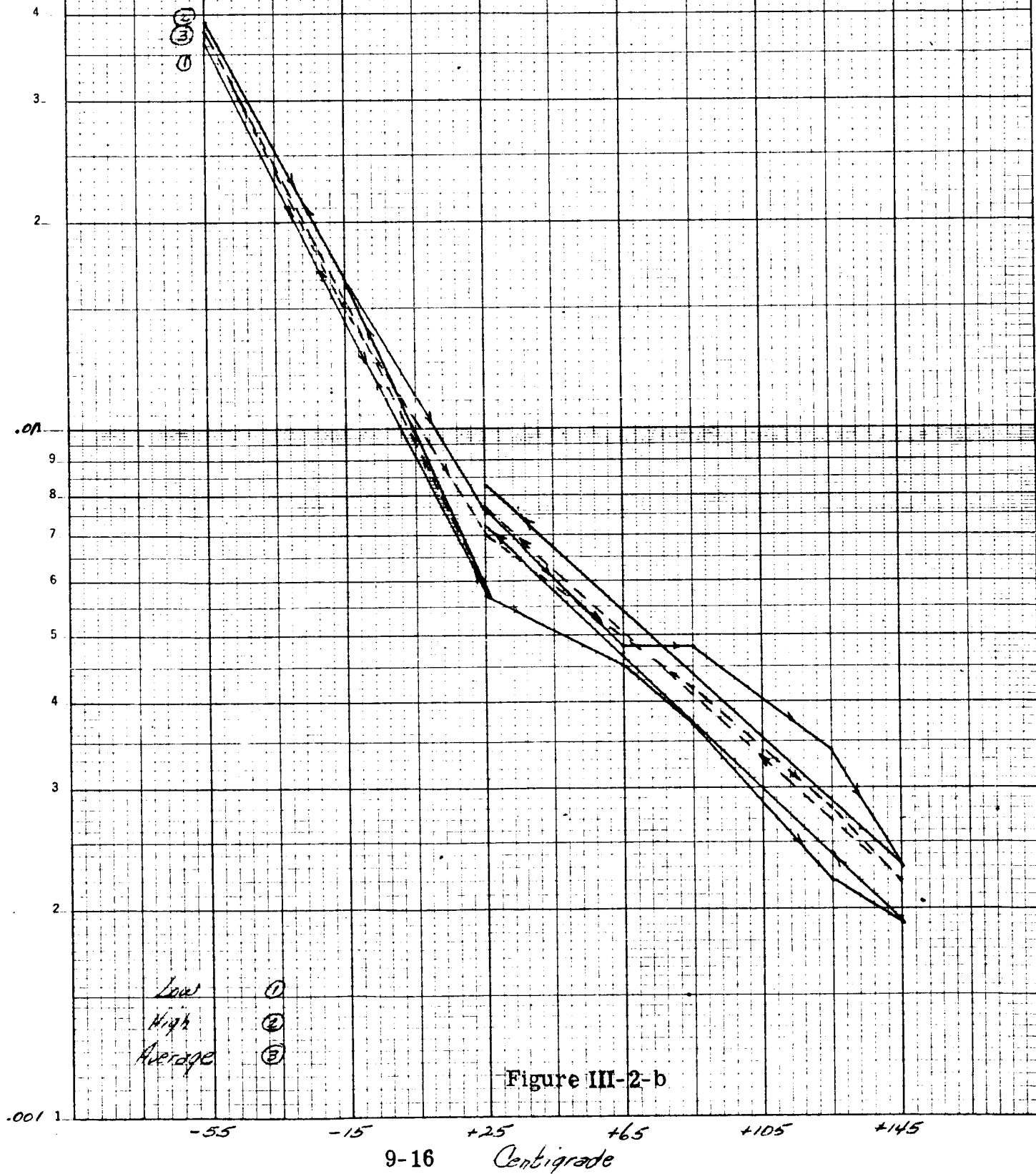
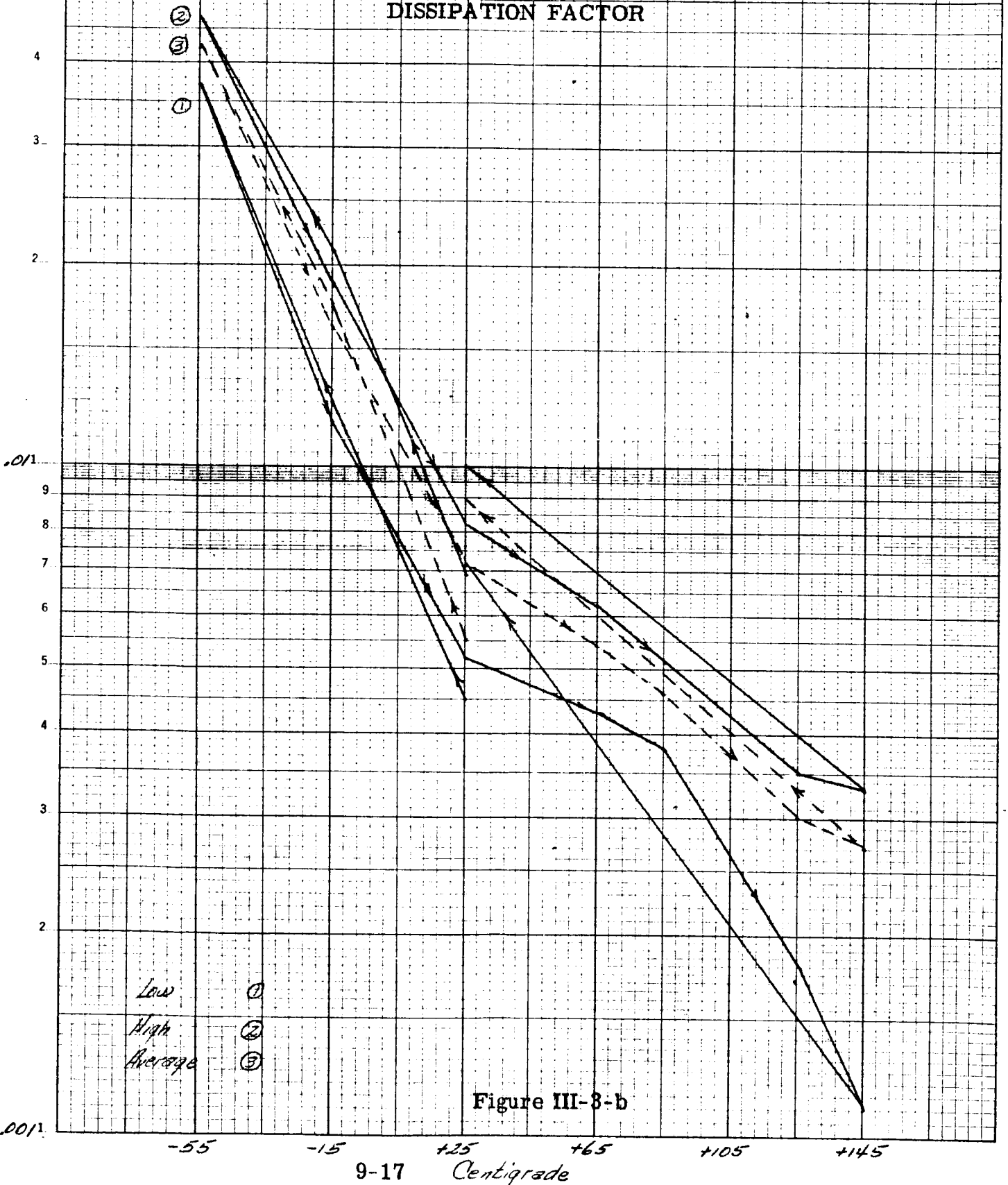


Figure III-1-b

GROUP III
 TYPE 2 - CHEM-ELECTRO RESEARCH CK2R104K
 Serial Nos. A68277-A68286
 DISSIPATION FACTOR



GROUP III
TYPE 3 - GULTON CK16M104K
Serial Nos. A68452-A68461
DISSIPATION FACTOR



GROUP III
TYPE 4 - GULTON CN05M105K
Serial Nos. A68627-A68636
DISSIPATION FACTOR

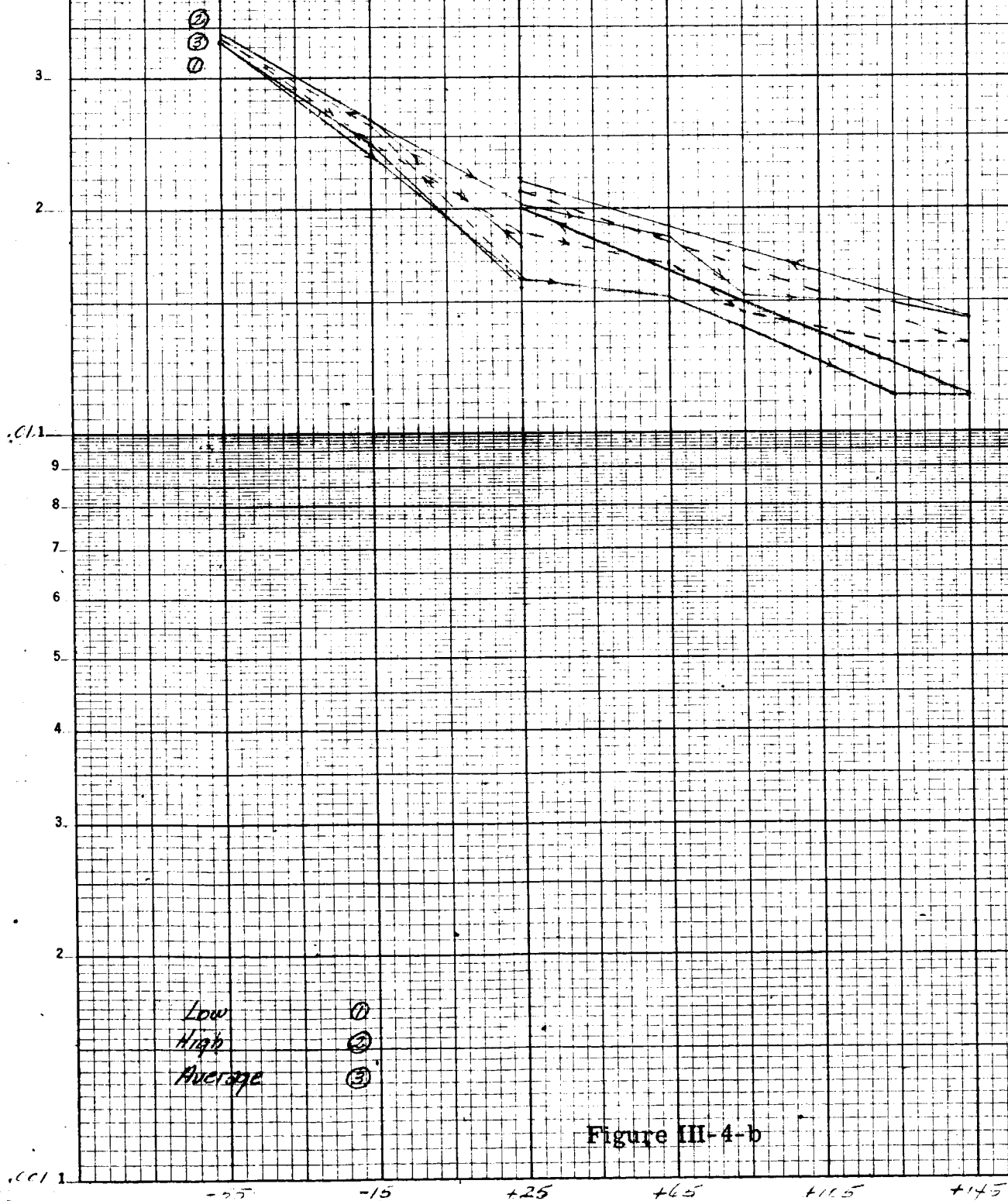
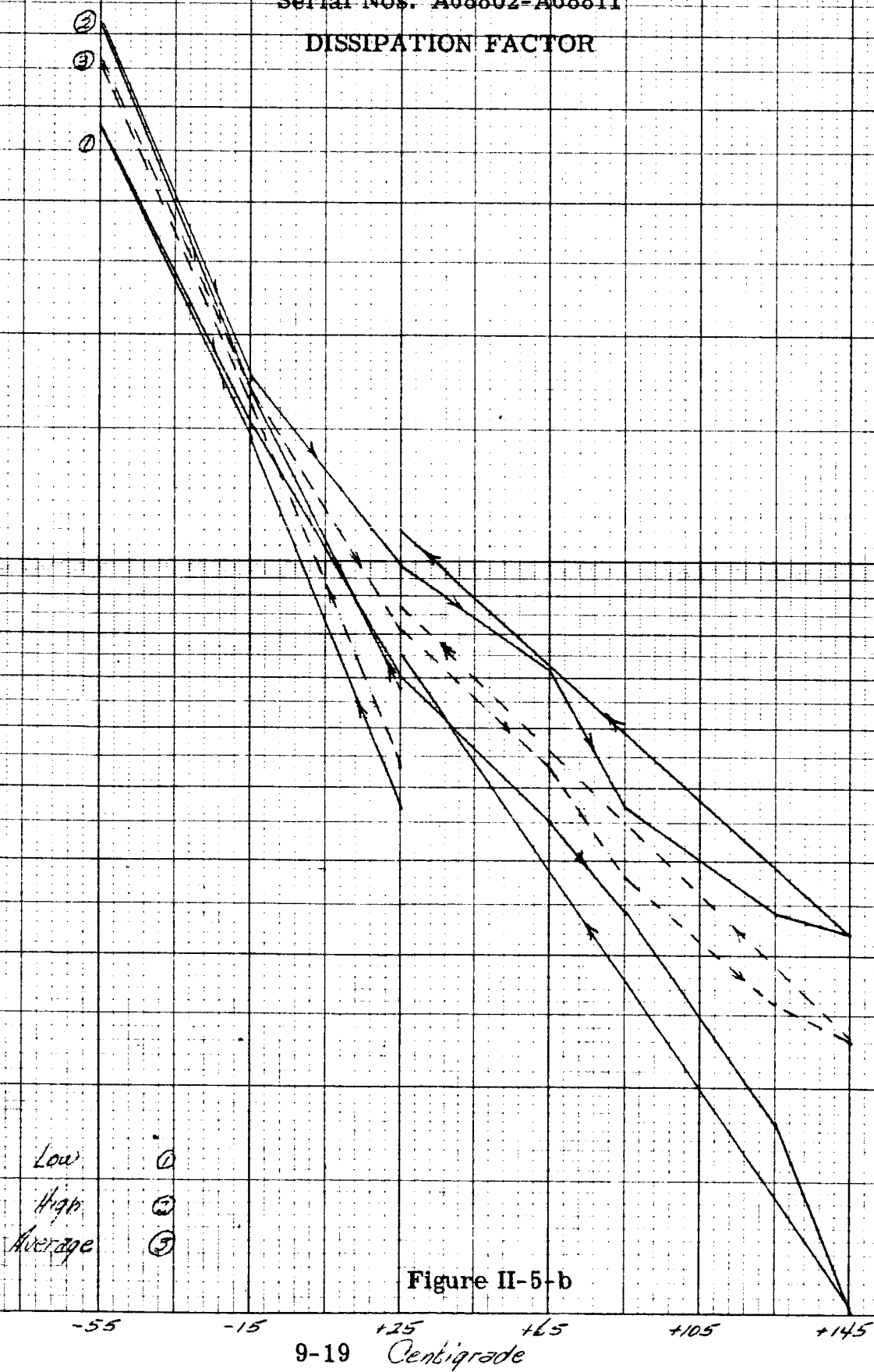


Figure III-4-b

GROUP III
 TYPE 5 - KING KC80BW104K
 Serial Nos. A68802-A68811
 DISSIPATION FACTOR



GROUP III
TYPE 6 - SCIONICS SCM30D104K
Serial Nos. A68977-A68986
DISSIPATION FACTOR

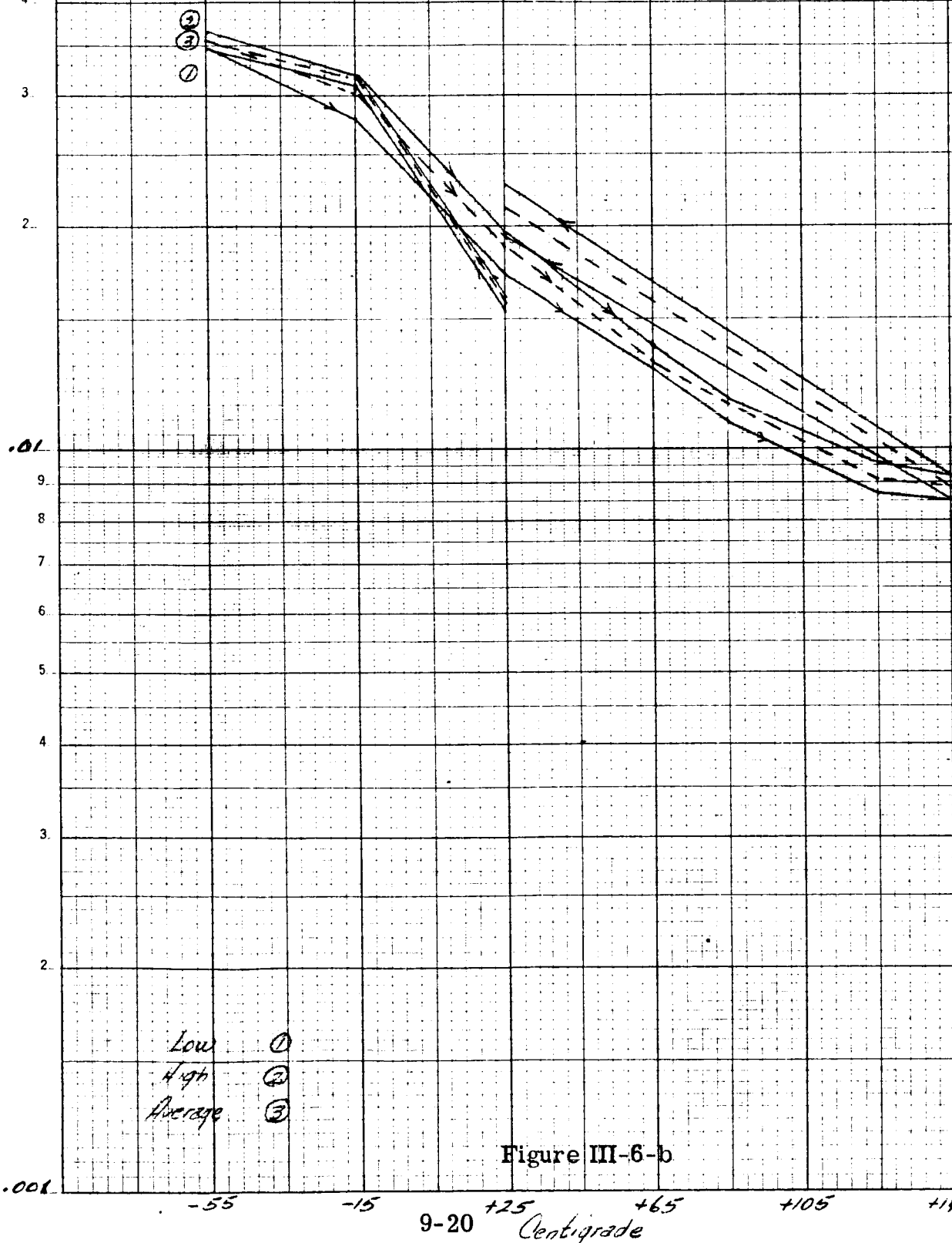
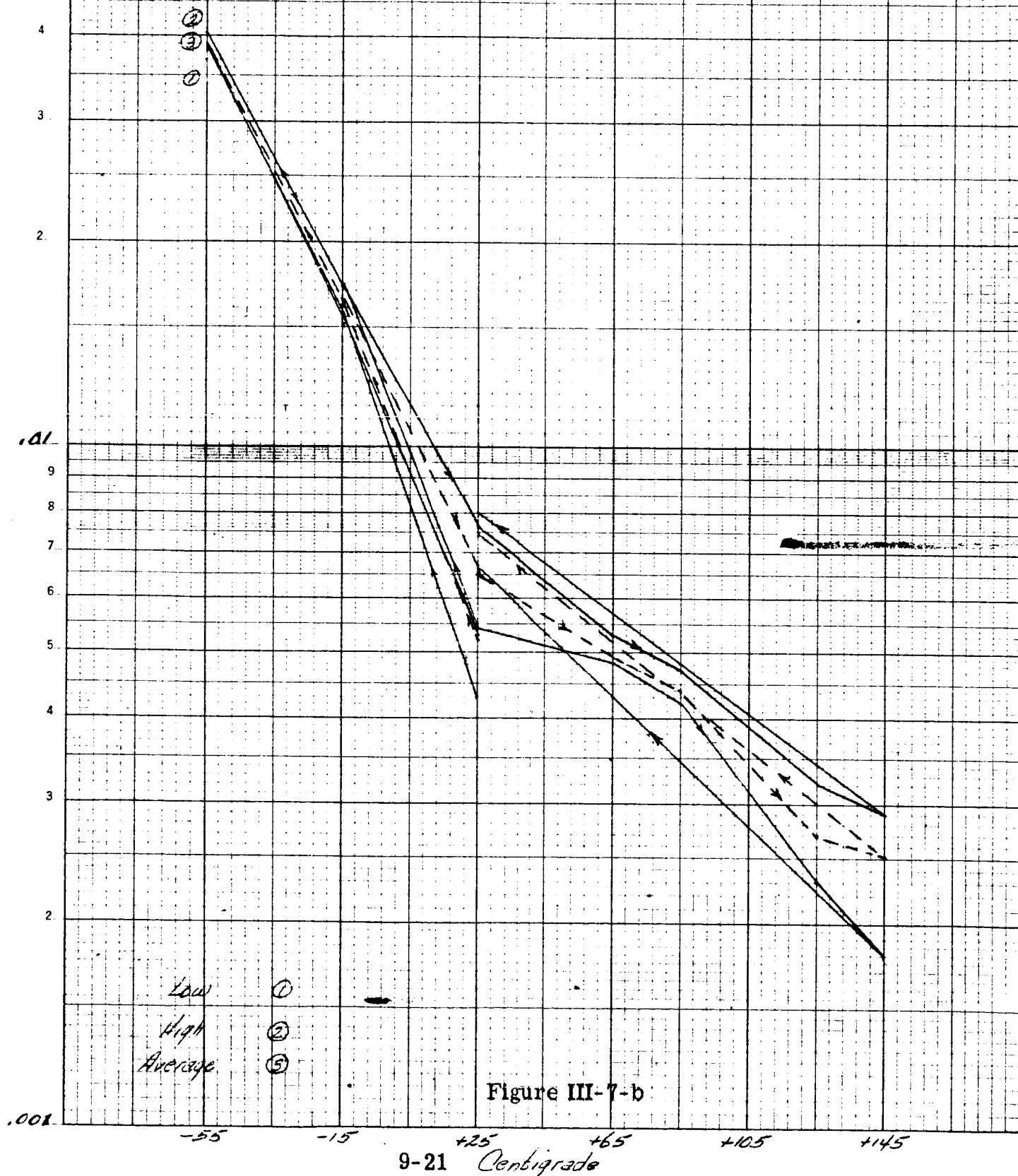


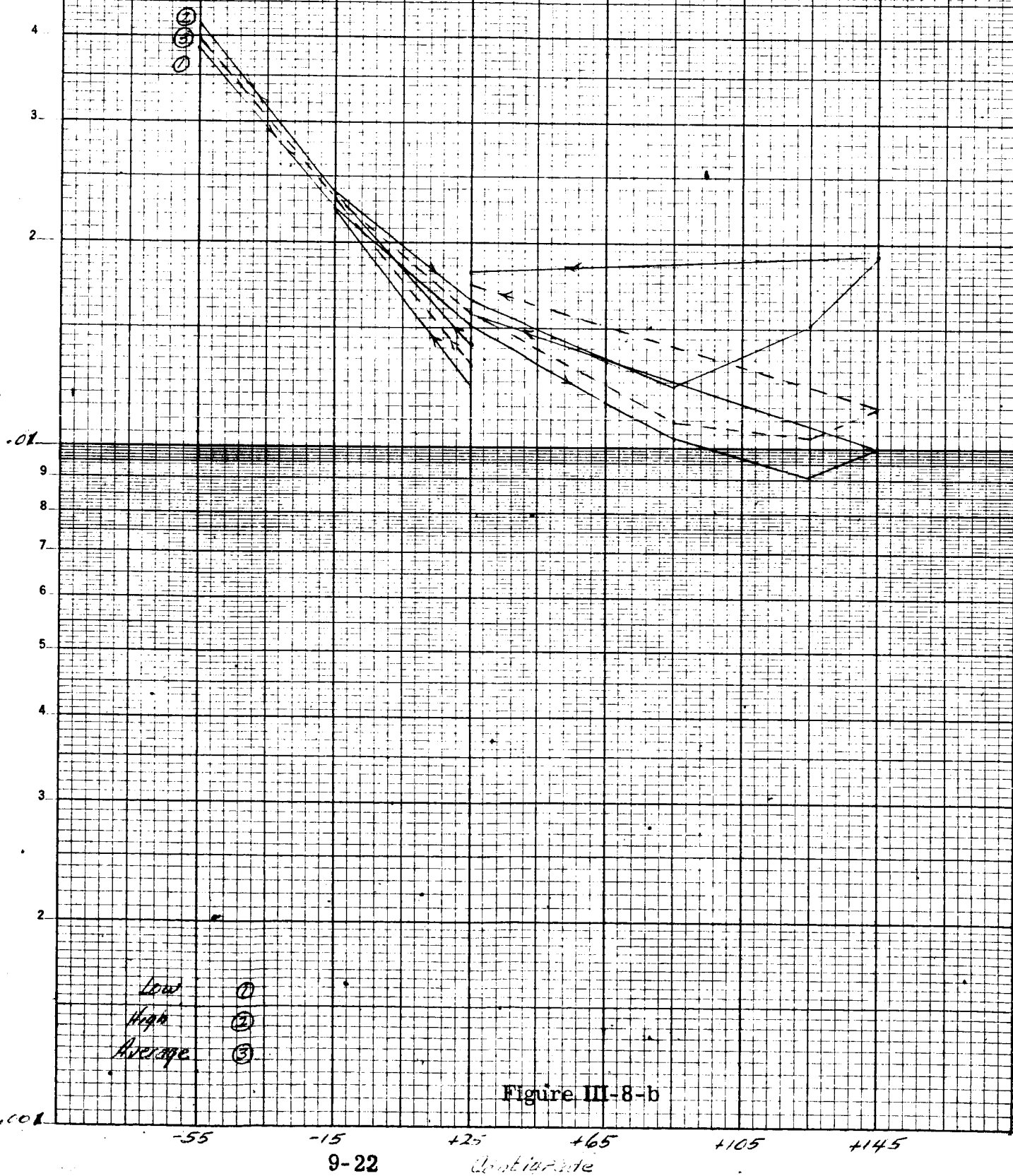
Figure III-6-b

GROUP III
TYPE 7 - ELECTRO-MATERIALS CORP. EK200R104K
Serial Nos. A69152-A69161
DISSIPATION FACTOR



2 CYCLES X 70 DIVISIONS

GROUP III
TYPE 8 - VITRAMON VL02BK103K
Serial Nos. A69327-A69336
DISSIPATION FACTOR



GROUP III
TYPE 9 - VITRAMON VK30BX104K
 Serial Nos. A69502-A69511
DISSIPATION FACTOR

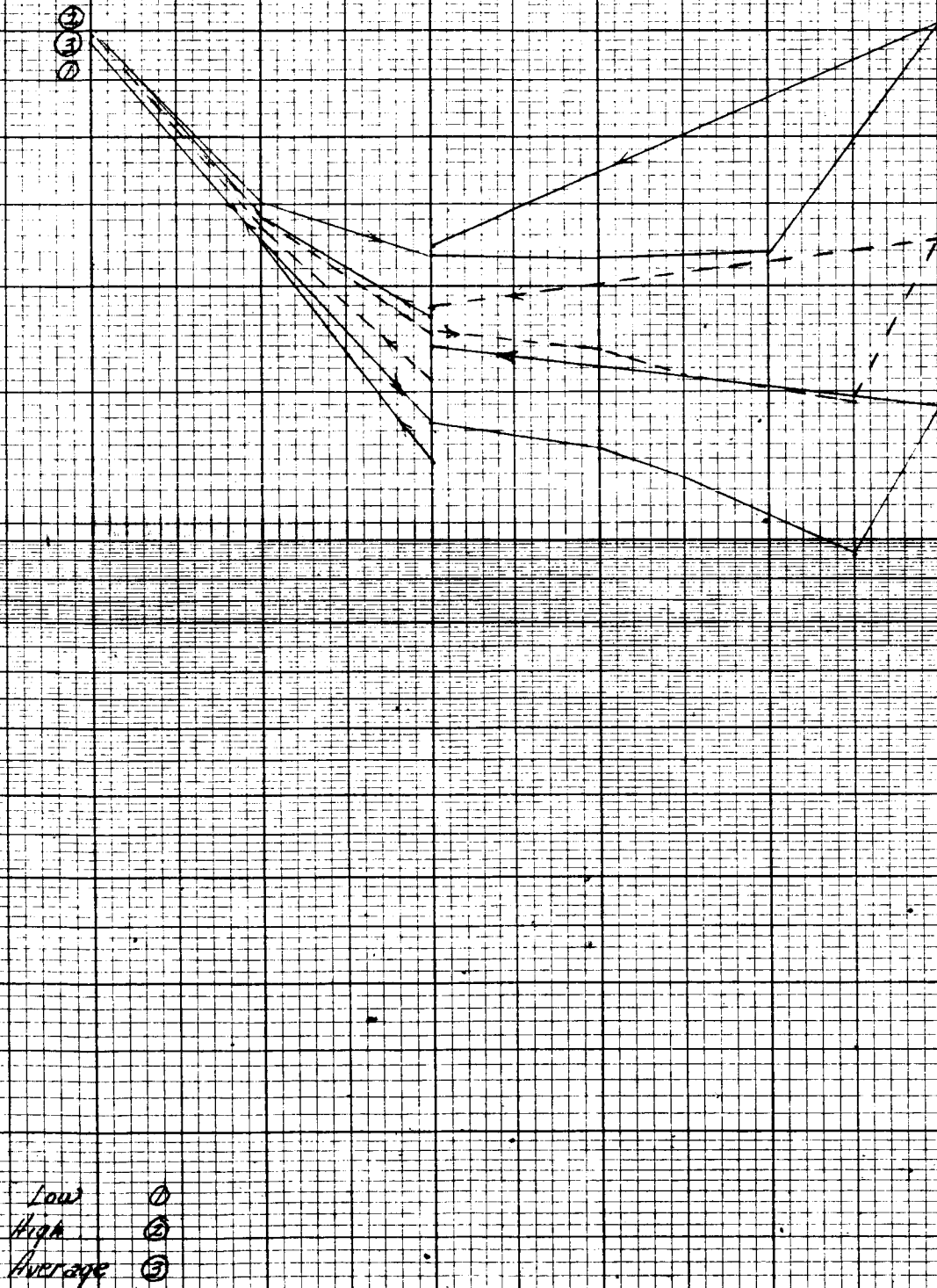


Figure II-9-b

0.1/10

2 CYCLES X 70 DIVISIONS

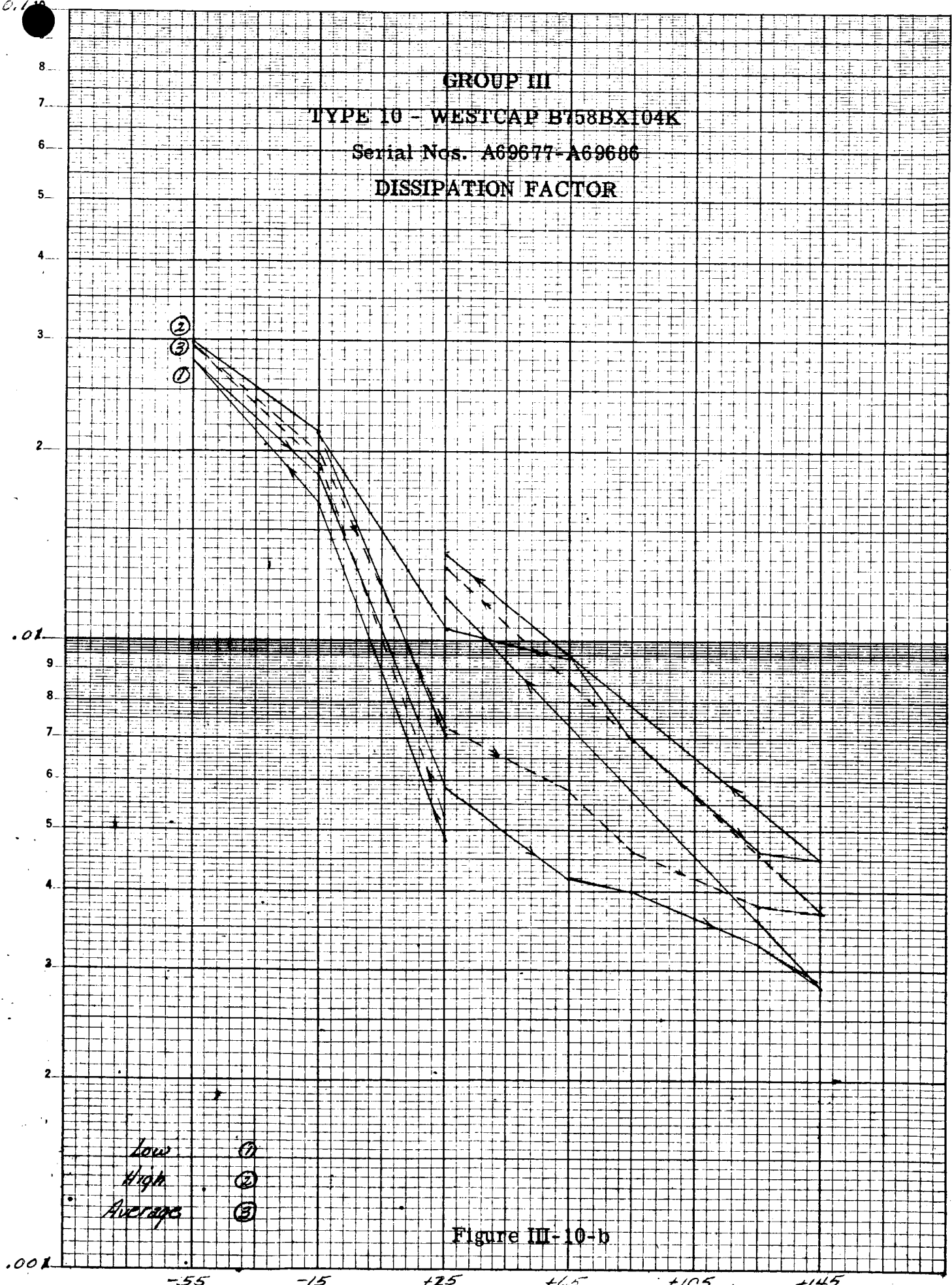
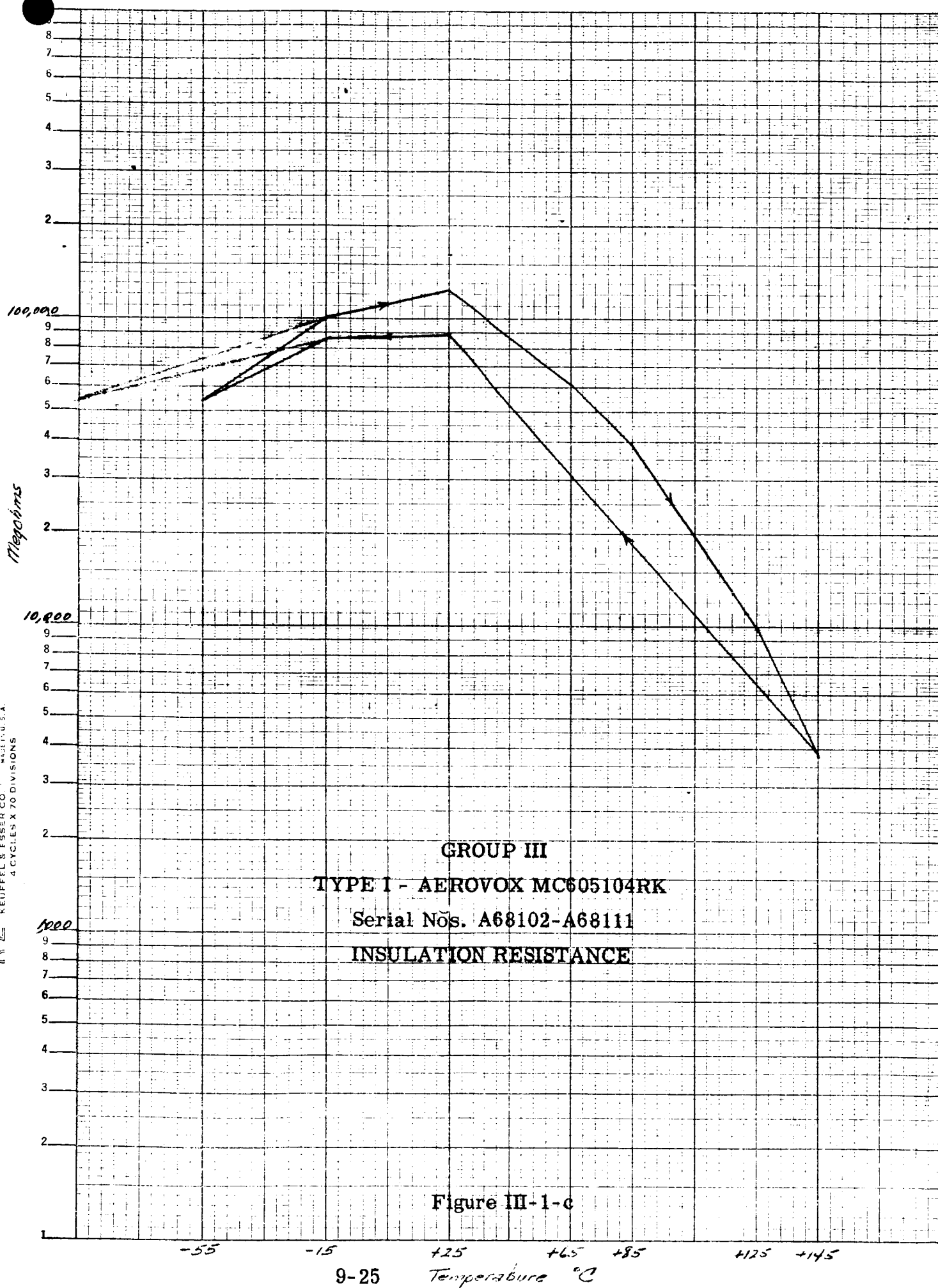
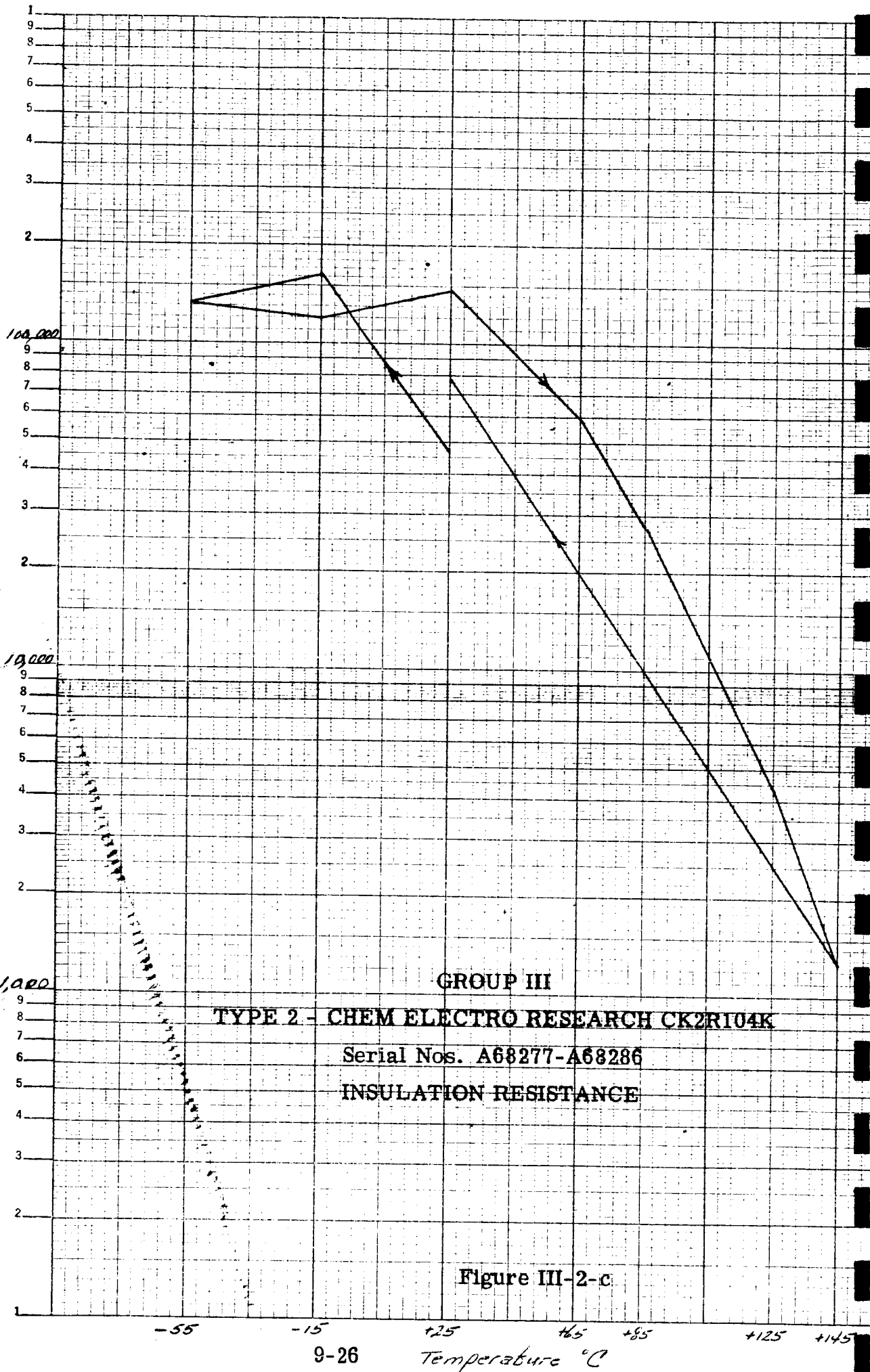


Figure III-10-b



KE SEMI-LOGARITHMIC 35981
 KEUFFEL & ESSER CO. U.S.A.
 4 CYCLES X 70 DIVISIONS

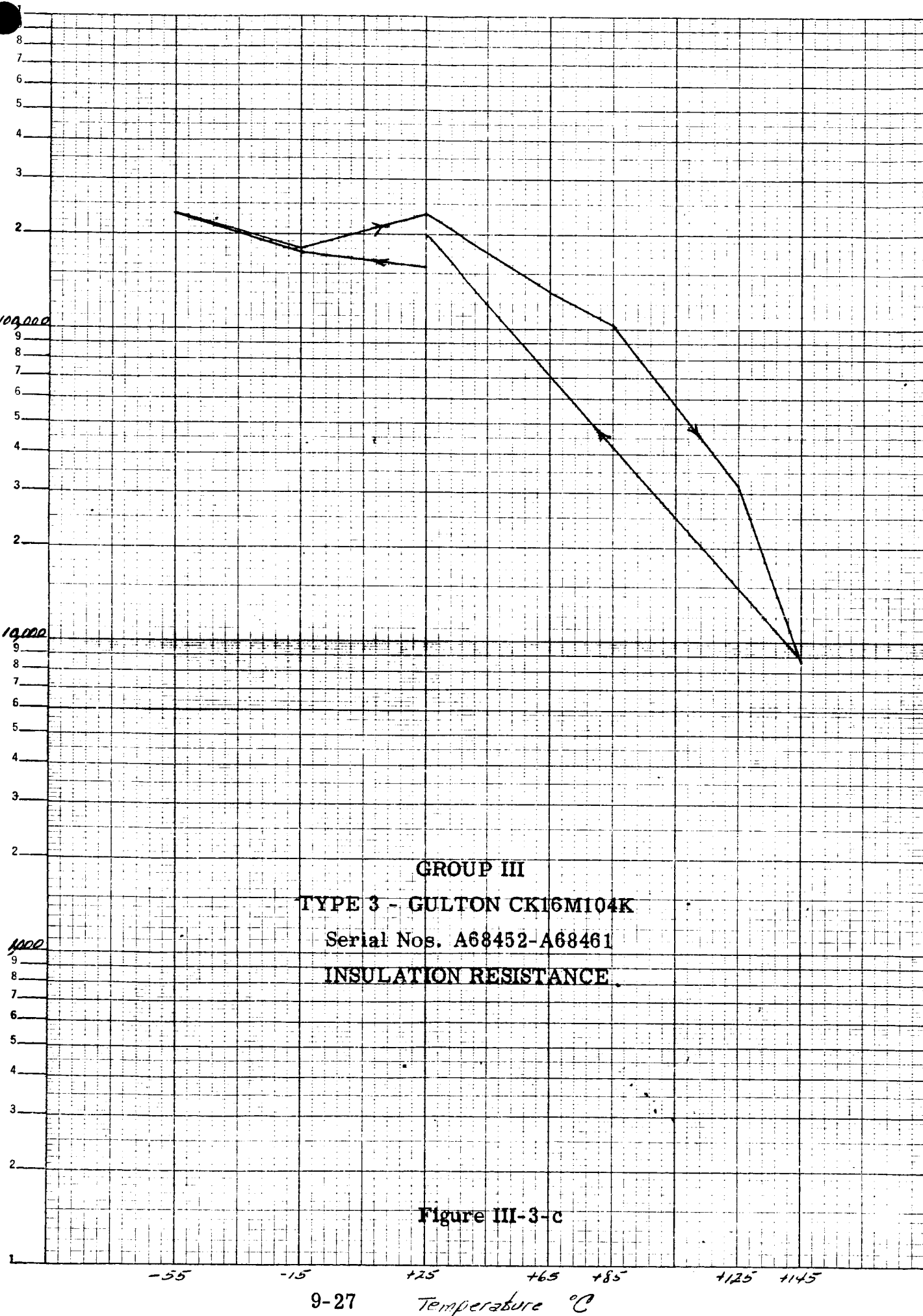
Megohms

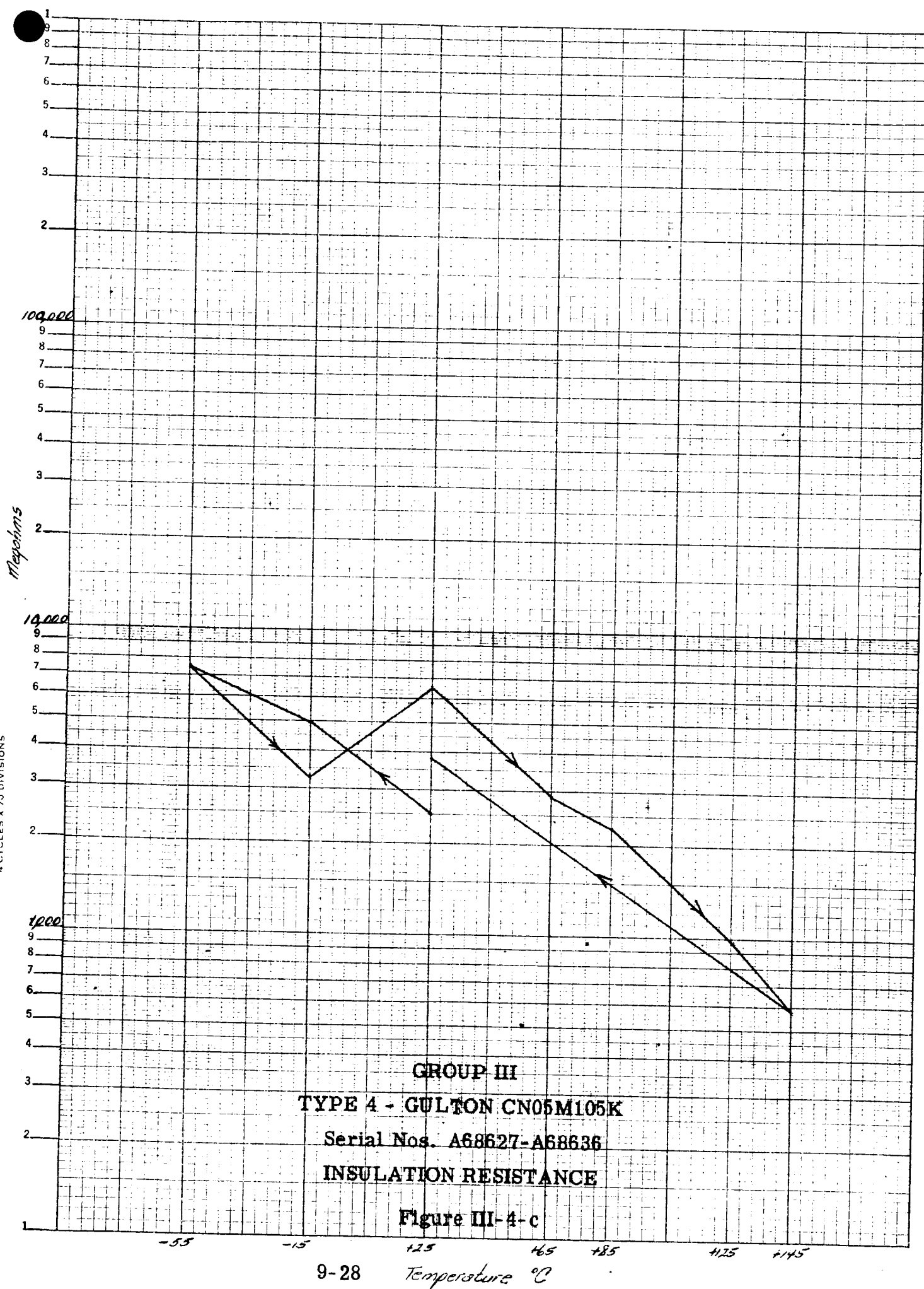


GROUP III
 TYPE 2 - CHEM ELECTRO RESEARCH CK2R104K
 Serial Nos. A68277-A68286
 INSULATION RESISTANCE

Figure III-2-c

Megohms
 100,000
 10,000
 1,000





Megohms

100,000

10,000

1,000

GROUP III
 TYPE 5 - KING KC80BW104K
 Serial Nos. A68802-A68811
 INSULATION RESISTANCE

Figure III-5-c

-55

-15

+25

+65

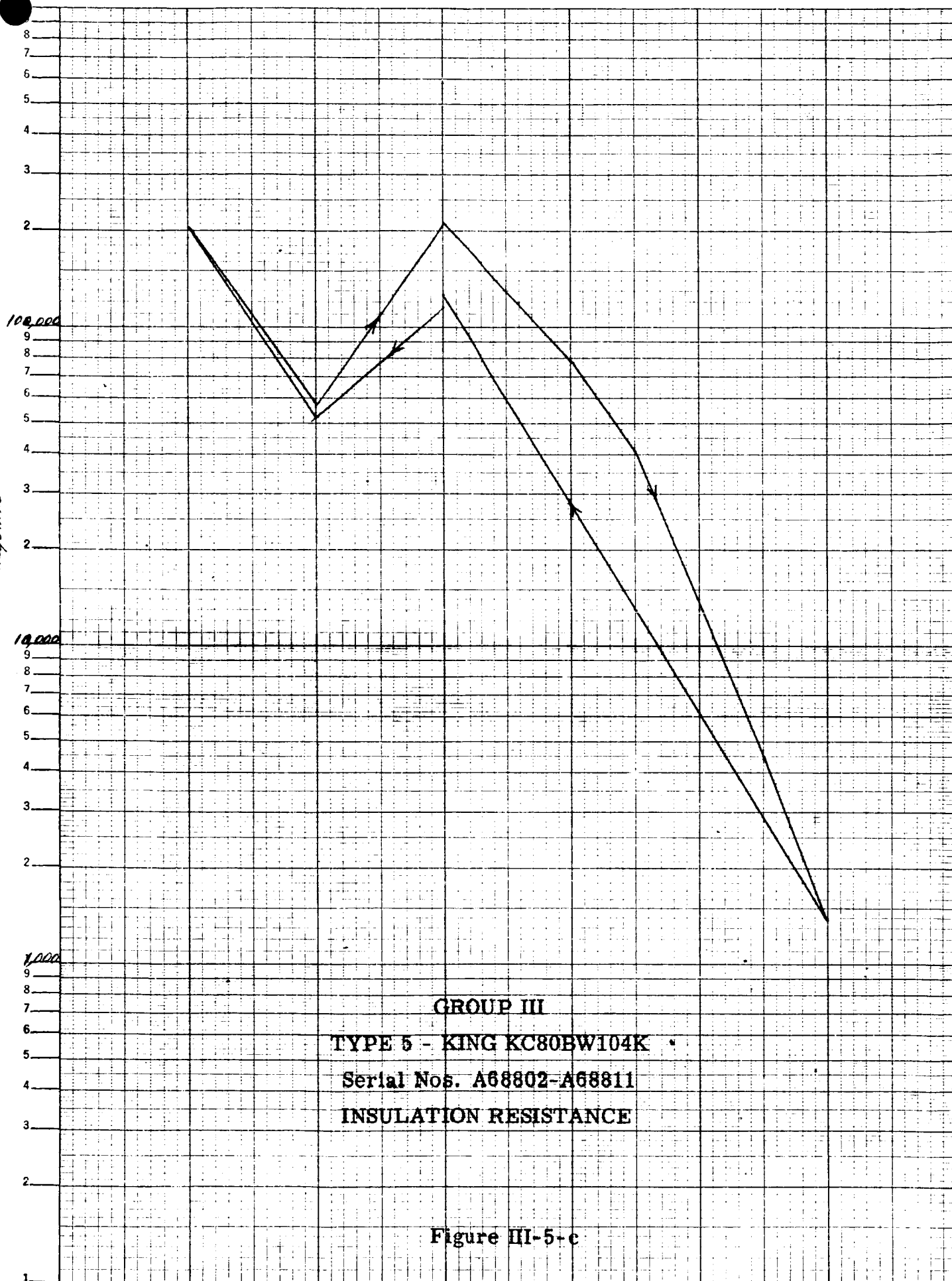
+85

+125

+145

9-29

Temperature °C



Megohms

100,000

10,000

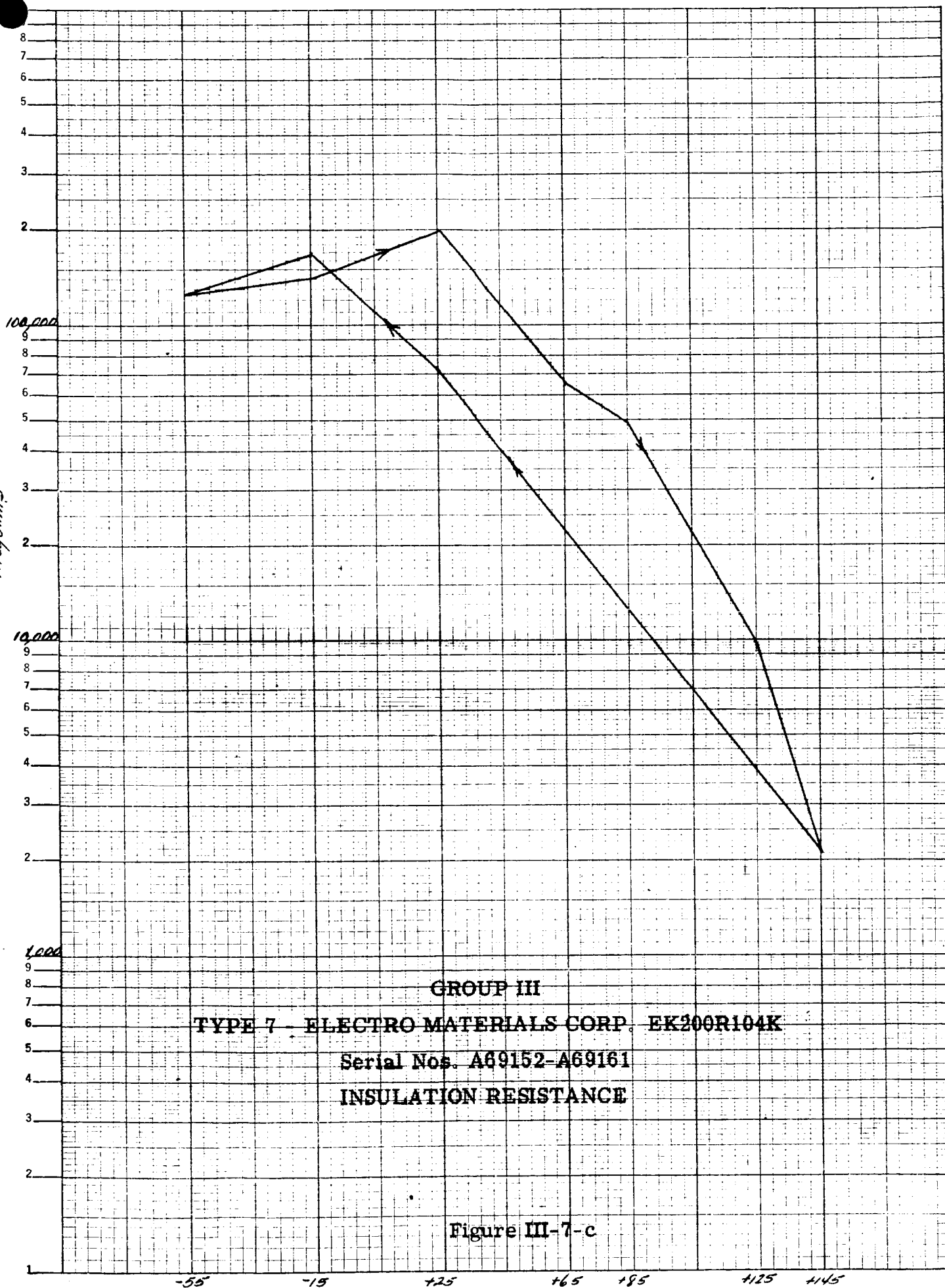
1,000

GROUP III
 TYPE 7 - ELECTRO MATERIALS CORP. EK200R104K
 Serial Nos. A69152-A69161
 INSULATION RESISTANCE

Figure III-7-c

-55° -15° +25° +65° +85° +125° +145°

9-31 Temperature °C



megohms

100,000

10,000

1,000

GROUP III
TYPE 6 - SCIONICS SCM30D104K
Serial Nos. A68977-A68986
INSULATION RESISTANCE

Figure III-6-c

-55

-15

+25

+65

+85

+125

+145

9-30 Temperature °C

Megohms

100,000

10,000

1,000

GROUP III
TYPE 8 - VITRAMON VL02BK103K
Serial Nos. A69327-A69336
INSULATION RESISTANCE

Figure III-8-c

-55

-15

+25

+65

+85

+125

+145

9-32

Temperature °C

Megohms

KEUFFEL & ESSER CO. - MADE IN U.S.A.
4 CYCLES X 70 DIVISIONS

100,000

10,000

1,000

1

-55

-15

+25

+65

+85

+125

+145

9-33

Temperature °C

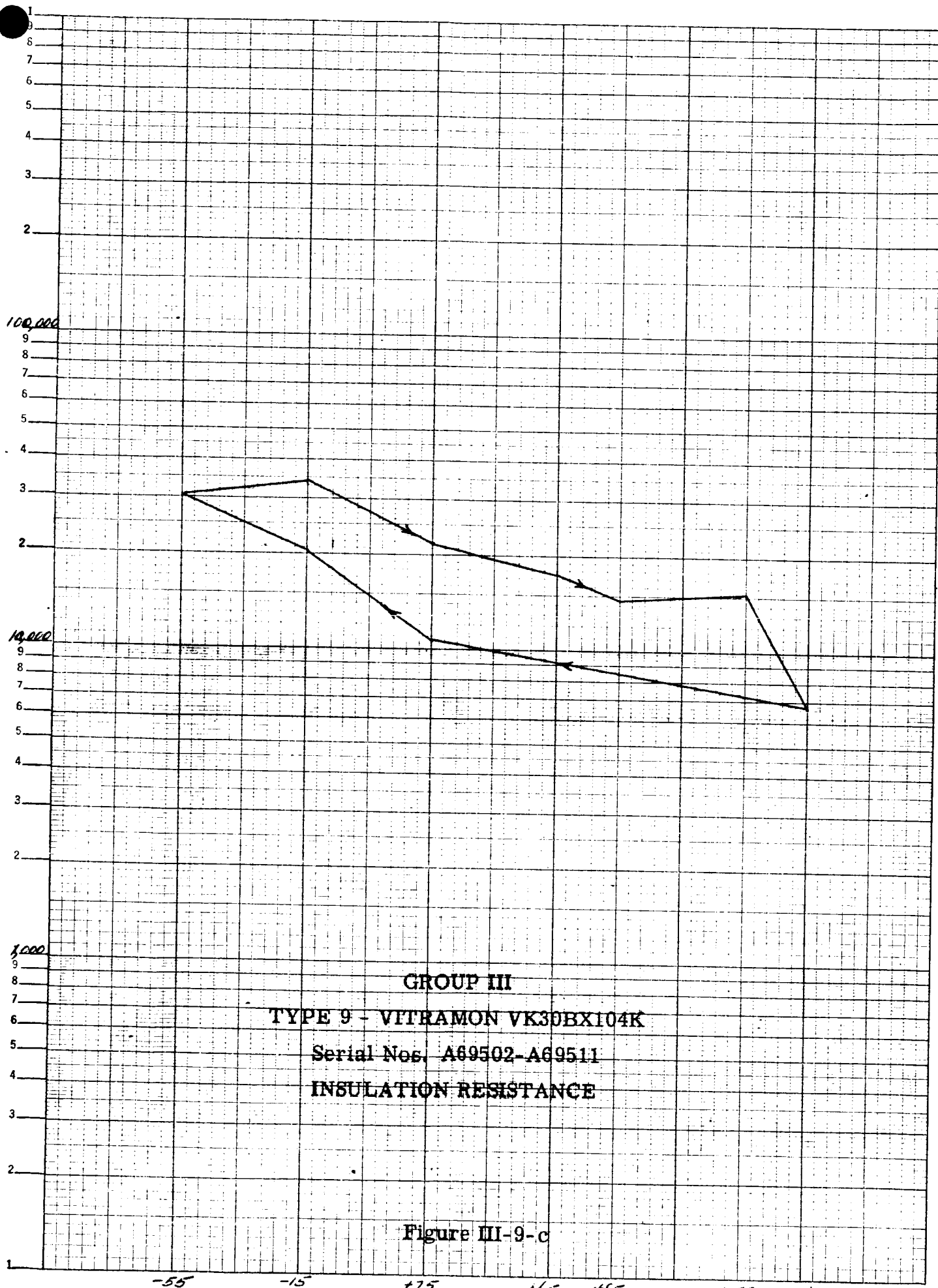
GROUP III

TYPE 9 - VITRAMON VK30BX104K

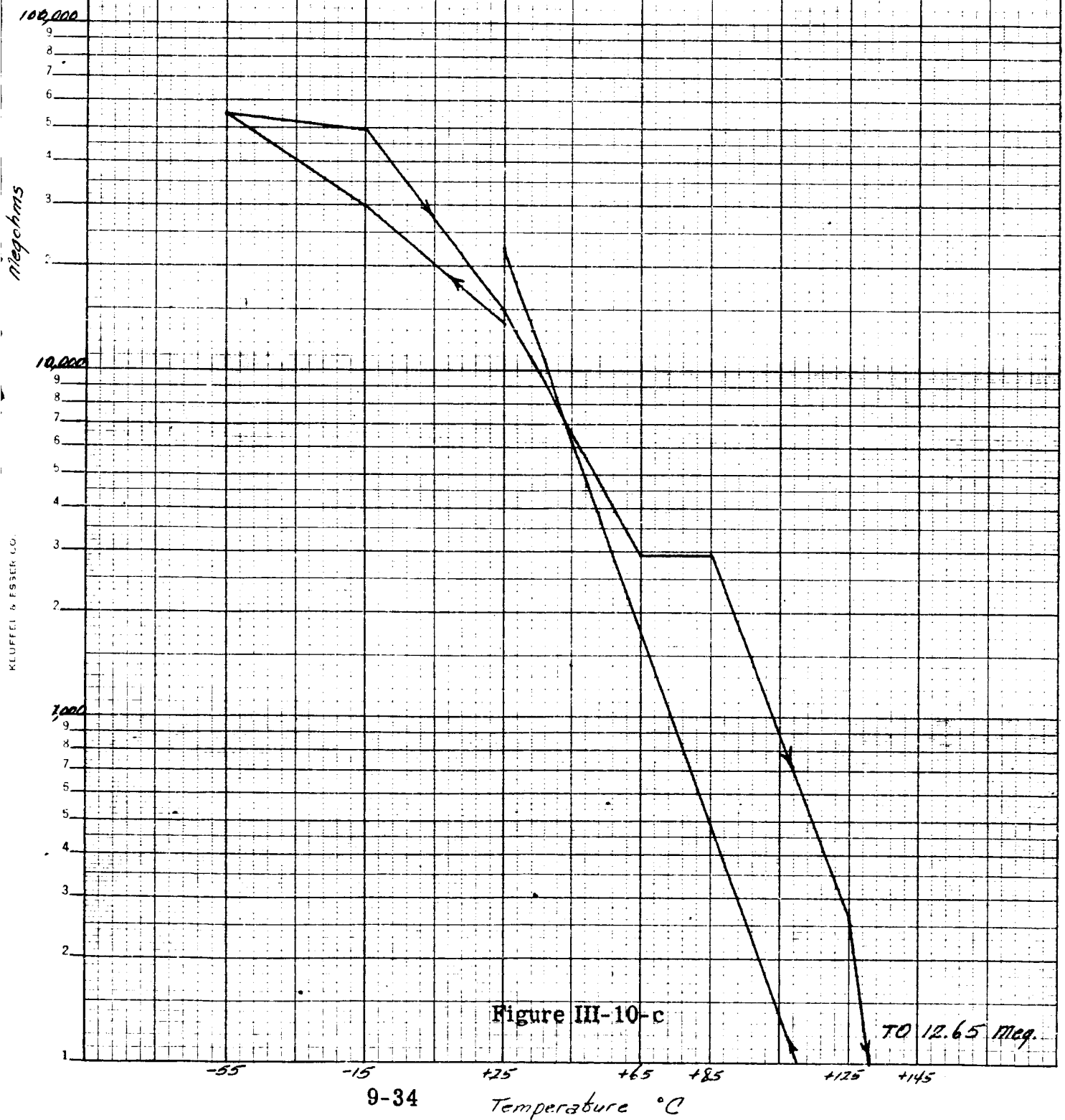
Serial Nos. A69502-A69511

INSULATION RESISTANCE

Figure III-9-c



GROUP III
TYPE 10 - WESTCAP B758BX104K
Serial Nos. A69677-A69686
INSULATION RESISTANCE



GROUP IV - VOLTAGE BREAKDOWN TEST

This test was performed in accordance with paragraphs 4.2 and 4.5.2 of JPL Test Procedure #152.20-02 dated May 13, 1964. The apparatus used in this test was a Hewlett Packard 412A Vacuum Tube Voltmeter Serial #05485 equipped with a 2 to 1 voltage divider and a filtered DC power supply capable of output voltages in excess of 10,000 volts. The breakdown current was limited with a fast blow of 1/2 ampere fuse in series with each capacitor to prevent total destruction of the test specimen when failure occurred. In the case of the small Vitramon capacitors, the units did suffer severe mechanical destruction. Therefore, the 1/2 ampere fuse specified was reduced to a 1/8 ampere fast blow fuse. However, the units still were, for the most part, destroyed. Details of the test results are given below:

Chart #1 lists all of the Capacitors by serial number together with the voltage at which each capacitor suffered breakdown. Figures IV-A through IV-J are cumulative distributions of number of units plotted against breakdown voltage. It is to be noted that a considerable range of breakdown voltage exists even for capacitors having the same voltage ratings.

Following the Breakdown Test, Failure Analysis, in accordance with paragraph 4.9 of the Test Procedure was performed. The Failure Analysis proved to be somewhat difficult because of problems in dissolving the various encapsulants used by the different capacitor manufacturers. First, attempts were made using Narmco Telesolv and Isochem Strip 708LV. Both of these solutions, given sufficient time, would dissolve all coating except those of Gulton and Scionic parts. Therefore, Epoxy Strip T51C was procured. This strip did successfully dissolve all of the encapsulants. However, as noted under the comments for individual specimens, the results were not

always satisfactory. Listed below is a tabulation of comments concerning the various parts together with the results of the failure analyses.

Part Type #1 - Aerovox 605104RK - Encapsulation is accomplished by filling a molded cup with plastic material. Internal assembly of the leads and elements is by means of soldering flattened leads along the sides of the ceramic elements. These parts are strong mechanically and no parts fell apart or were otherwise damaged during opening. The following observations are pertinent to the specific parts tested.

Serial #A68112 - Dark cracks are noted to propagate from contacts on one side.

Serial #A68113 - Crazing and cracking on one side propagating from contacts.

Serial #A68114 - Deep hole in top center of element.
This hole was observed prior to depotting and occurred at breakdown when the case fractured.

Serial #A68115 - Light crack in element.

Serial #A68116 - Small circular cracks, bottom side of element.

Serial #A68117 - Fine cracks in one side which appear to be propagating from contacts.

Serial #A68118 - Cracked near contact.

Serial #A68119 - Deep cracks in one side propagating from contacts.

Serial #A68120 - Long crack in element.

Serial #A68121 - Small hole in approximate center of one side.

It is to be noted that in this type of unit the cracks generally appear to generate either from or in the vicinity of contacts. There does not appear to be any particular correlation between resultant observed damage and observed value of breakdown voltage.

Part Type #2 - Chem-Electro Research CK2R104K - These
parts are encapsulated by filling a molded cup with the encapsulant.
Lead attachment to the element is by means of formed nailhead type
leads. This construction seems to be weak, as not one part remained
intact after dissolving the encapsulating material. However, and as
noted in detail below, all of the lead failures were by separation of
the metallic material attached to the ceramic, rather than by the leads
detaching from the material plated to the internal element.

Serial #A68287 - One lead intact. Element appeared
to have blown under the contact adjacent
to missing lead. Lead bond was good.
The plating for the element pulled away
with the lead.

Serial #A68288 - Same comment on lead separation
as above. Failure occurred within element,
however, as evidenced by deep circular
cracks on one side of element.

Serial #A68289 - Both leads separated. Failure is
evidenced by circular cracks per above
only adjacent to contacts.

Serial #A68290 - One separated lead. Large cracks
propagate from one contact, indicating
failure.

Serial A68291 - Both leads separated. Sector cracks
visible on one side.

Serial #A68292 - Same comment as above, except
wider propagation cracks.

Serial #A68293 - In addition to the deep crack, unit
exhibits burning near one contact, indicating
possibility of multiple breakdown.

Serial #A68294 - Element is fractured. Center of fracture appears to be in approximate center of body, indicating where breakdown occurred.

Serial #A68295 - Visible circular failure surrounded by cracks on one side.

Serial #A68296 - Deep failure in center of element.

It is to be noted that contrary to the results achieved on the Aerovox parts, failures on these parts are characteristically in the center of the unit. Here again, no particular correlation is observed between voltage breakdown and apparent severity of fracture.

Part Type #3 - Gulton CK16M104K - Encapsulation is by molding. Material is very durable requiring approximately two weeks in Epoxy Strip to dissolve. Lead attachment consists of soldering flattened leads to contacts along sides. Mechanically these units are very strong.

Serial #A68462 - No apparent damage.

Serial #A68463 - No apparent damage.

Serial #A68464 - No apparent damage.

Serial #A68465 - Light circular cracks on one side.

Serial #A68466 - Marked circular cracks on one side.

Serial #A68467 - No apparent damage.

Serial #A68468 - No apparent damage.

Serial #A68469 - No apparent damage.

Serial #A68470 - Small light circular cracks on one side. No apparent other damage.

Serial #A68471 - No apparent damage. Element fractured in depotting.

From the above it is obvious that most of the failures of this type part are internal to the part and that the part is constructed very well. Half of the parts exhibited no external evidence of failure.

Part Type #4 - Gulton CN05M105K - Units are molded of a similar compound to part #3. Like parts #3, these units were extremely difficult to dissolve, requiring three to four weeks. The mechanical construction of these units is very rugged. Leads are affixed to large nailheads which are apparently soldered to the active element. It should be noted that the long cycle in the solution caused a considerable amount of corrosion of the metal parts and may have contributed to some of the observations below regarding cracking and separation.

Serial #A68637 - Exhibit separation of outer layers of element.

Serial #A68638 - Same as A68637.

Serial #A68639 - Light cracks are visible.

Serial #A68640 - Same as A68637.

Serial #A68641 - Same as A68637.

Serial #A68642 - Same as A68639.

Serial #A68643 - Same as A68637.

Serial #A68644 - Same as A68637.

Serial #A68645 - Same as A68637.

Serial #A68646 - Same as A68637.

Thus, it can be seen that little was learned except that possibly the long cycle of dissolving caused certain bad effects upon the capacitor elements.

Part Type #5 - King KC80BW104K - Encapsulation of these parts was accomplished by filling a molded cup with the potting material. Lead attachment is by means of soldering leads along the side of the element. Elements are approximately the same sizes as Types 1, 2 and 3 above, but the case, however, is somewhat larger.

Serial #A68812 - Element exhibits cracks radiating from contact area on one side. Some damage also seen on reverse side.

Serial #A68813 - Cracks on both sides.

Serial #A68814 - Cracks on both sides. Unit was partially destroyed mechanically in the test.

Serial #A68815 - Element fractured. Separation of dielectric layers apparent.

Serial #A68816 - Visible crater in element from explosion of inside.

Serial #A68817 - No apparent damage.

Serial #A68818 - Visible craters in element similar to A68816 above.

Serial #A68819 - Same as A68818 above.

Serial #A68820 - Part was damaged in depotting. Failure per se is not apparent.

Serial #A68821 - Some cracking visible. Probably due to the dissection. Failure is not visible.

Part Type #6 - Scionics SCM30D104K - These units are molded and attempts to dissolve the units and maintain mechanical integrity of the active element were not successful. If the units were left in the solvent long enough to reach the element, the element came apart. Therefore, only bits and pieces remained of the units which were destroyed. Attempts to dissolve the remainder of the units were stopped. In the units which were destroyed the lead attachment does appear to be very strong, however.

Part Type #7 - Electro Materials Corp. EK200R104K. - Encapsulation is by means of filling a molded case with encapsulant. Leads are nailhead types soldered to the element. Soldering is, in certain cases, somewhat strengthened by the effective attachment area being reinforced by means of excess solder. This particular technique, however, was not consistent nor apparent in all parts.

Serial #A69162 - Small cracks visible on one side.

Serial #A69163 - Small cracks visible on one side.

Serial #A69164 - Deep crater started on one side.

Serial #69165 - One lead separated. Crack in one side starting at contact.

Serial #A69166 - One lead separated, otherwise no apparent damage.

Serial #A69167 - One lead separated. Crack in one side.

Serial #A69168 - Small clean crater is visible on one side. This crater apparently emanates from the point of initial failure.

Serial #A69169 - No apparent damage.

Serial #A69170 - Light cracks visible on one side.

Serial #A69171 - Light cracks visible on one side.

Part Type #8 - Vitramon VL02BK103K - These parts appear to be moded. Of all the units in the test, they exhibited the highest breakdown voltage which correlates somewhat to the 200 volt rating. The breakdown on these parts was very violent in nature and its effect on the units so great that the dissection of the units was not considered necessary. In conducting the test, after the first two parts, 1/8 ampere fast blow fuses were used in an attempt to limit the destruction of the specimens. However, in the case of the A69343 and A69344 parts, these parts, including leads, were blown out of the test fixture and not recovered.

Serial #A69337 - Side of case is blown. Layers of dielectric are spread.

Serial #A69338 - Same as A69337.

Serial #A69339 - Layers spread. Unit broken into two parts.

Serial #A69340 - Hole in side of case, crack of element visible.

Serial #A69341 - Same as A69337.

Serial #A69342 - Same as A69337.

Serial #A69343 - Lost in the test.

Serial #A69344 - Lost in the test.

Serial #A69345 - Hole in side of case, separation of layers.

Serial #A69346 - Same as A69345.

In view of all the above damage the integrity of the contacts appears to be good, as no contact separation was noted.

Part Type #9 - Vitramon VK30BX104K - Units are encapsulated by filling a molded cup with a capsulating compound. Sharply flattened leads are soldered along the side of the element. These leads are flattened so sharply that some stress concentration is apparent, as one lead was broken in handling. Also, it is to be noted that parts appear to be dipped in a transparent jell type material prior to final encapsulation.

Serial #A69512 - No apparent damage.

Serial #A69513 - Light cracks are visible on one side.

Serial #A69514 - No apparent damage.

Serial #A69515 - No apparent damage.

Serial #69516 - No apparent damage.

Serial #A69517 - One lead broken in handling.

Otherwise, no apparent damage.

Serial #A69518 - No apparent damage.

Serial #A69519 - No apparent damage.

Serial #A69520 - No apparent damage.

Serial #A69521 - No apparent damage.

Since little internal damage can be observed upon these parts, it is apparent that the element itself must be extremely well constructed and of great strength. Thus, further sectioning work would be necessary to find the actual place the failure occurred.

Part Type #10 - Westcap B758BX104K - Encapsulation is by means of filling a molded cup with the encapsulant. Leads are flattened and formed to permit soldering along the sides of the element.

Serial #A69687 - A complete separation of one side of the element can be observed.

Serial #A69688 - Similar to A69687. Also a visible crater and cracks in the element can be observed.

Serial #A69689 - Element is fractured and visible cracks and separations are apparent.

Serial #A69690 - Large area separation. Craters or burns are visible at the bottom of the element.

Serial #A69691 - Fine cracks visible. No other apparent damage.

Serial #A69692 - Element is fractured.

Serial #A69693 - Edge cracks are visible. No other apparent damage.

Serial #A69694 - Crater and edge cracks are visible on one side.

Serial #A69695 - Same as A69694.

Serial #A69696 - A large separation of one side of the entire area.

It is to be noted from the above observations that these parts tend to separate over a large area, more so than any other parts in the test, indicating the mechanical construction of the element, on a comparative basis, is not as strong as the other parts tested.

GROUP IV - VOLTAGE BREAKDOWN

Aerovox - MC605104RK

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A68112	1660
A68113	1600
A68114	1700
A68115	2000
A68116	2500
A68117	2010
A68118	1630
A68119	1620
A68120	1660
A68121	740

Chem-Electro Research - CK2R104K

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A68287	1011
A68288	947
A68289	1020
A68290	1370
A68291	940
A68292	1080
A68293	1020
A68294	1120
A68295	1220
A68296	1100

Gulton - CK16M104K

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A68462	1260
A68463	1160
A68464	840
A68465	1020
A68466	1100
A68467	1120
A68468	880
A68469	760
A68470	1250
A68471	1250

Gulton - CN05M105K

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A68637	490
A68638	510
A68639	380
A68640	620
A68641	520
A68642	490
A68643	270
A68644	390
A68645	460
A68646	540

King Electric - KC80BW104K

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A68812	1060
A68813	940
A68814	640
A68815	1180
A68816	1020
A68817	580
A68818	1080
A68819	1300
A68820	760
A68821	700

Scionics - SCM30D104K

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A68987	420
A68988	1200
A68989	760
A68990	1050
A68991	700
A68992	590
A68993	900
A68994	870
A68995	800
A68996	520

Electro Materials Corp. - EK200R104K

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A69162	1120
A69163	1060
A69164	1200
A69165	1160
A69166	1140
A69167	1020
A69168	1080
A69169	820
A69170	920
A69171	1100

Vitramon - VL02BK103K

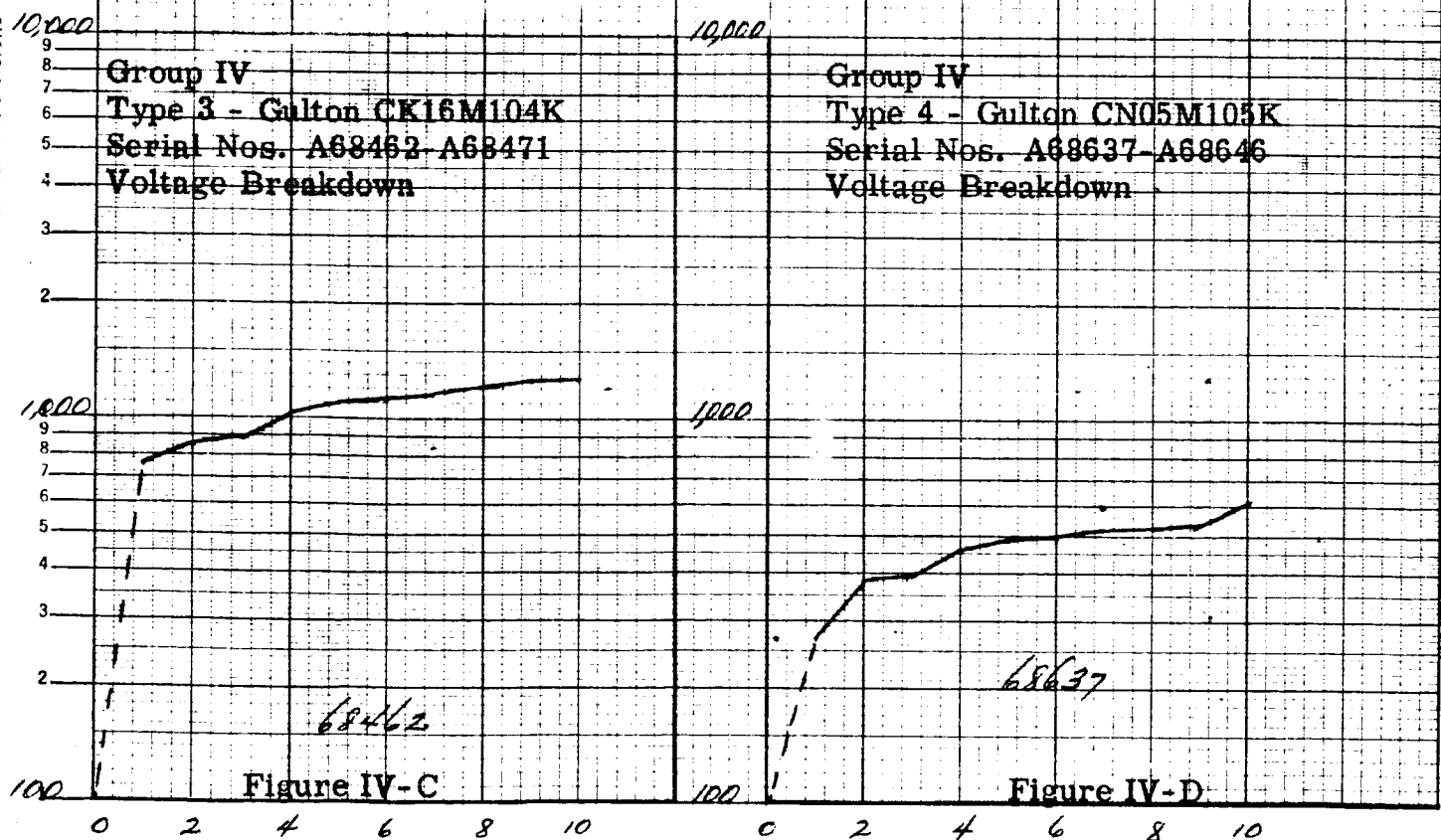
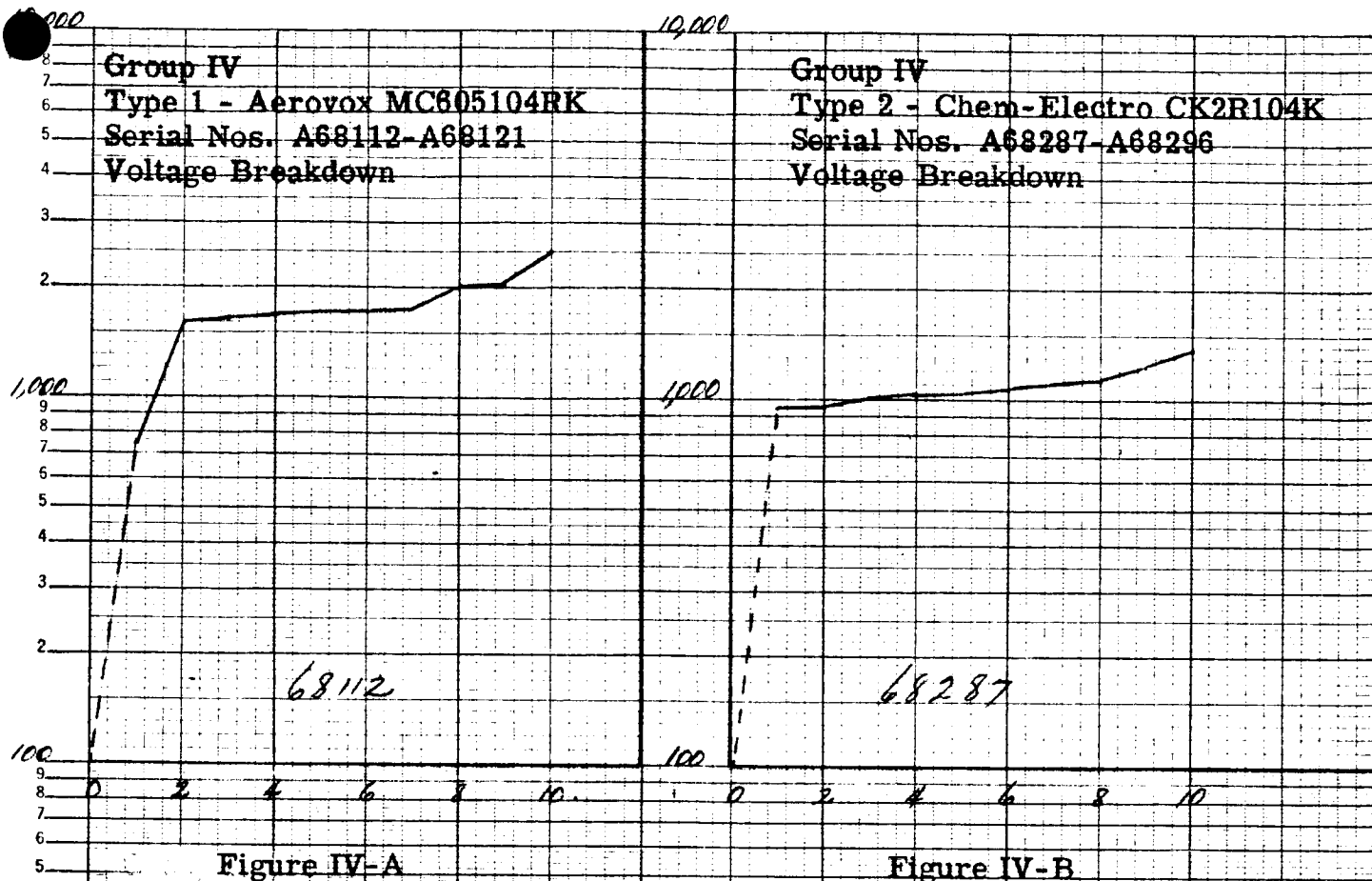
<u>Serial No.</u>	<u>Voltage Breakdown</u>
A69337	2200
A69338	1300
A69339	2200
A69340	3600
A69341	2100
A69342	2000
A69343	1800
A69344	2000
A69345	2400
A69346	2600

Vitramon - VK30BX104K

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A69512	660
A69513	300
A69514	820
A69515	770
A69516	600
A69517	640
A69518	480
A69519	1240
A69520	520
A69521	640

Westcap - B758BX104K

<u>Serial No.</u>	<u>Voltage Breakdown</u>
A69687	910
A69688	380
A69689	540
A69690	420
A69691	470
A69692	500
A69693	610
A69694	760
A69695	770
A69696	620



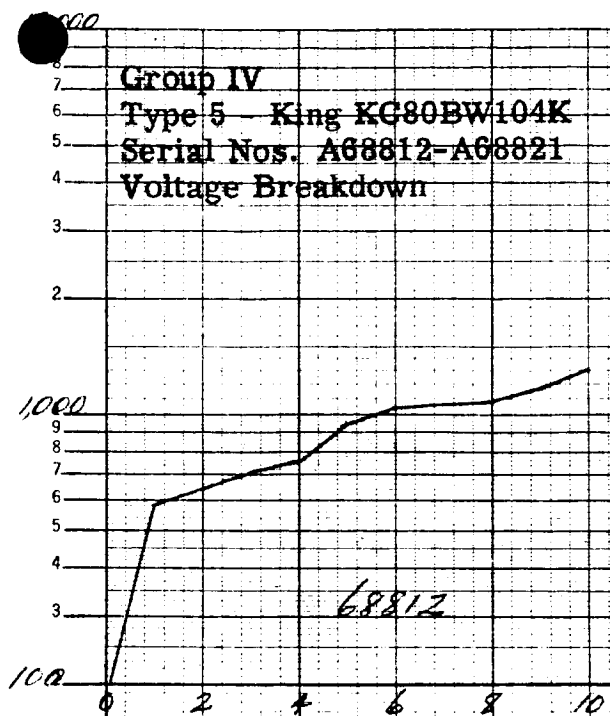


Figure IV-E

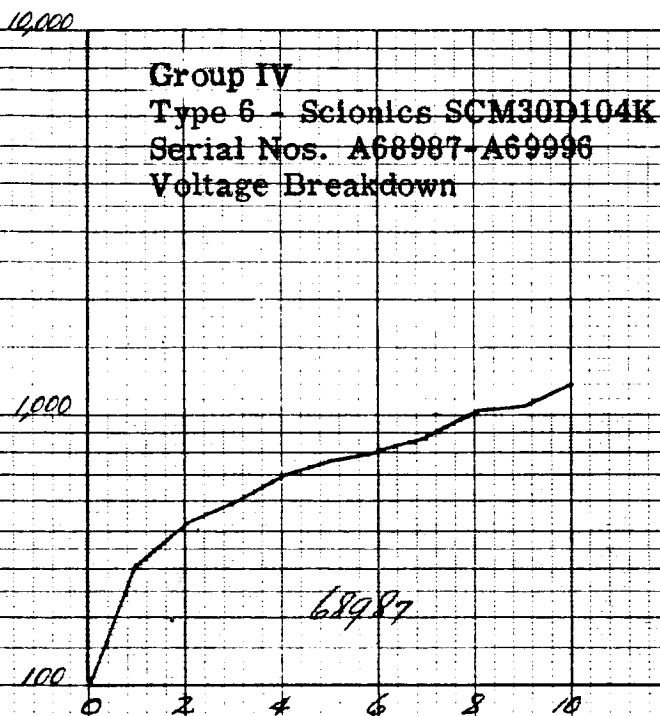


Figure IV-F

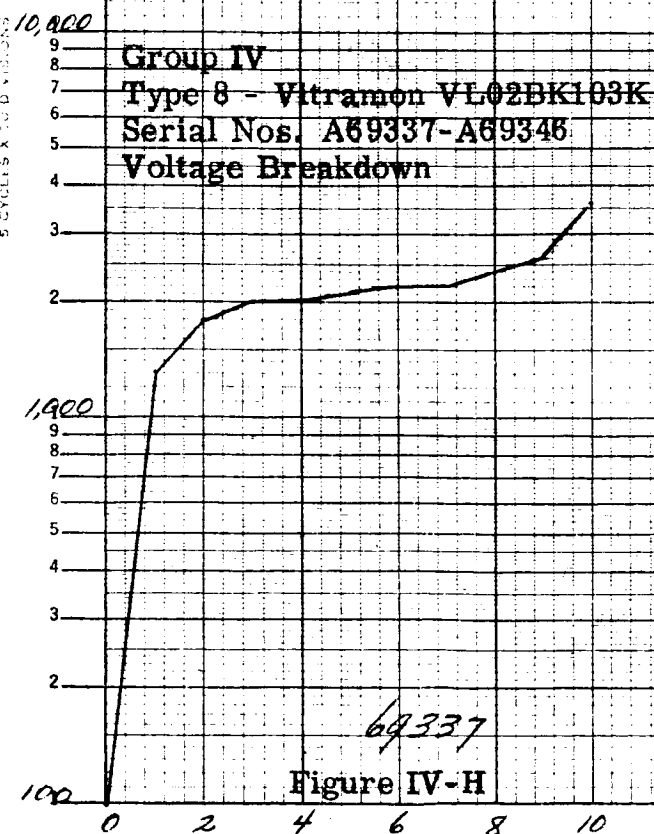


Figure IV-H

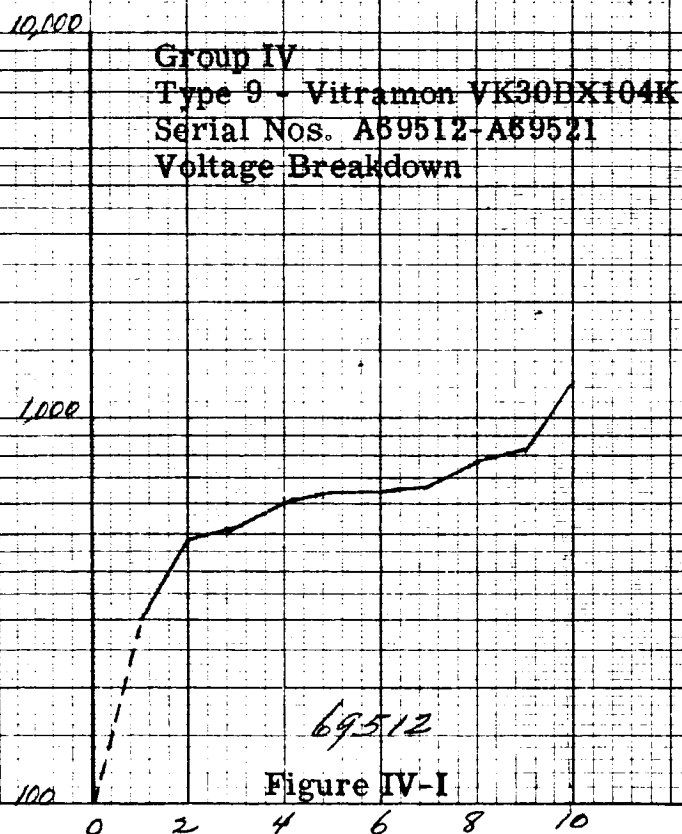
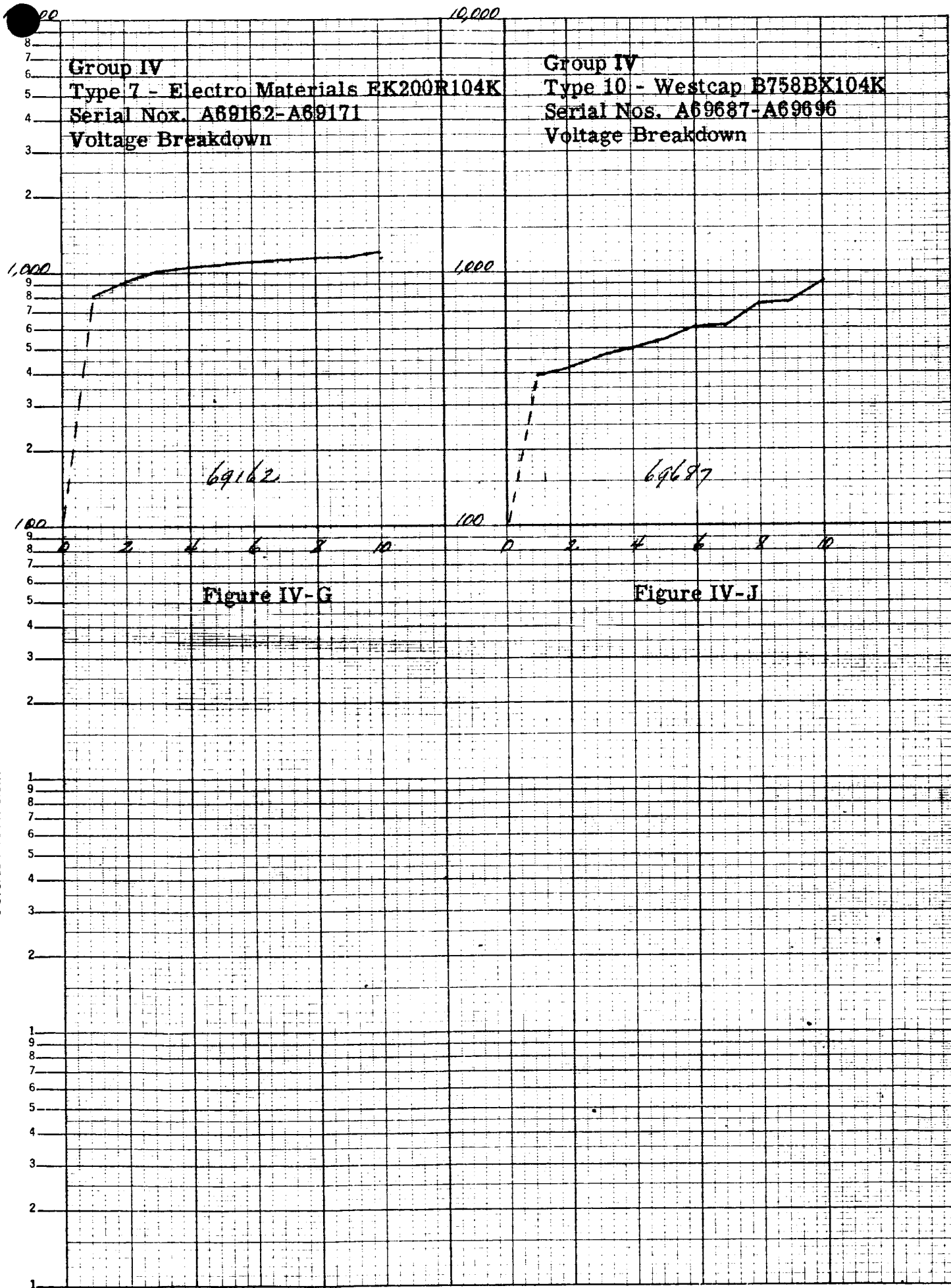


Figure IV-I



FAILURE ANALYSIS OF CATASTROPHIC FAILURES

Listed below are the results of failure analysis for catastrophic failures. Failure analysis was limited to 10% of any type on test (17 maximum). Details of the procedure and comments on construction are given in the results of the destructive voltage breakdown test.

Aerovox MC605104RK

No failures

CER CK2R104K

92-4-1	Leads separated from element. Element shows craze in lower center of one side indicating internal damage.
93-4-1	Lead separated from element - no other visible damage
84-5-1	" "
68347	" "
60-1-1	" "
50-6-1	" "
18-1-1	" "
12-1-1	" "
2-1-1	" "
144-1-1	One lead separated from element - no other visible damage
156-2-1	" "
131-1-1	" "
49-6-1	" "
95-4-1	" "
35-5-1	" "
8-1-1	" "
155-5-1	No apparent damage

Gulton CK16M104K

28-3-2	Integrity of unit maintained in depotting - no visible defects
38-2-2	" "
83-5-2	" "

- 158-2-2 Slight chipping at lead end of element possibly incurred in depotting
- 59-1-2 Internal defect observable on face of element indicative of damage

Gulton CN05M105K

Failure analysis on these parts was largely unsuccessful because of the extreme difficulty of dissolving the encapsulation. By the time the encapsulation is dissolved the element of the unit is damaged. Therefore, the following comments are not truly indicative of the true failure effects.

- 87-2-3 Some damage to surface layers of element. Probably caused in depotting.
- 97-6-3 " "
- 154-5-3 " "
- 28-3-3 " "
- 93-4-3 " "
- 98-6-3 " "
- 73-1-3 " "
- 89-2-3 " "
- 5-1-3 " "
- 168-6-3 " "
- 153-5-3 " "
- 169-6-3 " "
- 166-6-3 " "
- 151-5-3 " "
- 10-1-3 " "
- 81-5-3 Destroyed in depotting
- 100-6-3 " "

King Electronics KC80BW104K

- 70-1-4 Visible cracks and separation of element surface.
- 47-6-4 " "
- 22-1-4 Craziing of surface on both sides of element. All of the above tend to indicate failure within the dielectric element.

Scionics SCM30D104K

Failure analysis on the Scionics parts was very unsuccessful because of the extreme difficulty in dissolving the encapsulation. By the time the encapsulation was dissolved the internal element was also delaminated and destroyed. Therefore, the following comments only indicate the damage sustained in depotting.

96-6-5	Complete destruction of unit	
45-4-5	"	
94-4-5	"	
44-4-5	"	
166-4-5	"	
42-4-5	"	
91-4-5	"	
160-2-5	Partial destruction of unit - failure not visually observed	
93-4-5	"	"
161-4-5	"	"
163-4-5	"	"
162-4-5	"	"
92-4-5	"	"
164-4-5	"	"
43-4-5	"	"
158-2-5	"	"
95-4-5	"	"

EMC EK200R104K

2-1-6	Both leads separated from element - no apparent damage to element	
46-6-6	"	"
36-2-6	"	"
66-1-6	"	"
43-4-6	"	"

70-1-6	One lead detached from element - no other visible damage	
19-1-6	"	"
50-6-6	"	"
20-1-6	"	"
88-2-6	"	"
42-4-6	"	"
45-4-6	"	"
3-1-6	"	"
69-1-6	No apparent damage	
86-2-6	"	
26-3-6	"	
23-1-6	"	

Vitramon VL02BK103K V-LAM

The outer shell, which appears to be molded epoxy was dissolved by Epoxystrip T-251-C Epoxy solvent. The active element appears to be covered by a dielectric gel type material under the outer shell. This material was removed by light mechanical stripping and the units examined..

Since many of the units failed "open" particular attention was given the contacts. The contact for these units is a thin metallic saddle to which the actual leads are welded. The comments listed below apply.

63-1-7	Complete or partial separation of contact from active element - no other apparent damage	
81-5-7	"	"
10-1-7	"	"
29-3-7	"	"
51-1-7	"	"
71-1-7	No apparent damage	
65-1-7	"	
27-3-7	"	
70-1-7	"	
72-1-7	"	

23-1-7	No apparent damage
78-3-7	"
69-1-7	"
60-1-7	"
4-1-7	"
38-2-7	"
92-4-7	"

Vitramon VK30 BX104K

28-3-8	Contact separation by failure of solder
151-5-8	"
147-3-8	Contact separation by cracking of element
158-2-8	No apparent damage
147-3-8	"
138-1-8	"
68-1-8	"
44-4-8	"
35-5-8	"
45-4-8	"
5-1-8	"
42-4-8	"
36-2-8	"
60-1-8	"
27-3-8	"

Westcap B758 BX104K

54-1-9	Delamination of element - probably due to depotting stresses
29-3-9	" "
22-1-9	Fracture & delamination of element probably due to depotting stresses
36-2-9	" "
13-1-9	" "
6-1-9	" "
126-1-9	" "
30-3-9	" "
167-6-9	No apparent damage

VISUAL AND MECHANICAL INSPECTION

The results of the Visual and Mechanical Inspection are given in the laboratory log book.

Sketches of all parts together with complete identification data is given in the following pages.

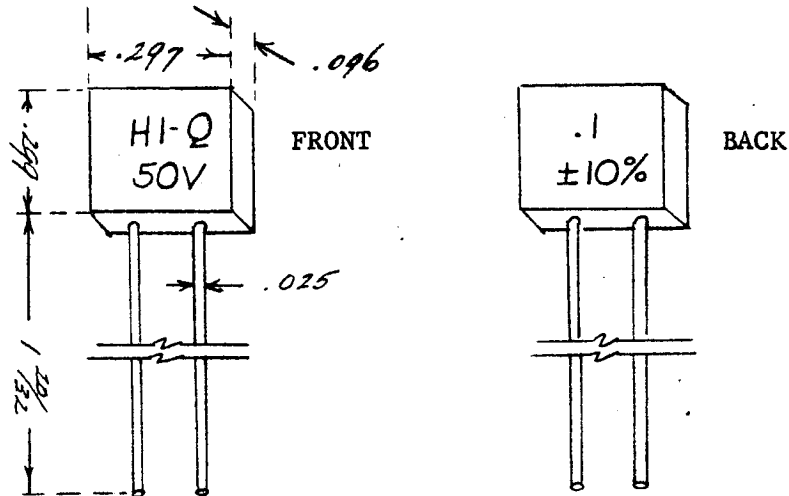
CAPACITOR PHYSICAL DIMENSIONS

AND MARKS

NO. 1

COMPONENT TYPE: AEROVOX MC605104RK
0.10 MFD., ± 10 PERCENT, 50 WVDC.

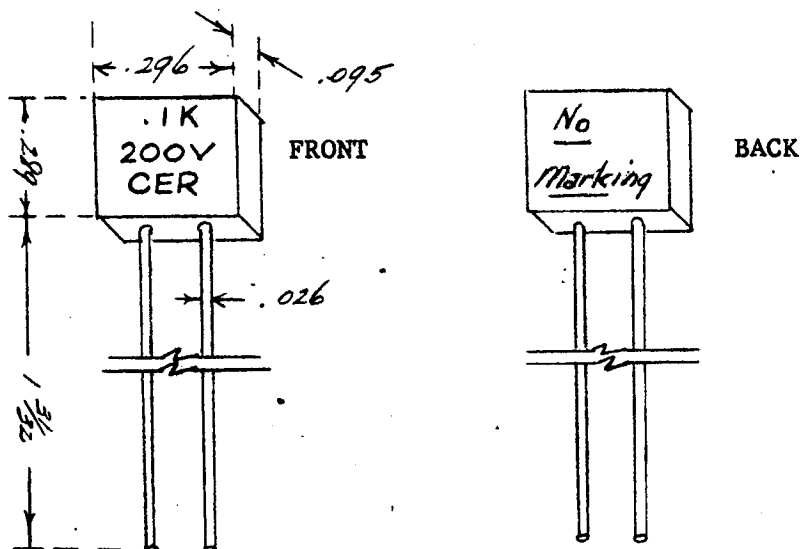
BLACK CASE
RADIAL LEADS



NO. 2

COMPONENT TYPE: CHEM-ELECTRO RESEARCH CK2R104K
0.10 MFD., 10 PERCENT, 200 WVDC.

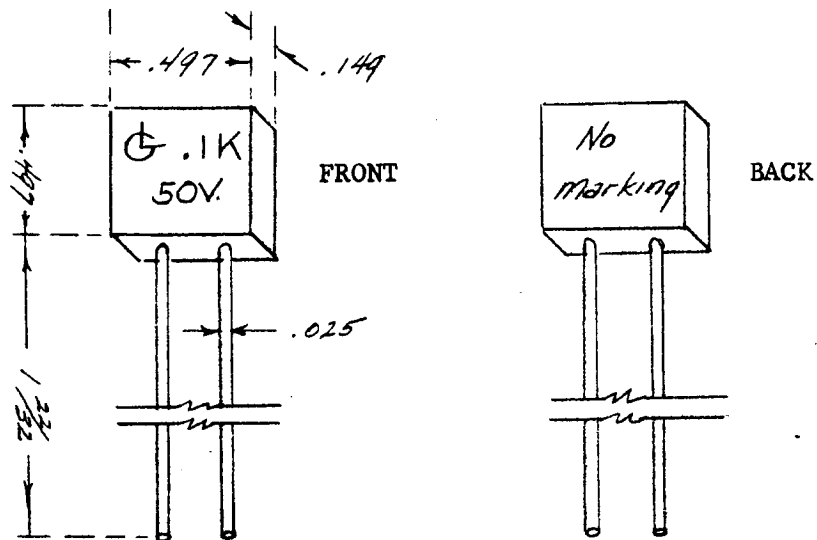
BLACK CASE
RADIAL LEADS



NO. 3

COMPONENT TYPE: GULTON CK16M104 K
0.10 MFD., 10 PERCENT, 50 WVDC.

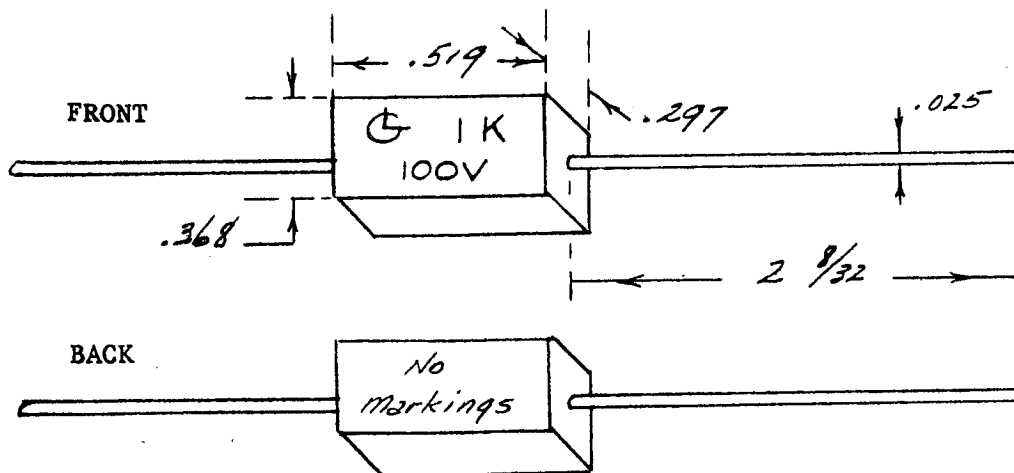
BLACK CASE
RADIAL LEADS



NO. 4

COMPONENT TYPE: GULTON CN05M105K
1.0 MFD., 10 PERCENT, 100 WVDC.

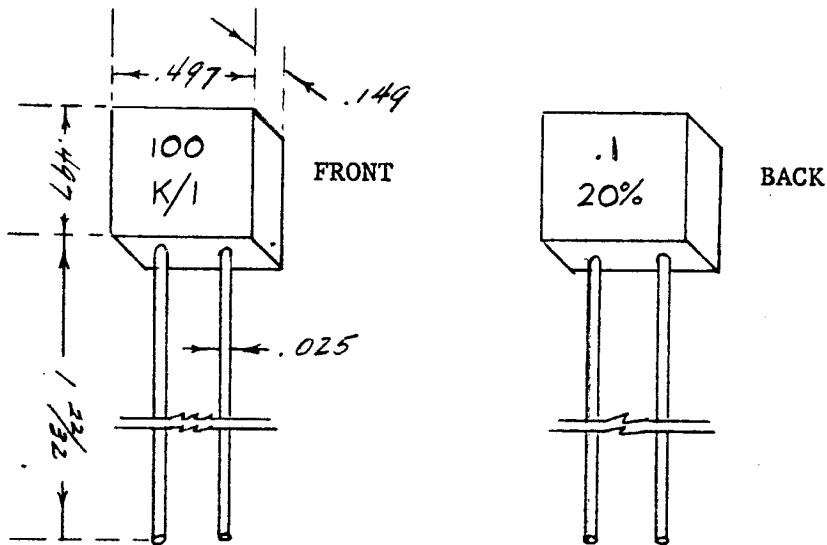
BLACK CASE
AXIAL LEADS



NO. 5

COMPONENT TYPE: KING ELECTRONICS, KC80BW104K
0.10 MFD., 20 PERCENT, 50 WVDC.

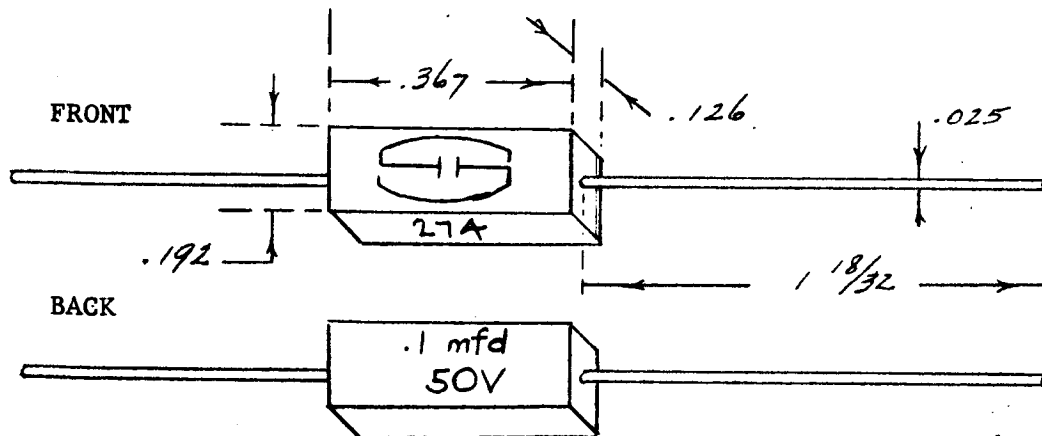
BLACK CASE
RADIAL LEADS



NO. 6

COMPONENT TYPE: SCIONICS SCM30D104K
0.10 MFD., 10 PERCENT, 50 WVDC.

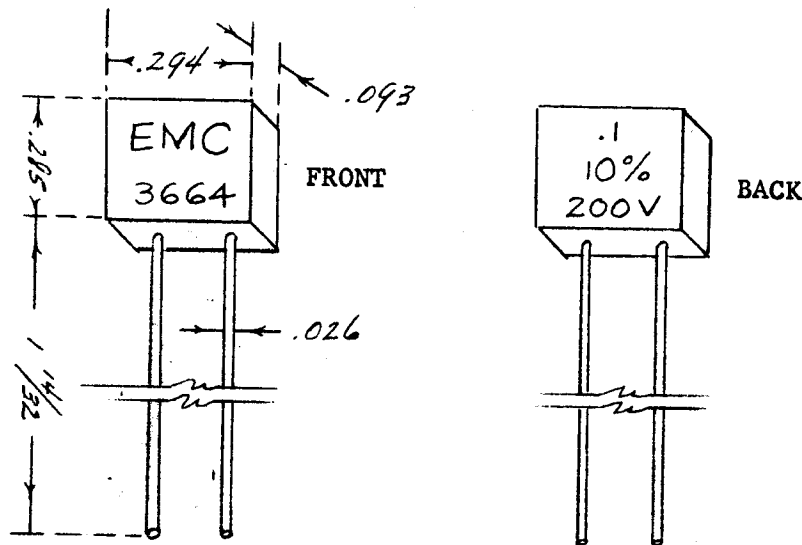
BLACK CASE
AXIAL LEADS



NO. 7

COMPONENT TYPE: ELECTRO MATERIALS CORP. EK200R104K
0.10 MFD., 10 PERCENT, 200 WVDC.

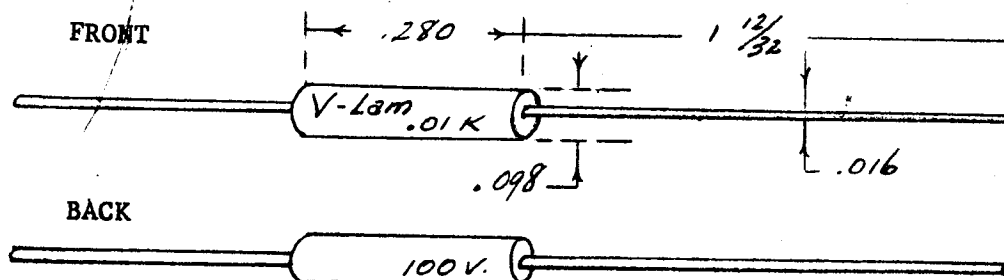
BLACK CASE
RADIAL LEADS



NO. 8

COMPONENT TYPE: VITRAMON VL02BK103K, V-LAM
0.01 MFD., 10 PERCENT, 100 WVDC.

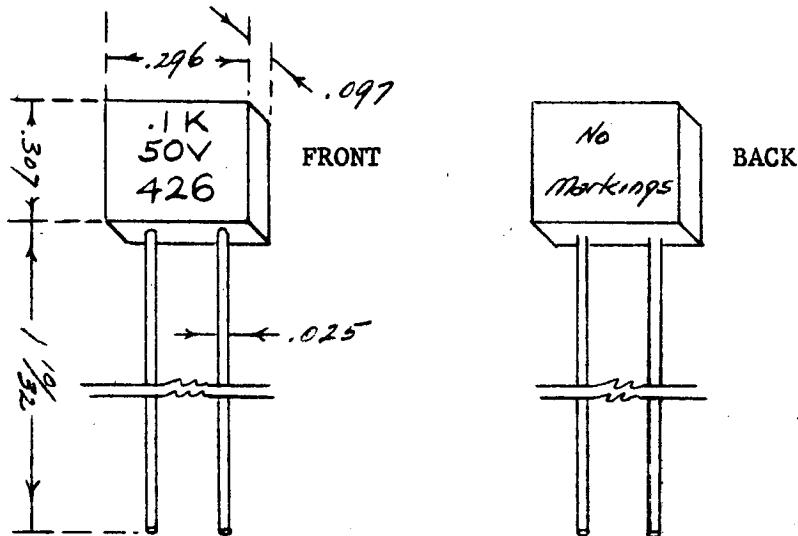
RED TUBULAR CASE
AXIAL LEADS



NO. 9

COMPONENT TYPE: VITRAMON VK30BX104K
0.10 MFD., 10 PERCENT, 50 WVDC.

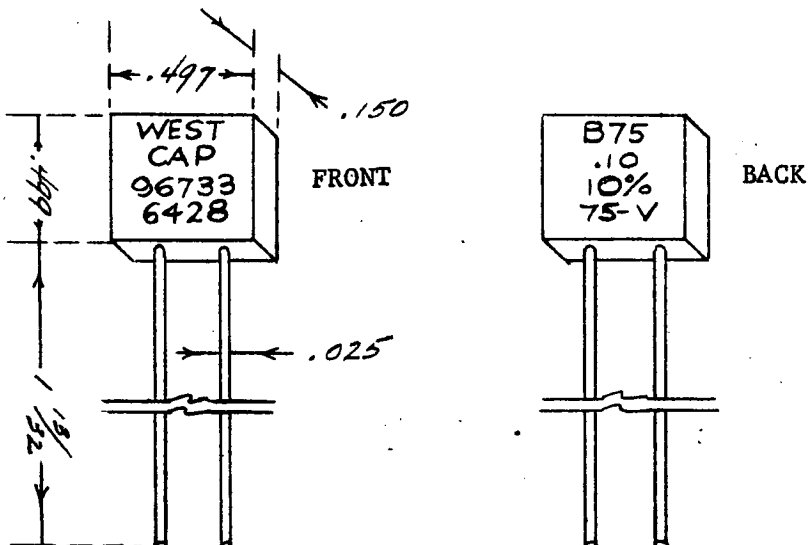
RED CASE
RADIAL LEADS



NO. 10

COMPONENT TYPE: WESTCAP B758BX104K
0.10 MFD., 10 PERCENT!, 75 WVDC.

WHITE CASE
RADIAL LEADS



X.

DESCRIPTION OF PARAMETER CHANGES WITH ENVIRONMENTAL AND LIFE TESTS

Parametric behavior of the parts is best illustrated by the computed statistics sheets (Appendix III). These sheets are prepared in accordance with JPL Specification ZPP-2040-GEN-B. It should be noted that Nc on these sheets includes both catastrophic and parametric failures by the definitions in previous paragraphs. Specific comments relating to the various parts are listed below:

Aerovox MC605104RK

Group I and II - Burn-In and Environmental Sequence
Parameters through the burn-in testing were relatively stable. Capacitance and Insulation Resistance increased slightly while Dissipation Factor decreased slightly and the values tend to group more closely as evidenced by the tighter distribution at the end of the burn-in period. All parts remained relatively stable throughout the first three environments although significant changes in the mean values are apparent by observation of the "t" values. After the Moisture Resistance test 16 units were classed as parametric failures based upon low value of Insulation Resistance.

Groups I, II and V - Life Test, 85°C - 50 volts
The population of units in this matrix cell exhibited an increase (approximately 5%) in Capacitance through the life test, appearing to stabilize at the 1000 hour readout point. A definite increase in Dissipation Factor (approximately 25%) was also noted. Since these increases were not accompanied by large changes in variance ratios the entire population did in fact change. Negligible Insulation Resistance degradation was observed.

Life Test, 125°C - 50V

The parametric performance of this group was very similar to that described above.

Life Test, 85°C - 100 V

This test group did not experience the increase in capacitance noted in the above 50 volt test groups. The Dissipation Factor increase was present however, as well as a higher degree of Insulation Resistance fluctuation.

Life Test, 125°C - 100V

This group behaved similarly to Groups 1 and 2 above with respect to Capacitance and Dissipation Factor. Insulation Resistance fluctuation is similar to all of the other groups.

Life Test, 85°C - 200V

After exhibiting a decrease in Capacitance to 1000 hours the mean Capacitance increased at the 2000 hour point. Like all other groups, Dissipation Factor increased throughout life. The value of Insulation Resistance, although higher than previous groups, showed about the same percentage variation in minimum value.

Life Test, 125°C - 200V

This condition, which represents the most extreme stress level produced a marked decrease in capacitance (10%) up to 100 hours followed by an increase to the original value at 2000 hours. The Dissipation Factor increased. Insulation Resistance showed about a 50% decrease during the Life Test.

CER CK2R104K

Groups I and II - Burn-In and Environmental Sequence
CER units exhibited a slightly tighter initial parametric grouping for Capacitance and Dissipation Factor than

Aerovox although the minimum Insulation Resistance was lower. The burn-in results indicate a significant change in the means.

Disregarding failures, the parametric behavior of these parts through the environmental sequence was quite stable on all parameters.

Groups I, II and V - Life Test

In general, these parts exhibited excellent stability and parametric grouping through the Life Tests. Capacitance was extremely stable, except for the highest stress levels, where typically a slight decrease was noted. Also, some increase, (generally less than 20%) in Dissipation Factor was observed. The minimum value of Insulation Resistance generally increased during life. However, it should be noted that this minimum value represents that obtained on surviving units rather than the entire population.

Gulton - CK16M104K

Groups I and II - Burn-In and Environmental Sequence

The behavior of the Gulton units is very similar to the CER units in that the change in parameters was small and the grouping was close through all of the environments up to Moisture Resistance. Here some degradation in Dissipation Factor and Insulation Resistance is apparent.

Groups I, II and V - Life Test

Behavior of the parts during the Life Test was also extremely stable. Degradation trends are not readily apparent at any stress level.

Gulton - CN05M105K

Groups I and II - Burn-In and Environmental Sequence

These units exhibit approximately the same percentage spread in Capacitance as described for the above listed

parts. However, the Dissipation Factor for these units is somewhat higher averaging above 1% which undoubtedly is representative of such a high capacitance - small size part. An increase in capacitance was noted during burn-in (approximately 3%). During the environmental sequence the mean Capacitance increased further (1.9%). The mean Dissipation Factor also increased approximately 15%. The Insulation Resistance data shows a wide fluctuation during the environments with particular degradation as evidenced by failures following the Moisture Resistance Test.

Groups I, II and V - Life Test

On the basis of the computed statistics the parametric behavior of these parts was as stable as any parts in the test. However, it should be noted that a high number of both parametric and catastrophic failures were encountered which do not contribute to the computed statistics, and that the stability observed is for surviving parts only.

King - KC80BW104K

Groups I and II - Burn-In and Environmental Sequence

These parts were as stable as any in the test throughout the environmental sequence. Some degradation, particularly in Dissipation Factor occurred as a result of the Moisture Resistance Test.

Groups I, II and V - Life Test

Parametric performance during the Life Test was very stable, particularly in view of the fact that a very small number of failures were encountered and thus, the drift of all parts was represented.

Scionics - SCM30D104K

Groups I and II - Burn-In and Environmental Sequence

Burn-in appears to tighten the parametric spread on

Dissipation Factor. This is possibly because of elimination of four marginal units. Also, the mean Dissipation Factor for these units is initially approximately three times as high as other like parts in the test, indicating that a different fabrication technique was used in manufacturing the parts.

Degradation on all parameters was observed during the environmental test. Moisture Resistance was particularly damaging with 25 failures being encountered on Dissipation Factor and 33 on Insulation Resistance. Degradation on surviving units was also apparent in the "mean" of Dissipation Factor measurements.

Groups I, II and V - Life Test

Because of the high number of failures and degradation encountered in the environments it was expected, and later developed, that the Life Test performance would be poor. It should be noted, however, that all of the failures in Life Testing cannot be attributed to the effects of prior environments. Of 56 complete catastrophic failures in life, 15 were Group V parts, which had not been subjected to prior environments.

EMC - EK200R104K

Groups I and II - Burn-In and Environmental Sequence

The EMC parts developed, on a comparative basis, a high degree of failures both in Burn-In and through the environments, however parametric behavior of surviving units was relatively stable except at Moisture Resistance where some spreading of Dissipation Factor was noted.

Groups I, II and V - Life Test

Parametric behavior of these parts was stable during life for surviving parts. Although effects of prior

environments are suspect, all complete catastrophic failures cannot be attributed to them since five of the 15 complete failures during Life were from Group V parts.

Vitramon VL02BK103K V-LAM

Group I - Burn-In and Environmental Sequence

These units show a significant parametric shift at Burn-In for both Capacitance and Dissipation Factor.

In the environments a number of failures (16) were encountered as a result of Vibration. Moisture Resistance also produced 11 additional failures as well as producing definite degradation effects upon Dissipation Factor.

Groups I, II and V - Life Test

Although a number of failures were encountered during life, the parametric behavior of surviving units was stable without degradation trends being apparent. While it might be suspected that prior environments caused Life Test problems nine of 17 complete catastrophic failures were Group V parts which had not been exposed to prior environments.

Vitramon VK30BX104K

Groups I and II - Burn-In and Environmental Sequence
Performance of these parts was stable through the test series although some degradation in Dissipation Factor can be attributed to the Moisture Resistance Test.

Groups I, II and V - Life Test

The Life Test performance of these units, while better than average, appears to be different than most of the other parts in the test as almost all of the failures were truly catastrophic rather than parametric and appear to occur almost randomly. Of interest is the fact that no

failures occurred in the highest stressed cell of the Life Test Matrix.

Westcap - B758BX104K

Groups I and II - Burn-In and Environmental Sequence

Initially the mean value of capacitance for these units was 89.3 nanofarads rather than the 100 nanofarads implicit in the specification of 100 nf $\pm 10\%$. Whether this low value was because of the manufacturer's selection technique or a basic instability in the devices is open to question, particularly in view of subsequent performance.

After Burn-In 42 of 50 units dropped below the lower limit. No failures were noted, however. As the units passed through the environments no marked changes were noted until the Post Thermal Shock measurement where 13 of the parts failed on Dissipation Factor. The effects of Moisture Resistance were even more severe with 59 parts failing the Capacitance Test and 91 failing on Dissipation Factor. Review of the data for individual parts indicates little if any correlation to prior readings. Also of interest is the fact that only 25 parts failed the Insulation Resistance Test.

Groups I, II and V - Life Test

In view of the instability of the components during environmental testing, it would be expected that Life Testing would produce an extremely large number of failures. Actually, a very small number of additional failures (6 catastrophic) were produced during the Life Test. Although the statistical treatment does not include parametric failures, these parametric failures remained on test for the entire life test period and thus could be expected to perform in a normal circuit application.

SUMMARY

Extreme differences in the parametric behavior of the various types of units through the test series was not observed. The Moisture Resistance test appeared to have more effect than any other exposure and degradation of all units occurred in one degree or another. It is also apparent that the effects of Moisture Resistance are less severe on the parts where monolithic internal construction is used.

The effects of life testing are best judged on the basis of actual failures rather than parametric shifts, since, as will be shown subsequently, parameter shift and the results of life test performance do not correlate well for this test.

XI. RELIABILITY ESTIMATES AND COMPARISONS

In the computed statistics sheets the number of catastrophic failures (Nc) includes both complete catastrophic failures (open or short) and parametric failures as previously defined. While such a definition is comparative in the sense that all units are subjected to the same criteria of failure, this definition does not completely define a failed part. Instead, in the context of this test, it defines a failed parameter.

Furthermore, the removal of parametric failures prior to computation of statistics leads to "filtered" data when appreciable numbers of failures occur. Therefore, comparisons on the basis of parametric behavior are extremely difficult to develop, although parametric behavior does illustrate possible weaknesses in the parts.

Since parts were tested to the completion of the test or destruction, whichever happened first, (i. e., parametric failures were not removed from the tests), and since examination of data on the parts shows in many cases that the parameters of the part stabilize after becoming a parametric failure, it would appear logical to offer reliability comparisons on the basis of catastrophic failures alone. This approach is further justified by the fact that in five of the six Life Test Matrix cells the maximum sample size is 15 parts which can at best (0 failures) define a failure rate of 0.78%/1000 hours at a confidence level of 90%.

Figure 4 has been prepared on the basis of complete catastrophic failures, i. e., parts removed from the test for all causes except leads broken in handling. In this chart parts are ranked by number of Life Test Failures as well as number of Total Failures. The correlation between Life Failures and Total Failures can be considered to be perfect. Life and Environment do not correlate as well except for the extremes in ranking.

Figure 5 presents calculated failure rate at 90%, 60% and 50% confidence levels for all matrix cells together with a combined

EXPONENTIAL FAILURE RATES

LIFE TEST

Confidence Level

Volts	Confidence Level	85°	125°	85°	125°	85°	125°	85°	125°
		Aerovox MC605104	CER CK2R104	Gulton CK16M104	Gulton CN05M105	King KC80BW104			
50	90%	1.55%	7.8%	1.55%	15.0%	10.0%	28.0%	1.60%	7.8%
	60	0.60	3.1	0.60	8.0	8.0	17.5	0.64	3.1
	50	0.46	2.3	0.46	6.2	7.2	16.0	0.48	2.3
100	90	7.8	7.8	8.2	7.8	9.2	29.5	7.80	7.8
	60	3.1	3.1	3.3	3.1	3.6	18.0	3.1	3.1
	50	2.3	2.3	2.5	2.3	2.8	16.0	2.3	2.3
200	90	7.8	7.8	7.8	7.8	63.0	68.0	7.8	14.0
	60	3.1	3.1	3.1	3.1	49.0	55.0	3.1	7.2
	50	2.3	2.3	2.3	2.3	45.0	50.0	2.3	6.0
Combined									
90		0.78		1.82		15.0		1.30	
60		0.32		1.06		12.6		0.64	
50		0.24		0.91		12.1		0.58	
		Scionics SCM30D104	EMC EK200R104	Vitramon VL02BK	Vitramon VK30BX	Westcap B758BX104			
50	90%	22%	94%	15.0%	15.4%	5.6%	19.2%	4.7%	8.2%
	60	17	69	11.6	8.0	3.7	11.3	3.0	3.3
	50	15.5	65	11.0	6.6	3.3	9.8	2.6	2.5
100	90	94	206	17.2	14.5	26.0	27.5	8.5	8.2
	60	69	160	8.8	7.6	16.5	17.0	3.6	3.3
	50	65	145	7.4	6.2	14.5	15.2	2.7	2.5
200	90	207	20	8.2	19.0	19.5	7.8	7.8	7.8
	60	161	12	3.3	10.0	11.5	3.1	3.1	3.1
	50	146	10.2	2.5	8.2	10.0	2.3	2.3	2.3
Combined									
90		41.0		9.3		7.3		2.8	
60		36.0		7.5		5.7		1.85	
50		35.0		7.0		5.3		1.65	

Figure 5

figure for each part. The ranking of the data gives the same results as Figure 4.

It is obvious from the above data that the Aerovox parts demonstrated superior performance in this test. The test does not show, however, what failure rate might ultimately be achieved by Aerovox since no failures were encountered and the failure rate demonstrated is merely statistical based upon unit hours without failure.

In addition to the foregoing data, which gives the reliability results actually achieved in the test, one of the goals of this program was to determine the effects of the Screen Burn-In upon reliability, particularly as to whether application of a Screen Test might result in substantially lower failure rates both by "weed out" and prediction.

Group I parts only were subjected to a Screen Burn-In per JPL ZPP-2073-0101D, therefore, one approach to the effectiveness of screening would be to calculate failure rates for Groups I, II and V separately with Group I screening failures removed. Such a procedure poses a problem, however, because the resultant sample sizes are too small for significant results to be achieved. Since the basic Group I sample size is small (50 parts) another approach which can be applied is to individually determine the fate of screening failures through the course of the test, and determine if, in fact, the screening test was effective in failure prediction.

Since JPL ZPP-2073-0101D is designed both as an acceptance document and a screening document, and is written for a specific capacitor type (Aerovox HMC 80) only the parts of the specification concerning percentage change were employed as screening criteria. These are contained in paragraph f, (2) - the capacitance change shall be less than $\pm 5\%$, and in paragraph f, (3) - the change in dissipation factor shall be less than 30%.

Using these end points as definitions, Figure 6 was developed.

SCREENING SUMMARY

	Total Failures to Screening Spec	Failures Removed From Test	Screening Failures Into Test	Subsequent Failures of Screening Failures	Total Failures From Parts Screened
Aerovox MC605104RK	13	0	13	0	0
CER CK2R104K	4	2	2	1	23
Gulton CK16M104K	2	0	2	0	1
Gulton CN05M105K	3	2	1	1	12
King KC80BW104K	2	1	1	1	1
Scionics SCM30D104K	5	2	3	1	32
EMC EK200R104K	11	9	2	2	8
Vitramon VL02BK103K V-LAM	16	0	16	4	9
Vitramon VK30BX104K	3	0	3	1	8
Westcap B758BX104K	<u>5</u>	<u>0</u>	<u>5</u>	<u>0</u>	<u>6</u>
Total all mfgs.	64	16	48	11	100
Total Top 5 mfgs. #1, 3, 5, 9, 10	25	1	24	2	16
Total Low 5 mfgs.	39	14	25	9	84

Figure 6

Figure 6 is a listing of manufacturers together with various specified failures. The first failure column represents the number of screening failures at the end of the screening test. Column 2 presents the failures removed from the test at or before this data point for being complete catastrophic failures. Column 3 is the difference between columns 1 and 2 and represents the number of screening failures which were subjected to the remainder of the tests. Column 4 presents screening failures that did, in fact, become catastrophic failures. Column 5 presents the total number of catastrophic failures from previously screened Group I parts which had to be removed from the test.

Figure 6 shows that the screening prediction was true only for the King parts wherein one failure was predicted and this part did, in fact, fail. The results are somewhat spotty for the other parts in the test. The data does indicate, however, that the screening test predicts, as indicated by the totals, approximately the same number of failures regardless of subsequent part performance, or, as discussed in the foregoing paragraphs, a similar degree of parametric stability for parts offering different degrees of reliability.

This screening test therefore tends to predict a higher failure rate than actually observed for high reliability parts and lower than actually observed for low reliability parts. This fact alone is not too important if the screening test does, in fact, eliminate a high percentage of potential failures. Actually, in this respect, the screening is not too effective. For example in the case of the highest rated parts only two of 16 failures (12.1%) were removed and for the lower ranked parts nine of 84 (10.7%) were removed. The overall figure is 11 from a total of 100 (9.1%). If this true failure rate were known in advance ($\approx 20\%$), a random selection could provide better results.

Obviously, these screening criteria are not definitive for ceramic capacitors which inherently exhibit a high degree of parametric instability compared to most passive electrical components. It appears that in

the relationship between changes in parameter and reliability, Insulation Resistance changes might offer the most sensitivity followed by Dissipation Factor and Capacitance, respectively. Current techniques for measuring these parameters, such as the Insulation Resistance procedure used in this test, do not offer sufficient definition to offer a solution.

XII. CONCLUSIONS

This test shows without doubt that there is a wide variation in the reliability of ceramic capacitors offered by various manufacturers. Moreover, it shows that differences in reliability exist for a given manufacturer depending upon the specific fabrication techniques used.

In a general sense, capacitors fabricated from "monolithic" block elements show a higher degree of reliability and stability than "stacked" units. This is particularly true where resistance to moisture is concerned.

The test also illustrates that mechanical fabrication techniques can affect reliability to a marked degree, particularly where weak electrical contacts are involved as was the case with two of the manufacturers.

Results of this test also illustrate that no correlation exists between manufacturer's rated voltage and reliability. Parts bearing a higher voltage rating did not perform as well as lower voltage parts. In fact, the parts exhibiting the best performance were rated at only fifty volts.

The test does not appear to offer a solution to the question of effectiveness of a "screen" test or "burn-in" and its effect on reliability prediction. In this regard, however, it is not known to what extent parts were subjected to pre-treatment before being shipped from the respective manufacturers.

While this test shows the relative differences in manufacturers in an absolute sense, insufficient data was generated to provide quantitative reliability data for the higher ranking manufacturers. In the case of the Aerovox components, where no real failures developed, it would appear that a test of approximately 10 times this size under more severe stress conditions might be necessary to produce the desired results.

APPENDIX I
CATASTROPHIC FAILURES

<u>Item</u> <u>No.</u>	<u>Date</u>	<u>Remarks</u>
42-4-0	8-13-65	Lead broken in handling
16-1-1	3-22-65	Intermittent short - post moisture resistance
28-3-1	2-24-65	" " " vibration
34-5-1	2-24-65	" " " "
17-6-1	3-4-65	Shorted during mechanical shock
12-1-1	2-15-65	Shorted - post burn-in measurement
35-5-1	2-18-65	" during burn-in
49-6-1	2-15-65	Shorted - post burn-in
18-1-1	2-24-65	" Post vibration
51-1-1	2-17-65	" "
77-3-1	2-17-65	" "
92-4-1	2-17-65	" "
95-4-1	2-17-65	" "
50-6-1	4-7-65	Intermittent Short - 168 hr. life
2-1-1	5-19-65	Open - 500 hr. life
60-1-1	5-19-65	" "
53-1-1	6-22-65	Open - 1000 hr. life
144-1-1	6-22-65	" "
26-3-1	6-23-65	" "
29-3-1	6-24-65	" "
84-5-1	6-24-65	" "
155-5-1	6-24-65	" "
42-4-1	6-28-65	" "
39-2-1	6-28-65	" "
156-2-1	6-28-65	Int. Short "
83-5-1	6-24-65	Open "
68347	3-1-65	Short - Post Shock
131-1-1	8-9-65	Open - 2000 hr. life
73-1-1	8-9-65	" "
70-1-1	8-9-65	" "
8-1-1	8-9-65	" "
11-1-1	8-9-65	" "
20-1-1	8-9-65	" "
13-1-1	8-9-65	" "
93-4-1	8-13-65	" "
38-2-1	8-13-65	" "
32-5-1	8-13-65	" "
27-3-1	8-13-65	" "
28-3-2	3-4-65	Short - Post shock
38-2-2	3-4-65	Short - Initial Measurement
59-6-2	2-17-65	Short - Post vibration

<u>Item</u> <u>No.</u>	<u>Date</u>	<u>Remarks</u>
158-2-2	5-25-65	Short - 500 hr. life
160-2-2	8-12-65	Lead broken in handling (2000 hr. readout)
83-5-3	8-14-65	Short - 2000 hr. life
5-1-3	4-5-65	Short - Life Test 96 hrs.
10-1-3	2-15-65	Short - Burn-in
73-1-3	4-1-65	Short - Life test 8 hrs.
81-5-3	6-2-65	Short - 1000 hr. life
87-2-3	5-5-65	" 500 hr. life
89-2-3	4-9-65	" life test 120 hrs.
93-4-3	4-9-65	" life test 120 hrs.
98-6-3	4-29-65	" 168 hr. life
100-6-3	4-7-65	" Life test - 48 hrs.
151-5-3	4-5-65	" life test - 120 hrs.
153-5-3	5-6-65	" 500 hr. life
154-5-3	4-6-65	" 168 hr. life
166-6-3	6-8-65	" 1000 hr life
168-6-3	4-6-65	" 168 hr. life
169-6-3	4-6-65	" "
97-6-3	6-7-65	" 1000 hr. life
28-3-3	2-15-65	" Burn-in
22-1-3	3-12-65	" thermal shock
31-5-3	5-27-65	" 500 hr. life
39-2-3	2-15-65	" 168 hr. life
40-2-3	6-11-65	" 1000 hr. life
41-2-3	2-18-65	Lead broken in vibration
47-6-3	4-29-65	Cracked case - 168 hr. life
42-4-3	2-18-65	Lead broken in vibration
74-1-3	4-1-65	Short - Moisture resistance
133-1-3	1-28-65	Intermittent short - initial measurement
146-3-3	1-26-65	Short - Initial readout
131-1-3	6-22-65	IR short - 1000 hr. life
129-1-3	6-22-65	" "
134-1-3	6-22-65	" "
95-4-3	6-25-65	Lead broken in handling 1000 hr. life
20-1-3	7-6-65	Intermittent short - 2000 hr. life
142-1-3	4-6-65	Short - 168 hr. life
136-1-3	8-9-65	IR short - 2000 hr life
155-5-3	8-14-65	Short - 2000 hr. life
45-4-3	8-16-65	" "
43-4-3	8-16-65	" "
49-6-3	8-16-65	" "
70-1-4	2-15-65	Short - Burn-in
22-1-4	3-22-65	Short - Moisture Resistance
47-6-4	4-29-65	Open - 168 hr. life

<u>Item</u> <u>No.</u>	<u>Date</u>	<u>Remarks</u>
13-1-5	2-16-65	Short - Burn-in
25-1-5	2-16-65	" "
2-1-5	2-18-65	Lead broken in vibration
5-1-5	2-18-65	"
11-1-5	2-18-65	"
15-1-5	2-24-65	Short - Post vibration
63-1-6	3-2-65	Short - Post Mechanical Shock
27-3-5	2-24-65	Short - Post Vibration
6-1-5	3-22-65	Short - Post Moisture Resistance
14-1-5	3-22-65	" "
53-1-5	3-26-65	" "
55-1-5	3-26-65	" "
56-1-5	3-26-65	" "
57-1-5	3-26-65	" "
59-1-5	3-26-65	" "
60-1-5	3-26-65	" "
64-1-5	3-26-65	" "
67-1-5	3-26-65	" "
68-1-5	3-26-65	" "
71-1-5	3-26-65	" "
72-1-5	3-26-65	" "
73-1-5	3-26-65	" "
75-1-5	3-26-65	" "
42-4-5	3-24-65	" "
41-4-5	3-24-65	" "
38-2-5	3-24-65	" "
22-1-5	3-24-65	" "
12-1-5	3-24-65	" "
9-1-5	3-24-65	" "
10-1-5	4-1-65	Short - 168 hr. life
24-1-5	4-2-65	" "
66-1-5	4-2-65	" "
70-1-5	4-2-65	" "
74-1-5	4-2-65	" "
154-5-5	4-5-65	" "
35-5-5	4-5-65	" "
32-5-5	4-6-65	" "
31-5-5	4-6-65	" "
7-1-5	4-7-65	" "
92-4-5	4-9-65	" "
95-4-5	4-12-65	" "
162-4-5	4-12-65	" "
94-4-5	4-29-65	" "
96-6-5	4-29-65	" "
151-5-5	4-28-65	" "

<u>Item</u> <u>No.</u>	<u>Date</u>	<u>Remarks</u>
33-5-5	5-3-65	Short - 500 hr. life
95-4-5	5-3-65	" "
121-1-5	5-3-65	" "
156-2-5	5-5-65	" "
163-4-5	5-6-65	" "
158-2-5	5-9-65	" "
44-4-5	5-9-65	" "
160-2-5	5-12-65	" "
161-4-5	5-12-65	" "
164-4-5	5-12-65	" "
81-5-5	6-2-65	Short - 1000 hr. life
85-5-5	6-3-65	" "
93-4-5	6-7-65	" "
34-5-5	6-7-65	" "
91-4-5	6-7-65	" "
43-4-5	6-7-65	" "
165-4-5	6-14-65	" "
157-2-5	6-17-65	" "
26-3-5	4-2-65	Short - 168 hr. life
30-3-5	4-2-65	" "
77-3-5	4-2-65	" "
54-1-5	6-23-65	Short - 1000 hr. life
62-1-5	6-23-65	" "
21-1-5	6-23-65	" "
23-1-5	6-23-65	" "
86-2-5	7-7-65	Short - 2000 hr. life
29-3-5	7-8-65	" "
82-5-5	7-8-65	" "
90-2-5	7-9-65	" "
125-1-5	7-12-65	" "
84-5-5	4-6-65	Short - 168 hr. life
36-2-5	2-18-54	Lead broken in vibration
53-5-5	7-27-65	Short - 2000 hr. life
83-5-5	7-27-65	" "
149-3-5	7-28-65	" "
39-2-5	7-29-65	" "
37-2-5	7-30-65	" "
87-2-5	7-30-65	" "
78-3-5	8-6-65	" "
146-3-5	8-14-65	" "
40-2-5	8-16-65	" "
2-1-6	2-16-65	Intermittent short - Post burn-in
19-1-6	2-16-65	" "
23-1-6	2-8-65	Short - Burn-in
42-4-6	2-16-65	" "
26-3-6	2-24-65	" "

<u>Item</u> <u>No.</u>	<u>Date</u>	<u>Remarks</u>
36-2-6	2-24-65	Short - Burn-in
45-4-6	2-24-65	" "
46-6-6	2-24-65	" "
50-6-6	2-24-65	" "
69-1-6	2-17-65	Open - Post vibration
70-1-6	2-17-65	Short "
86-2-6	2-17-65	" "
88-2-6	2-17-65	Short - Post Mechanical Shock
20-1-6	3-4-65	" "
98-6-6	3-2-65	" "
68-1-6	3-12-65	" "
3-1-6	3-11-65	Short - Post Thermal Shock
43-4-6	3-11-65	" "
165-4-6	6-2-65	Lead broken in handling 1000 hr. life
7-1-6	6-23-65	Open - 1000 hr. life
1-1-6	6-23-65	" "
142-1-6	6-23-65	" "
75-1-6	6-23-65	" "
68-1-6	6-23-65	" "
59-1-6	6-23-65	" "
129-1-6	6-23-65	" "
153-5-6	6-24-65	" "
34-5-6	6-24-65	" "
149-3-6	6-24-65	" "
40-2-6	6-28-65	" "
97-6-6	6-28-65	" "
167-6-6	6-28-65	" "
37-2-6	8-16-65	Short - 2000 hr. life
4-1-7	2-8-65	Case fractured in vibration
27-3-7	2-24-65	Short - Post vibration
38-2-7	2-24-65	" "
48-6-7	2-18-65	Lead broken in vibration
49-6-7	2-18-65	" "
50-6-7	2-18-65	" "
56-1-7	2-12-65	" "
59-1-7	2-12-65	" "
60-1-7	3-8-65	Short - Post Thermal Shock
69-1-7	3-8-65	" "
70-1-7	3-8-65	" "
78-3-7	3-8-65	" "
81-5-7	3-8-65	" "
92-4-7	3-8-65	" "
100-6-7	3-8-65	" "

<u>Item</u> <u>No.</u>	<u>Date</u>	<u>Remarks</u>
23-1-7	6-23-65	Open - 1000 hr. life
123-1-7	6-23-65	" "
72-1-7	6-23-65	" "
131-1-7	6-23-65	" "
63-1-7	6-23-65	" "
128-1-7	6-23-65	" "
134-1-7	6-23-65	" "
127-1-7	6-23-65	" "
126-1-7	6-23-65	" "
65-1-7	6-23-65	" "
71-1-7	6-23-65	" "
148-3-7	6-24-65	" "
160-2-7	6-28-65	" "
164-4-7	6-28-65	" "
165-4-7	6-28-65	" "
40-2-7	6-29-65	Broken lead - 1000 hr. life
29-3-7	3-4-65	Short - Post Mechanical Shock
69398	3-12-65	Unstable - Thermal Shock
135-1-7	8-12-65	Open - 2000 hr. life
151-1-7	8-12-65	" "
27-3-8	4-2-65	Short - 168 hr. life
60-1-8	4-6-65	" "
68-1-8	4-6-65	" "
28-3-8	4-8-65	" "
44-4-8	4-9-65	" "
36-2-8	4-9-65	" "
5-1-8	2-24-65	" Post Vibration
45-4-8	4-5-65	" 168 hr. life
42-4-8	5-28-65	" 500 hr. life
35-5-8	6-16-65	" 1000 hr. life
57-1-8	8-12-65	" 2000 hr. life
138-1-8	8-12-65	" "
151-5-8	5-24-65	" 500 hr. life
147-3-8	8-14-65	" 2000 hr. life
158-2-8	8-16-65	" "
51-1-9	2-12-65	Leads broken in vibration
92-4-9	2-12-65	" "
6-1-9	3-4-65	Short - Post Mechanical Shock
13-1-9	3-22-65	Short - Post Moisture Resistance
29-3-9	3-22-65	" "
30-3-9	3-22-65	" "
36-2-9	3-22-65	" "
167-6-9	4-7-65	Short - 168 hr. life
126-1-9	4-28-65	" "
54-1-9	7-6-65	Short - 2000 hr. life
22-1-9	8-12-65	" "

APPENDIX II
PARAMETRIC FAILURES

Item No.	Prior Meas.	Exp.	Post P. F. Meas.	Exp.	Group No.	Mfg.
46	806	4	988	4	6	0 24
47	928	4	1095	4	6	0 23
47			1081	4	6	0 24
156	1020	4	1178	4	2	0 21
156			1168	4	2	0 22
156			1195	4	2	0 23
156			1234	4	2	0 24
166	976	4	1133	4	6	0 21
166			1127	4	6	0 22
166			1166	4	6	0 23
166			1144	4	6	0 24
167	991	4	1177	4	6	0 21
167			1169	4	6	0 22
167			1191	4	6	0 23
167			1179	4	6	0 24
2	956	4	6	4	1	1 21
2			J	4	1	1 22
2			CF	4	1	1 23
2			CF	4	1	1 24
8	983	4	4	4	1	1 21
8			974	4	1	1 22
8			986	4	1	1 23
8			CF	4	1	1 24
86	961	4	1	4	2	1 22
86			968	4	2	1 23
86			981	4	2	1 24

148	519	4	894	4	3	2	24

95	871	4		4	4	4	22
95			871	4	4	4	23
95			989	4	4	4	24

15	1131	4	1322	4	1	5	13
15			1089	4	1	5	14
15			CF	4	1	5	15
15			CF	4	1	5	16
15			CF	4	1	5	21
15			CF	4	1	5	22
15			CF	4	1	5	23
15			CF	4	1	5	24

27	975	4	1135	4	1	5	13
27			951	4	1	5	14
27			CF	4	1	5	15
27			CF	4	1	5	16
27			CF	4	1	5	21
27			CF	4	1	5	22
27			CF	4	1	5	23
27			CF	4	1	5	24

50	940	4	8	4	1	6	12
50			CF	4	1	6	13
50			CF	4	1	6	14
50			CF	4	1	6	15
50			CF	4	1	6	16
50			CF	4	1	6	21
50			CF	4	1	6	22
50			CF	4	1	6	23
50			CF	4	1	6	24

59	978	4	5	4	2	6	22
59			J	4	1	6	23
59			CF	4	1	6	24

142	955	4	1	4	5	6	22
142			J	4	1	6	23
142			CF	4	1	6	24

149	954	4	1	4	3	6	22
149			J	4	3	6	23

149			CF	4	3	6	24

152	660	4	955	4	5	6	24

153	943	4	1097	4	5	6	22
153			J	4	5	6	23
153			CF	4	5	6	24

167	987	4	1	4	6	6	22
167			J	4	6	6	23
167			CF	4	6	6	24

27	1000	5	44	5	1	7	12
27			CF	5	1	7	13
27			CF	5	1	7	14
27			CF	5	1	7	15
27			CF	5	1	7	16
27			CF	5	1	7	21
27			CF	5	1	7	22
27			CF	5	1	7	23
27			CF	5	1	7	24

60		5	40	5	2	7	11
60			42	5	2	7	13
60			41	5	2	7	14
60			CF	5	2	7	15
60			CF	5	2	7	16
60			CF	5	2	7	21
60			CF	5	2	7	22
60			CF	5	2	7	23
60			CF	5	2	7	24

63	1030	5	45	5	1	7	21
63			21	5	1	7	22
63			J	5	1	7	23
63			CF	5	1	7	24

65	1008	5	41	5	2	7	16
65			976	5	1	7	21
65			42	5	1	7	22
65			J	5	1	7	23
65			CF	5	1	7	24

69		5	40	5	2	7	11
69			989	5	2	7	13
69			43	5	2	7	14
69			CF	5	2	7	15
69			CF	5	2	7	16
69			CF	5	2	7	21
69			CF	5	2	7	22
69			CF	5	2	7	23
69			CF	5	2	7	24

70		5	40	5	2	7	11
70			J	5	2	7	13
70			J	5	2	7	14
70			CF	5	2	7	15
70			CF	5	2	7	16
70			CF	5	2	7	21
70			CF	5	2	7	22
70			CF	5	2	7	23
70			CF	5	2	7	24

71	940	5	38	5	2	7	14
71			948	5	2	7	15
71			37	5	2	7	16
71			J	5	1	7	21
71			37	5	1	7	22
71			J	5	1	7	23
71			CF	5	1	7	24

81		5	40	5	2	7	11
81			48	5	2	7	13
81			47	5	2	7	14
81			CF	5	2	7	15
81			CF	5	2	7	16
81			CF	5	2	7	21
81			CF	5	2	7	22
81			CF	5	2	7	23
81			CF	5	2	7	24

92		5	40	5	2	7	11
92			45	5	2	7	13
92			44	5	2	7	14
92			CF	5	2	7	15
92			CF	5	2	7	16
92			CF	5	2	7	21
92			CF	5	2	7	22
92			CF	5	2	7	23
92			CF	5	2	7	24

127	951	5	45	5	1	7	21

127			47	5	1	7	22
127			J	5	1	7	23
127			CF	5	1	7	24

128	1011	5	42	5	1	7	21
128			44	5	1	7	22
128			J	5	1	7	23
128			CF	5	1	7	24

131	1040	5	41	5	1	7	21
131			1052	5	1	7	22
131			J	5	1	7	23
131			CF	5	1	7	24

134		5	40	5	5	7	11
134			45	5	1	7	21
134			CF	5	1	7	22
134			CF	5	1	7	23
134			CF	5	1	7	24

135	979	5	38	5	5	7	22
135			J	5	1	7	23
135			CF	5	1	7	24

148		5	30	5	5	7	11
148			38	5	3	7	21
148			J	5	3	7	22
148			J	5	3	7	23
148			CF	5	3	7	24

1	890	4	1140	4	1	9	16
1			885	4	1	9	21
1			895	4	1	9	22
1			900	4	1	9	23
1			893	4	1	9	24

3	864	4	1061	4	1	9	16
3			805	4	1	9	21
3			805	4	1	9	22
3			809	4	1	9	23
3			807	4	1	9	24

4	842	4	991	4	1	9	16

4			835	4	1	9	21
4			836	4	1	9	22
4			843	4	1	9	23
4			840	4	1	9	24
5	937	4	1367	4	1	9	16
5			933	4	1	9	21
5			936	4	1	9	22
5			935	4	1	9	23
5			921	4	1	9	24
7	875	4	1122	4	1	9	16
7			877	4	1	9	21
7			883	4	1	9	22
7			888	4	1	9	23
7			879	4	1	9	24
8	885	4	1096	4	1	9	16
8			853	4	1	9	21
8			851	4	1	9	22
8			863	4	1	9	23
8			851	4	1	9	24
10	871	4	1203	4	1	9	16
10			865	4	1	9	21
10			865	4	1	9	22
10			871	4	1	9	23
10			862	4	1	9	24
11	845	4	1108	4	1	9	16
11			855	4	1	9	21
11			851	4	1	9	22
11			856	4	1	9	23
11			831	4	1	9	24
12	974	4	813	4	1	9	21
12			811	4	1	9	22
12			815	4	1	9	23
12			814	4	1	9	24
14	820	4	1064	4	1	9	16
14			800	4	1	9	21
14			803	4	1	9	22
14			806	4	1	9	23

14			801	4	1	9	24
15	900	4	1059	4	1	9	16
15			843	4	1	9	21
15			832	4	1	9	22
15			833	4	1	9	23
15			828	4	1	9	24
18	865	4	1201	4	1	9	16
18			788	4	1	9	21
18			789	4	1	9	22
18			781	4	1	9	23
18			767	4	1	9	24
19	876	4	1168	4	1	9	16
19			877	4	1	9	21
19			868	4	1	9	22
19			875	4	1	9	23
19			873	4	1	9	24
20	865	4	1047	4	1	9	16
20			866	4	1	9	21
20			864	4	1	9	22
20			870	4	1	9	23
20			868	4	1	9	24
21	892	4	1295	4	1	9	16
21			905	4	1	9	21
21			899	4	1	9	22
21			904	4	1	9	23
21			904	4	1	9	24
22	858	4	994	4	1	9	16
22			755	4	1	9	21
22			755	4	1	9	22
22			763	4	1	9	23
22			CF	4	1	9	24
23	932	4	1202	4	1	9	16
23			945	4	1	9	21
23			947	4	1	9	22
23			958	4	1	9	23
23			962	4	1	9	24

24	877	4	1298	4	1	9	16
24			844	4	1	9	21
24			831	4	1	9	22
24			836	4	1	9	23
24			837	4	1	9	24

25	828	4	1029	4	1	9	16
25			840	4	1	9	21
25			841	4	1	9	22
25			852	4	1	9	23
25			857	4	1	9	24

26	826	4	1220	4	1	9	16
26			781	4	3	9	21
26			775	4	3	9	22
26			767	4	3	9	23
26			775	4	3	9	24

27	841	4	1232	4	1	9	16
27			797	4	3	9	21
27			804	4	3	9	22
27			791	4	3	9	23
27			789	4	3	9	24

28	875	4	1219	4	1	9	16
28			770	4	3	9	21
28			737	4	3	9	22
28			715	4	3	9	23
28			720	4	3	9	24

31	876	4	1134	4	1	9	16
31			837	4	5	9	21
31			821	4	5	9	22
31			812	4	5	9	23
31			820	4	5	9	24

32	868	4	1218	4	1	9	16
32			846	4	5	9	21
32			851	4	5	9	22
32			847	4	5	9	23
32			843	4	5	9	24

33	944	4	724	4	5	9	21
33			721	4	5	9	22

33			722	4	5	9	23
33			729	4	5	9	24
35	875	4	1040	4	1	9	16
35			859	4	5	9	21
35			853	4	5	9	22
35			857	4	5	9	23
35			863	4	5	9	24
37	880	4	1218	4	1	9	16
37			906	4	2	9	21
37			893	4	2	9	22
37			925	4	2	9	23
37			935	4	2	9	24
38	836	4	1035	4	1	9	16
38			861	4	2	9	21
38			854	4	2	9	22
38			873	4	2	9	23
38			891	4	2	9	24
39	834	4	1266	4	1	9	16
39			743	4	2	9	21
39			748	4	2	9	22
39			758	4	2	9	23
39			768	4	2	9	24
40	870	4	1211	4	1	9	16
40			915	4	2	9	21
40			900	4	2	9	22
40			920	4	2	9	23
40			936	4	2	9	24
41	841	4	1402	4	1	9	16
41			734	4	4	9	21
41			741	4	4	9	22
41			748	4	4	9	23
41			744	4	4	9	24
42	899	4	1095	4	1	9	16
42			959	4	4	9	21
42			961	4	4	9	22
42			981	4	4	9	23
42			975	4	4	9	24

43	832	4	1045	4	1	9	16
43			868	4	4	9	21
43			869	4	4	9	22
43			887	4	4	9	23
43			878	4	4	9	24

44	827	4	1081	4	1	9	16
44			855	4	4	9	21
44			853	4	4	9	22
44			868	4	4	9	23
44			862	4	4	9	24

45	883	4	1094	4	1	9	16
45			931	4	4	9	21
45			929	4	4	9	22
45			950	4	4	9	23
45			940	4	4	9	24

47	888	4	1112	4	1	9	16
47			952	4	6	9	21
47			944	4	6	9	22
47			951	4	6	9	23
47			939	4	6	9	24

48	844	4	1004	4	1	9	16
48			873	4	6	9	21
48			873	4	6	9	22
48			894	4	6	9	23
48			880	4	6	9	24

50	851	4	1209	4	1	9	16
50			880	4	6	9	21
50			877	4	6	9	22
50			899	4	6	9	23
50			888	4	6	9	24

54	884	4	1021	4	2	9	16
54			718	4	1	9	21
54			721	4	1	9	22
54			722	4	1	9	23
54			CF	4	1	9	24

56	915	4	1187	4	2	9	16
56			877	4	1	9	21

56			878	4	1	9	22
56			878	4	1	9	23
56			882	4	1	9	24

57	898	4	1248	4	2	9	16
57			869	4	1	9	21
57			884	4	1	9	22
57			878	4	1	9	23
57			876	4	1	9	24

59	981	4	1203	4	2	9	16
59			960	4	1	9	21
59			977	4	1	9	22
59			979	4	1	9	23
59			984	4	1	9	24

60	888	4	1197	4	2	9	16
60			753	4	1	9	21
60			758	4	1	9	22
60			760	4	1	9	23
60			754	4	1	9	24

61	909	4	1130	4	2	9	16
61			854	4	1	9	21
61			866	4	1	9	22
61			867	4	1	9	23
61			872	4	1	9	24

62	943	4	1158	4	2	9	16
62			890	4	1	9	21
62			896	4	1	9	22
62			902	4	1	9	23
62			894	4	1	9	24

63	940	4	797	4	1	9	21
63			793	4	1	9	22
63			789	4	1	9	23
63			791	4	1	9	24

64	889	4	1285	4	2	9	16
64			646	4	1	9	21
64			643	4	1	9	22
64			631	4	1	9	23
64			625	4	1	9	24

65	879	4	1197	4	2	9	16
65			834	4	1	9	21
65			846	4	1	9	22
65			848	4	1	9	23
65			830	4	1	9	24

66	924	4	1231	4	2	9	16
66			936	4	1	9	21
66			944	4	1	9	22
66			943	4	1	9	23
66			929	4	1	9	24

69	925	4	1184	4	2	9	16
69			915	4	1	9	21
69			939	4	1	9	22
69			939	4	1	9	23
69			932	4	1	9	24

70	885	4	1115	4	2	9	16
70			835	4	1	9	21
70			829	4	1	9	22
70			826	4	1	9	23
70			825	4	1	9	24

71	873	4	1153	4	2	9	16
71			744	4	1	9	21
71			738	4	1	9	22
71			735	4	1	9	23
71			737	4	1	9	24

72	919	4	1164	4	2	9	16
72			902	4	1	9	21
72			917	4	1	9	22
72			919	4	1	9	23
72			923	4	1	9	24

73	927	4	1157	4	2	9	16
73			880	4	1	9	21
73			886	4	1	9	22
73			887	4	1	9	23
73			881	4	1	9	24

75	888	4	1030	4	2	9	16
75			850	4	1	9	21

75			852	4	1	9	22
75			860	4	1	9	23
75			861	4	1	9	24

76	878	4	1035	4	2	9	16
76			854	4	3	9	21
76			847	4	3	9	22
76			836	4	3	9	23
76			838	4	3	9	24

77	874	4	1184	4	2	9	16
77			798	4	3	9	21
77			803	4	3	9	22
77			796	4	3	9	23
77			794	4	3	9	24

78	878	4	1100	4	2	9	16
78			773	4	3	9	21
78			775	4	3	9	22
78			770	4	3	9	23
78			763	4	3	9	24

84	1061	4	881	4	5	9	21
84			882	4	5	9	22
84			885	4	5	9	23
84			879	4	5	9	24

169	945	4	1112	4	6	9	23
169			952	4	6	9	24

Item No.	Prior Meas.	Exp.	Post P. F. Meas.	Exp.	Group No.	Mfg.
21	9 6	4	27 5	4	1 0	2 2
21			13 6	4	1 0	2 3
21			14 2	4	1 0	2 4
167	5 2	4	11 2	4	6 0	2 1
167			10 5	4	6 0	2 2
167			11 2	4	6 0	2 3
167			9 5	4	6 0	2 4
2	5 7	4	54 0	4	1 1	1 6
2			15 8	4	1 1	2 1
2			J	4	1 1	2 2
2			CF	4	1 1	2 3
2			CF	4	1 1	2 4
8	5 6	4	19 0	4	1 1	1 5
8			5 9	4	1 1	1 6
8			20 3	4	1 1	2 1
8			5 7	4	1 1	2 2
8			6 3	4	1 1	2 3
8			CF	4	1 1	2 4
16	6 9	4	15 3	4	1 1	1 5
16			CF	4	1 1	1 6
16			CF	4	1 1	2 1
16			CF	4	1 1	2 2
16			CF	4	1 1	2 3
16			CF	4	1 1	2 4
33	4 8	4	17 5	4	5 1	2 3
33			5 3	4	5 1	2 4
38	5 4	4	45 6	4	2 1	2 2
38			72 0	4	2 1	2 3
38			CF	4	2 1	2 4

45	53	4	520	4	4	1	23
45			82	4	4	1	24
46	52	4	295	4	6	1	23
46			56	4	6	1	24
70	54	4	150	4	1	1	23
70			J	4	1	1	24
86	57	4	203	4	2	1	22
86			60	4	2	1	23
86			1050	4	2	1	24
90	62	4	800	4	2	1	24
93	53	4	540	4	4	1	23
93			CF	4	4	1	24
4	69	4	495	4	1	2	16
4			62	4	1	2	21
4			62	4	1	2	22
4			68	4	1	2	23
4			67	4	1	2	24
33	68	4	207	4	1	2	16
33			59	4	5	2	21
33			62	4	5	2	22
33			65	4	5	2	23
33			67	4	5	2	24
44	62	4	205	4	1	2	16
44			72	4	4	2	21
44			55	4	4	2	22
44			55	4	4	2	23
44			64	4	4	2	24
50	65	4	147	4	1	2	16
50			63	4	6	2	21
50			61	4	6	2	22
50			68	4	6	2	23

50			62	4	6	2	24
99	56	4	120	4	6	2	21
99			54	4	6	2	22
99			55	4	6	2	23
99			54	4	6	2	24
129	56	4	471	4	1	2	22
129			67	4	1	2	23
129			66	4	1	2	24
148	1	4	9200	4	3	2	23
148			1350	4	3	2	24
11	163	4	320	4	1	3	16
11			157	4	1	3	21
11			172	4	1	3	22
11			185	4	1	3	23
11			160	4	1	3	24
82	150	4	922	4	5	3	23
82			147	4	5	3	24
98	155	4	430	4	2	3	16
98			268	4	6	3	21
98			CF	4	6	3	22
98			CF	4	6	3	23
98			CF	4	6	3	24
100	164	4	420	4	2	3	16
100			CF	4	6	3	21
100			CF	4	6	3	22
100			CF	4	6	3	23
100			CF	4	6	3	24
53	67	4	505	4	1	4	16
53			68	4	1	4	21
53			64	4	1	4	22
53			65	4	1	4	23
53			76	4	1	4	24

57	56	4	164	4	1	4	16
57			56	4	1	4	21
57			56	4	1	4	22
57			62	4	1	4	23
57			63	4	1	4	24

2	59	4	119	4	2	4	16
2			63	4	1	4	21
2			57	4	1	4	22
2			63	4	1	4	23
2			66	4	1	4	24

4	57	4	172	4	1	4	24

5	56	4	288	4	2	4	16
5			53	4	1	4	21
5			54	4	1	4	22
5			57	4	1	4	23
5			60	4	1	4	24

78	59	4	173	4	2	4	16
78			57	4	3	4	21
78			58	4	3	4	22
78			57	4	3	4	23
78			62	4	3	4	24

91	62	4	127	4	2	4	16
91			57	4	4	4	21
91			53	4	4	4	22
91			57	4	4	4	23
91			65	4	4	4	24

95	52	4	356	4	4	4	22
95			56	4	4	4	23
95			65	4	4	4	24

9	163	4	393	4	1	5	16
9			CF	4	1	5	21
9			CF	4	1	5	22
9			CF	4	1	5	23
9			CF	4	1	5	24

10	163	4	320	4	1	5	16

10			CF	4	1	5	21
10			CF	4	1	5	22
10			CF	4	1	5	23
10			CF	4	1	5	24

12	165	4	633	4	1	5	16
12			CF	4	1	5	21
12			CF	4	1	5	22
12			CF	4	1	5	23
12			CF	4	1	5	24

18	164	4	380	4	1	5	16
18			160	4	1	5	21
18			163	4	1	5	22
18			175	4	1	5	23
18			165	4	1	5	24

22	169	4	465	4	1	5	16
22			CF	4	1	5	21
22			CF	4	1	5	22
22			CF	4	1	5	23
22			CF	4	1	5	24

27	188	4	505	4	1	5	12
27			J	4	1	5	13
27			422	4	1	5	14
27			CF	4	1	5	15
27			CF	4	1	5	16
27			CF	4	3	5	21
27			CF	4	3	5	22
27			CF	4	3	5	23
27			CF	4	3	5	24

28	152	4	625	4	1	5	15
28			225	4	1	5	16
28			162	4	3	5	21
28			163	4	3	5	22
28			175	4	3	5	23
28			170	4	3	5	24

32	157	4	555	4	1	5	16
32			CF	4	5	5	21
32			CF	4	5	5	22
32			CF	4	5	5	23
32			CF	4	5	5	24

38	160	4	500	4	1	5	16
38			CF	4	2	5	21
38			CF	4	2	5	22
38			CF	4	2	5	23
38			CF	4	2	5	24

41	160	4	373	4	1	5	16
41			CF	4	4	5	21
41			CF	4	4	5	22
41			CF	4	4	5	23
41			CF	4	4	5	24

44	157	4	323	4	1	5	16
44			159	4	4	5	21
44			CF	4	4	5	22
44			CF	4	4	5	23
44			CF	4	4	5	24

48	158	4	330	4	1	5	16
48			184	4	6	5	21
48			172	4	6	5	22
48			188	4	6	5	23
48			175	4	6	5	24

52	172	4	360	4	2	5	16
52			163	4	1	5	21
52			172	4	1	5	22
52			185	4	1	5	23
52			180	4	1	5	24

53	162	4	340	4	2	5	16
53			CF	4	1	5	21
53			CF	4	1	5	22
53			CF	4	1	5	23
53			CF	4	1	5	24

57	166	4	320	4	2	5	16
57			CF	4	1	5	21
57			CF	4	1	5	22
57			CF	4	1	5	23
57			CF	4	1	5	24

60	169	4	340	4	2	5	16
60			CF	4	1	5	21

60			CF	4	1	5	22
60			CF	4	1	5	23
60			CF	4	1	5	24

62	280	4	522	4	1	5	21
62			155	4	1	5	22
62			175	4	1	5	23
62			CF	4	1	5	24

67	168	4	400	4	2	5	16
67			CF	4	1	5	21
67			CF	4	1	5	22
67			CF	4	1	5	23
67			CF	4	1	5	24

71	162	4	363	4	2	5	16
71			CF	4	1	5	21
71			CF	4	1	5	22
71			CF	4	1	5	23
71			CF	4	1	5	24

72	170	4	315	4	2	5	16
72			CF	4	1	5	21
72			CF	4	1	5	22
72			CF	4	1	5	23
72			CF	4	1	5	24

73	163	4	413	4	2	5	16
73			CF	4	1	5	21
73			CF	4	1	5	22
73			CF	4	1	5	23
73			CF	4	1	5	24

88	163	4	330	4	2	5	16
88			176	4	2	5	21
88			162	4	2	5	22
88			195	4	2	5	23
88			193	4	2	5	24

96	167	4	382	4	2	5	16
96			183	4	6	5	21
96			CF	4	6	5	22
96			CF	4	6	5	23
96			CF	4	6	5	24

152	1	4	1540	4	5	6	23
152			65	4	5	6	24
153	46	4	398	4	5	6	21
153			J	4	5	6	22
153			J	4	5	6	23
153			CF	4	5	6	24
160	61	4	1760	4	2	6	24
2	139	4	318	4	1	7	16
2			137	4	1	7	21
2			137	4	1	7	22
2			140	4	1	7	23
2			140	4	1	7	24
7	135	4	320	4	1	7	16
7			137	4	1	7	21
7			136	4	1	7	22
7			135	4	1	7	23
7			140	4	1	7	24
9	137	4	344	4	1	7	16
9			144	4	1	7	21
9			146	4	1	7	22
9			143	4	1	7	23
9			145	4	1	7	24
14	138	4	652	4	1	7	16
14			138	4	1	7	21
14			140	4	1	7	22
14			142	4	1	7	23
14			142	4	1	7	24
16	139	4	365	4	1	7	16
16			140	4	1	7	21
16			138	4	1	7	22
16			142	4	1	7	23
16			142	4	1	7	24
17	142	4	310	4	1	7	16
17			138	4	1	7	21

151	148	4	488	4	5	5	21
151			CF	4	5	5	22
151			CF	4	5	5	23
151			CF	4	5	5	24
1	58	4	243	4	1	6	16
1			J	4	1	6	21
1			190	4	1	6	22
1			CF	4	1	6	23
1			CF	4	1	6	24
29	53	4	240	4	3	6	24
50	62	4	484	4	1	6	12
50			J	4	1	6	13
50			CF	4	1	6	14
50			CF	4	1	6	15
50			CF	4	1	6	16
50			CF	4	6	6	21
50			CF	4	6	6	22
50			CF	4	6	6	23
50			CF	4	6	6	24
59	72	4	630	4	1	6	21
59			85	4	2	6	22
59			J	4	1	6	23
59			CF	4	1	6	24
71	62	4	510	4	1	6	21
71			365	4	1	6	22
71			63	4	1	6	23
71			100	4	1	6	24
93	58	4	223	4	4	6	24
142	89	4	202	4	5	6	22
142			J	4	1	6	23
142			CF	4	1	6	24
149	54	4	172	4	3	6	22
149			J	4	3	6	23
149			CF	4	3	6	24

17			138	4	1	7	22
17			138	4	1	7	23
17			140	4	1	7	24
19	144	4	464	4	1	7	16
19			142	4	1	7	21
19			137	4	1	7	22
19			138	4	1	7	23
19			140	4	1	7	24
21	144	4	370	4	1	7	16
21			142	4	1	7	21
21			142	4	1	7	22
21			143	4	1	7	23
21			144	4	1	7	24
24	47	4	130	4	1	7	21
24			137	4	1	7	22
24			141	4	1	7	23
24			145	4	1	7	24
28	137	4	344	4	1	7	16
28			136	4	3	7	21
28			136	4	3	7	22
28			133	4	3	7	23
28			140	4	3	7	24
30	141	4	920	4	1	7	16
30			136	4	3	7	21
30			136	4	3	7	22
30			135	4	3	7	23
30			142	4	3	7	24
34	136	4	298	4	1	7	16
34			137	4	5	7	21
34			133	4	5	7	22
34			122	4	5	7	23
34			127	4	5	7	24
39	136	4	324	4	1	7	16
39			136	4	2	7	21
39			134	4	2	7	22
39			132	4	2	7	23
39			142	4	2	7	24

45	56	4	166	4	4	7	22
45			155	4	4	7	23
45			155	4	4	7	24

71	147	4	630	4	2	7	14
71			142	4	2	7	15
71			152	4	2	7	16
71			J	4	1	7	21
71			145	4	1	7	22
71			J	4	1	7	23
71			CF	4	1	7	24

82	211	4	322	4	5	7	23
82			130	4	5	7	24

166	137	4	430	4	6	7	23
166			137	4	6	7	24

42	164	4	600	4	4	8	22
42			CF	4	4	8	23
42			CF	4	4	8	24

1	54	4	169	4	1	9	15
1			1270	4	1	9	16
1			220	4	1	9	21
1			235	4	1	9	22
1			176	4	1	9	23
1			68	4	1	9	24

3	62	4	1180	4	1	9	16
3			86	4	1	9	21
3			78	4	1	9	22
3			72	4	1	9	23
3			67	4	1	9	24

4	65	4	800	4	1	9	16
4			107	4	1	9	21
4			76	4	1	9	22
4			75	4	1	9	23
4			70	4	1	9	24

5	50	4	125	4	1	9	15

5			1640	4	1	9	16
5			273	4	1	9	21
5			300	4	1	9	22
5			210	4	1	9	23
5			72	4	1	9	24

7	48	4	120	4	1	9	15
7			1380	4	1	9	16
7			215	4	1	9	21
7			259	4	1	9	22
7			195	4	1	9	23
7			65	4	1	9	24

8	83	4	168	4	1	9	15
8			1180	4	1	9	16
8			324	4	1	9	21
8			292	4	1	9	22
8			310	4	1	9	23
8			205	4	1	9	24

9	62	4	502	4	1	9	16
9			870	4	1	9	21
9			66	4	1	9	22
9			65	4	1	9	23
9			65	4	1	9	24

10	52	4	173	4	1	9	15
10			1530	4	1	9	16
10			247	4	1	9	21
10			240	4	1	9	22
10			230	4	1	9	23
10			98	4	1	9	24

11	52	4	352	4	1	9	15
11			7300	4	1	9	16
11			484	4	1	9	21
11			456	4	1	9	22
11			430	4	1	9	23
11			205	4	1	9	24

12	82	4	845	4	1	9	16
12			146	4	1	9	21
12			122	4	1	9	22
12			95	4	1	9	23
12			66	4	1	9	24

13	72	4	179	4	1	9	15
13			CF	4	1	9	16
13			CF	4	1	9	21
13			CF	4	1	9	22
13			CF	4	1	9	23
13			CF	4	1	9	24

14	86	4	900	4	1	9	16
14			215	4	1	9	21
14			262	4	1	9	22
14			185	4	1	9	23
14			90	4	1	9	24

15	66	4	760	4	1	9	16
15			67	4	1	9	21
15			62	4	1	9	22
15			65	4	1	9	23
15			61	4	1	9	24

16	63	4	174	4	1	9	16
16			67	4	1	9	21
16			64	4	1	9	22
16			72	4	1	9	23
16			67	4	1	9	24

17	62	4	530	4	1	9	16
17			84	4	1	9	21
17			69	4	1	9	22
17			72	4	1	9	23
17			68	4	1	9	24

18	114	4	352	4	1	9	15
18			1450	4	1	9	16
18			450	4	1	9	21
18			482	4	1	9	22
18			320	4	1	9	23
18			107	4	1	9	24

19	55	4	180	4	1	9	15
19			1350	4	1	9	16
19			225	4	1	9	21
19			132	4	1	9	22
19			100	4	1	9	23
19			65	4	1	9	24

20	67	4	830	4	1	9	16
20			103	4	1	9	21
20			100	4	1	9	22
20			82	4	1	9	23
20			65	4	1	9	24

21	94	4	1340	4	1	9	16
21			158	4	1	9	21
21			119	4	1	9	22
21			92	4	1	9	23
21			72	4	1	9	24

22	60	4	748	4	1	9	16
22			68	4	1	9	21
22			62	4	1	9	22
22			76	4	1	9	23
22			CF	4	1	9	24

23	62	4	134	4	1	9	15
23			1240	4	1	9	16
23			123	4	1	9	21
23			120	4	1	9	22
23			93	4	1	9	23
23			67	4	1	9	24

24	52	4	115	4	1	9	15
24			1600	4	1	9	16
24			252	4	1	9	21
24			185	4	1	9	22
24			125	4	1	9	23
24			70	4	1	9	24

25	74	4	9280	4	1	9	16
25			104	4	1	9	21
25			112	4	1	9	22
25			80	4	1	9	23
25			70	4	1	9	24

26	79	4	2020	4	1	9	16
26			102	4	3	9	21
26			106	4	3	9	22
26			95	4	3	9	23
26			100	4	3	9	24

27	64	4	172	4	1	9	15

27			1590	4	1	9	16
27			442	4	3	9	21
27			558	4	3	9	22
27			480	4	3	9	23
27			390	4	3	9	24

28	308	4	1380	4	1	9	16
28			485	4	3	9	21
28			232	4	3	9	22
28			126	4	3	9	23
28			104	4	3	9	24

29	56	4	233	4	1	9	15
29			CF	4	1	9	16
29			CF	4	3	9	21
29			CF	4	3	9	22
29			CF	4	3	9	23
29			CF	4	3	9	24

31	60	4	193	4	1	9	15
31			1330	4	1	9	16
31			403	4	5	9	21
31			436	4	5	9	22
31			395	4	5	9	23
31			362	4	5	9	24

32	62	4	146	4	1	9	15
32			1370	4	1	9	16
32			292	4	5	9	21
32			366	4	5	9	22
32			305	4	5	9	23
32			204	4	5	9	24

33	66	4	965	4	1	9	16
33			238	4	5	9	21
33			253	4	5	9	22
33			241	4	5	9	23
33			272	4	5	9	24

34	64	4	585	4	1	9	16
34			112	4	5	9	21
34			111	4	5	9	22
34			105	4	5	9	23
34			115	4	5	9	24

35	54	4	135	4	1	9	15
35			1040	4	1	9	16
35			176	4	5	9	21
35			187	4	5	9	22
35			153	4	5	9	23
35			170	4	5	9	24

37	77	4	1070	4	1	9	16
37			265	4	2	9	21
37			318	4	2	9	22
37			370	4	2	9	23
37			270	4	2	9	24

38	94	4	1190	4	1	9	16
38			148	4	2	9	21
38			187	4	2	9	22
38			130	4	2	9	23
38			85	4	2	9	24

39	104	4	1570	4	1	9	16
39			323	4	2	9	21
39			378	4	2	9	22
39			300	4	2	9	23
39			172	4	2	9	24

40	77	4	278	4	1	9	15
40			1490	4	1	9	16
40			570	4	2	9	21
40			535	4	2	9	22
40			520	4	2	9	23
40			490	4	2	9	24

41	55	4	345	4	1	9	15
41			2020	4	1	9	16
41			83	4	4	9	21
41			73	4	4	9	22
41			77	4	4	9	23
41			85	4	4	9	24

42	161	4	1080	4	1	9	16
42			83	4	4	9	21
42			112	4	4	9	22
42			142	4	4	9	23
42			138	4	4	9	24

43	69	4	1230	4	1	9	16
43			76	4	4	9	21
43			75	4	4	9	22
43			78	4	4	9	23
43			67	4	4	9	24

44	77	4	1070	4	1	9	16
44			90	4	4	9	21
44			72	4	4	9	22
44			82	4	4	9	23
44			80	4	4	9	24

45	82	4	925	4	1	9	16
45			98	4	4	9	21
45			82	4	4	9	22
45			86	4	4	9	23
45			75	4	4	9	24

46	118	4	885	4	1	9	16
46			126	4	6	9	21
46			185	4	6	9	22
46			195	4	6	9	23
46			202	4	6	9	24

47	76	4	162	4	1	9	15
47			1380	4	1	9	16
47			366	4	6	9	21
47			336	4	6	9	22
47			165	4	6	9	23
47			110	4	6	9	24

48	106	4	970	4	1	9	16
48			92	4	6	9	21
48			118	4	6	9	22
48			90	4	6	9	23
48			72	4	6	9	24

49	64	4	242	4	1	9	16
49			71	4	6	9	21
49			64	4	6	9	22
49			80	4	6	9	23
49			63	4	6	9	24

50	109	4	1420	4	1	9	16

50			81	4	6	9	21
50			72	4	6	9	22
50			80	4	6	9	23
50			67	4	6	9	24

52	97	4	535	4	2	9	16
52			130	4	1	9	21
52			159	4	1	9	22
52			130	4	1	9	23
52			75	4	1	9	24

53	76	4	248	4	2	9	16
53			75	4	1	9	21
53			68	4	1	9	22
53			75	4	1	9	23
53			80	4	1	9	24

54	72	4	169	4	2	9	15
54			970	4	2	9	16
54			184	4	1	9	21
54			201	4	1	9	22
54			206	4	1	9	23
54			CF	4	1	9	24

55	106	4	850	4	2	9	16
55			65	4	1	9	21
55			64	4	1	9	22
55			74	4	1	9	23
55			75	4	1	9	24

56	112	4	950	4	2	9	16
56			111	4	1	9	21
56			116	4	1	9	22
56			95	4	1	9	23
56			80	4	1	9	24

57	127	4	1220	4	2	9	16
57			212	4	1	9	21
57			288	4	1	9	22
57			219	4	1	9	23
57			105	4	1	9	24

59	61	4	242	4	2	9	15
59			1070	4	2	9	16

59			78	4	1	9	21
59			140	4	1	9	22
59			110	4	1	9	23
59			70	4	1	9	24

60	51	4	222	4	2	9	15
60			1400	4	2	9	16
60			330	4	1	9	21
60			371	4	1	9	22
60			355	4	1	9	23
60			263	4	1	9	24

61	88	4	950	4	2	9	16
61			96	4	1	9	21
61			104	4	1	9	22
61			87	4	1	9	23
61			75	4	1	9	24

62	52	4	283	4	2	9	15
62			1220	4	2	9	16
62			207	4	1	9	21
62			262	4	1	9	22
62			260	4	1	9	23
62			132	4	1	9	24

63	68	4	502	4	2	9	16
63			77	4	1	9	21
63			69	4	1	9	22
63			70	4	1	9	23
63			67	4	1	9	24

64	163	4	1440	4	2	9	16
64			366	4	1	9	21
64			328	4	1	9	22
64			159	4	1	9	23
64			110	4	1	9	24

65	70	4	194	4	2	9	15
65			1230	4	2	9	16
65			385	4	1	9	21
65			455	4	1	9	22
65			430	4	1	9	23
65			208	4	1	9	24

66	52	4	193	4	2	9	15

66			1270	4	2	9	16
66			353	4	1	9	21
66			382	4	1	9	22
66			352	4	1	9	23
66			170	4	1	9	24

67	166	4	780	4	2	9	16
67			128	4	1	9	21
67			135	4	1	9	22
67			155	4	1	9	23
67			95	4	1	9	24

68	69	4	343	4	2	9	15
68			980	4	2	9	16
68			68	4	1	9	21
68			92	4	1	9	22
68			91	4	1	9	23
68			76	4	1	9	24

69	56	4	209	4	2	9	15
69			1280	4	2	9	16
69			195	4	1	9	21
69			312	4	1	9	22
69			275	4	1	9	23
69			115	4	1	9	24

70	68	4	185	4	2	9	15
70			1180	4	2	9	16
70			533	4	1	9	21
70			470	4	1	9	22
70			400	4	1	9	23
70			390	4	1	9	24

71	102	4	318	4	2	9	15
71			1580	4	2	9	16
71			145	4	1	9	21
71			106	4	1	9	22
71			90	4	1	9	23
71			81	4	1	9	24

72	53	4	130	4	2	9	15
72			1120	4	2	9	16
72			95	4	1	9	21
72			172	4	1	9	22
72			105	4	1	9	23
72			80	4	1	9	24

73	52	4	362	4	2	9	15
73			1260	4	2	9	16
73			243	4	1	9	21
73			294	4	1	9	22
73			235	4	1	9	23
73			80	4	1	9	24

74	88	4	400	4	2	9	16
74			89	4	1	9	21
74			86	4	1	9	22
74			95	4	1	9	23
74			94	4	1	9	24

75	47	4	139	4	2	9	15
75			990	4	2	9	16
75			62	4	1	9	21
75			59	4	1	9	22
75			72	4	1	9	23
75			70	4	1	9	24

76	53	4	208	4	2	9	15
76			950	4	2	9	16
76			502	4	3	9	21
76			475	4	3	9	22
76			410	4	3	9	23
76			395	4	3	9	24

77	52	4	190	4	2	9	15
77			1370	4	2	9	16
77			198	4	3	9	21
77			310	4	3	9	22
77			240	4	3	9	23
77			127	4	3	9	24

78	54	4	172	4	2	9	15
78			1120	4	2	9	16
78			393	4	3	9	21
78			423	4	3	9	22
78			382	4	3	9	23
78			282	4	3	9	24

81	86	4	208	4	2	9	16
81			68	4	5	9	21
81			78	4	5	9	22
81			82	4	5	9	23
81			85	4	5	9	24

83	68	4	146	4	2	9	16
83			57	4	5	9	21
83			57	4	5	9	22
83			70	4	5	9	23
83			78	4	5	9	24

84	164	4	722	4	2	9	16
84			292	4	5	9	21
84			344	4	5	9	22
84			312	4	5	9	23
84			240	4	5	9	24

85	94	4	476	4	2	9	16
85			78	4	5	9	21
85			86	4	5	9	22
85			85	4	5	9	23
85			82	4	5	9	24

86	72	4	249	4	2	9	16
86			78	4	2	9	21
86			73	4	2	9	22
86			80	4	2	9	23
86			96	4	2	9	24

88	62	4	243	4	2	9	16
88			82	4	2	9	21
88			77	4	2	9	22
88			80	4	2	9	23
88			97	4	2	9	24

89	60	4	231	4	2	9	16
89			91	4	2	9	21
89			85	4	2	9	22
89			82	4	2	9	23
89			123	4	2	9	24

90	72	4	520	4	2	9	16
90			82	4	2	9	21
90			72	4	2	9	22
90			75	4	2	9	23
90			88	4	2	9	24

91	102	4	500	4	2	9	16
91			93	4	4	9	21

91			102	4	4	9	22
91			98	4	4	9	23
91			83	4	4	9	24

93	63	4	194	4	2	9	16
93			107	4	4	9	21
93			102	4	4	9	22
93			104	4	4	9	23
93			96	4	4	9	24

94	67	4	210	4	2	9	16
94			95	4	4	9	21
94			93	4	4	9	22
94			100	4	4	9	23
94			102	4	4	9	24

96	67	4	162	4	2	9	16
96			86	4	6	9	21
96			78	4	6	9	22
96			90	4	6	9	23
96			85	4	6	9	24

98	82	4	400	4	2	9	16
98			92	4	6	9	21
98			82	4	6	9	22
98			88	4	6	9	23
98			75	4	6	9	24

100	73	4	310	4	2	9	16
100			88	4	6	9	21
100			94	4	6	9	22
100			86	4	6	9	23
100			70	4	6	9	24

Item No.	Prior Meas.	Exp.	Post P. F. Meas.	Exp.	Group No.	Mfg.	
9		9	23	6	1	0	16
9			640	9	1	0	21
9			300	9	1	0	22
9			100	9	1	0	23
9			760	9	1	0	24
14		9	40	6	1	0	16
14			150	9	1	0	21
14			600	9	1	0	22
14			620	9	1	0	23
14			660	9	1	0	24
15		9	10	6	1	0	16
15			500	9	1	0	21
15			250	9	1	0	22
15			280	9	1	0	23
15			440	9	1	0	24
19		9	15	6	1	0	16
19			350	9	1	0	21
19			150	9	1	0	22
19				9	1	0	23
19			540	9	1	0	24
21		9	11	6	1	0	16
21			250	9	1	0	21
21			200	9	1	0	22
21			250	9	1	0	23
21			960	9	1	0	24
23	10	9	140	6	1	0	16
23			380	9	1	0	21
23			100	9	1	0	22
23			500	9	1	0	23
23			860	9	1	0	24
25		9	26	6	1	0	16

25			250	9	1	0	21
25			200	9	1	0	22
25			220	9	1	0	23
25			100	9	1	0	24

27		9	270	6	1	0	16
27			520	9	3	0	21
27			80	9	3	0	22
27			760	9	3	0	23
27			1400	9	3	0	24

33	100	9	260	6	1	0	16
33			150	9	5	0	21
33			300	9	5	0	22
33				9	5	0	23
33			160	9	5	0	24

38		9	24	6	1	0	16
38			1000	9	2	0	21
38			420	9	2	0	22
38			600	9	2	0	23
38			1300	9	2	0	24

42		9	16	6	1	0	16
42			400	9	4	0	21
42			420	9	4	0	22
42			180	9	4	0	23
42			CF	9	4	0	24

44		9	110	6	1	0	16
44			500	9	4	0	21
44			110	9	4	0	22
44			360	9	4	0	23
44			1400	9	4	0	24

57	500	9	23	3	2	0	16
57			170	9	1	0	21
57			150	9	1	0	22
57			20	9	1	0	23
57			160	9	1	0	24

94		9	450	6	2	0	16
94			30	9	4	0	21
94			900	9	4	0	22

94			940	9	4	0	23
94			640	9	4	0	24
95		9	21	6	2	0	16
95			110	9	4	0	21
95			100	9	4	0	22
95			280	9	4	0	23
95			920	9	4	0	24
98		9	16	6	2	0	16
98			1	9	6	0	21
98			220	9	6	0	22
98			660	9	6	0	23
98			300	9	6	0	24
1	360	9	470	6	1	1	16
1			200	9	1	1	21
1			670	9	1	1	22
1			300	9	1	1	23
1			220	9	1	1	24
7	12	6	3	9	1	1	21
7			90	9	1	1	22
7			80	9	1	1	23
7			820	9	1	1	24
22	12	6	3	9	1	1	21
22			100	9	1	1	22
22			140	9	1	1	23
22			960	9	1	1	24
43			7300	9	1	1	16
43			1	9	4	1	21
43			10	9	4	1	22
43			280	9	4	1	23
43			420	9	4	1	24
49	1300	6		9	1	1	14
49			CF	9	1	1	15
49			CF	9	1	1	16
49			CF	9	6	1	21
49			CF	9	6	1	22
49			CF	9	6	1	23
49			CF	9	6	1	24

5	250	9	860	6	1	2	16
5			30	9	1	2	21
5			370	9	1	2	22
5			380	9	1	2	23
5			560	9	1	2	24
13	55	6	40	9	1	2	21
13			360	9	1	2	22
13			380	9	1	2	23
13			520	9	1	2	24
15	250	9	260	6	1	2	16
15			170	9	1	2	21
15			200	9	1	2	22
15			180	9	1	2	23
15			540	9	1	2	24
18	140	6	3	9	1	2	21
18			200	9	1	2	22
18			320	9	1	2	23
18			660	9	1	2	24
20	220	6	3	9	1	2	21
20			250	9	1	2	22
20			520	9	1	2	23
20			460	9	1	2	24
23	300	6	190	9	1	2	21
23			200	9	1	2	22
23			360	9	1	2	23
23			440	9	1	2	24
31	100	6	35	9	5	2	21
31			230	9	5	2	22
31			80	9	5	2	23
31			480	9	5	2	24
33	300	9	1300	6	1	2	16
33			100	9	5	2	21
33			200	9	5	2	22
33			120	9	5	2	23
33			360	9	5	2	24

34	300	9	1000	6	1	2	16
34			120	9	5	2	21
34			230	9	5	2	22
34			320	9	5	2	23
34			160	9	5	2	24

35	150	9	160	6	1	2	16
35			3	9	5	2	21
35			150	9	5	2	22
35			100	9	5	2	23
35			220	9	5	2	24

39	150	9	170	6	1	2	16
39			360	9	2	2	21
39			370	9	2	2	22
39			380	9	2	2	23
39			960	9	2	2	24

45	200	9	440	6	1	2	16
45			3	9	4	2	21
45			40	9	4	2	22
45			380	9	4	2	23
45			380	9	4	2	24

46	300	9	10	3	1	2	16
46			1000	9	6	2	21
46			430	9	6	2	22
46			460	9	6	2	23
46			840	9	6	2	24

49	250	9	350	6	1	2	16
49			450	9	6	2	21
49			390	9	6	2	22
49			400	9	6	2	23
49			760	9	6	2	24

50	250	9	3000	6	1	2	16
50			180	9	6	2	21
50			260	9	6	2	22
50			550	9	6	2	23
50			540	9	6	2	24

53	150	9	600	6	2	2	16
53			210	9	1	2	21

53			220	9	1	2	22
53			900	9	1	2	23
53			380	9	1	2	24

56	150	9	220	6	2	2	16
56			170	9	1	2	21
56			230	9	1	2	22
56			180	9	1	2	23
56			400	9	1	2	24

61	120	6	50	9	1	2	21
61			140	9	1	2	22
61			70	9	1	2	23
61			560	9	1	2	24

62	250	9	460	6	2	2	16
62			170	9	1	2	21
62			150	9	1	2	22
62			240	9	1	2	23
62			620	9	1	2	24

71	50	9	300	6	2	2	16
71			210	9	1	2	21
71			230	9	1	2	22
71			240	9	1	2	23
71			620	9	1	2	24

79	130	9	310	6	2	2	16
79			160	9	3	2	21
79			320	9	3	2	22
79			420	9	3	2	23
79			820	9	3	2	24

2	24	6	62	3	1	3	16
2			60	6	1	3	21
2			22	6	1	3	22
2			15	6	1	3	23
2			19	6	1	3	24

16	18	6	12	3	1	3	16
16			120	6	1	3	21
16			220	6	1	3	22
16			18	6	1	3	23
16			12	6	1	3	24

18	25	6	24	3	1	3	16
18			15	6	1	3	21
18			24	6	1	3	22
18			27	6	1	3	23
18			20	6	1	3	24

29	36	6	230	3	1	3	16
29			53	9	3	3	21
29			2	3	3	3	22
29			110	6	3	3	23
29			18	6	3	3	24

30	24	6	12	9	3	3	21
30			30	6	3	3	22
30			26	6	3	3	23
30			21	6	3	3	24

31	22	6	750	3	1	3	16
31			J	9	5	3	21
31			J	9	5	3	22
31			CF	9	5	3	23
31			CF	9	5	3	24

37	300	6	7	9	2	3	21
37			21	6	2	3	22
37			30	6	2	3	23
37			41	6	2	3	24

45	34	6	74	3	1	3	16
45			1000	6	4	3	21
45			38	6	4	3	22
45			8	6	4	3	23
45			CF	6	4	3	24

46	20	6	100	3	1	3	16
46			23	6	6	3	21
46			24	6	6	3	22
46			26	6	6	3	23
46			48	6	6	3	24

47	190	6	78	3	1	3	16
47			J	6	6	3	21
47			CF	6	6	3	22
47			CF	6	6	3	23

47			CF	6	6	3	24
48	8	9	13	6	6	3	23
48			9000	9	6	3	24
49	26	6	78	3	1	3	16
49			3000	6	6	3	21
49			1400	6	6	3	22
49			1800	6	6	3	23
49			CF	9	6	3	24
54	46	6	720	3	2	3	16
54			120	6	1	3	21
54			140	6	1	3	22
54			30	6	1	3	23
54			43	6	1	3	24
66	12	6	120	3	1	3	24
77	49	6	43	9	3	3	23
77			31	6	3	3	24
78	29	6	24	3	2	3	16
78			250	6	3	3	21
78			160	6	3	3	22
78			100	6	3	3	23
78			86	6	3	3	24
98	480	6	52	3	2	3	16
98			J	6	6	3	21
98			CF	6	6	3	22
98			CF	6	6	3	23
98			CF	6	6	3	24
100	70	6	105	3	2	3	16
100			CF	6	6	3	21
100			CF	6	6	3	22
100			CF	6	6	3	23
100			CF	9	6	3	24
129	66	6	67	3	1	3	22

129			42	3	1	3	23
129			CF	6	1	3	24
131	65	6	32	3	1	3	22
131			J		1	3	23
131			CF	6	1	3	24
134	200	6	140	3	1	3	21
134			15	3	1	3	22
134			J		1	3	23
134			CF	6	1	3	24
152	11	6	8	9	5	3	22
152			6400	9	5	3	23
152			5800	9	5	3	24
68	80	9	84	6	1	4	24
45	3	9	17	6	4	4	24
50	9	9	26	6	6	4	23
50			240	6	6	4	24
163	220	9	570	6	4	4	22
163			23	6	4	4	23
163			20	6	4	4	24
4	1500	9	220	3	1	5	16
4			1050	9	1	5	21
4			1400	9	1	5	22
4			6100	9	1	5	23
4			1800	9	1	5	24
17	360	6	160	9	1	5	21
17			760	9	1	5	22
17			600	9	1	5	23
17			1300	9	1	5	24
21	2500	6	35	3	1	5	22

21			J		1	5	23
21			CF	9	1	5	24
23	3200	6	1900	3	1	5	22
23			J		1	5	23
23			CF	9	1	5	24
27	700	9	6000	3	1	5	12
27			J		1	5	13
27			9700	6	1	5	14
27			CF	9	1	5	15
27			CF	6	1	5	16
27			CF		3	5	21
27			CF	9	3	5	22
27			CF	9	3	5	23
27			CF	9	3	5	24
29	700	9	840	6	3	5	23
29			CF	9	3	5	24
44	1000	9	480	3	1	5	16
44			8200	6	4	5	21
44			CF	9	4	5	22
44			CF	9	4	5	23
44			CF	9	4	5	24
50	1600	9	600	3	1	5	16
50			1300	9	6	5	21
50			1650	9	6	5	22
50			2600	9	6	5	23
50			3600	9	6	5	24
51	1800	9	22	3	2	5	16
51			3	9	1	5	21
51			2150	9	1	5	22
51			2500	9	1	5	23
51			2500	9	1	5	24
54	460	6	24	3	1	5	21
54			11	3	1	5	22
54			J		1	5	23
54			CF	9	1	5	24

56	1400	9	1650	6	2	5	16
56			CF	3	1	5	21
56			CF	3	1	5	22
56			CF	9	1	5	23
56			CF	9	1	5	24

57	1500	9	4000	6	2	5	16
57			CF	3	1	5	21
57			CF	3	1	5	22
57			CF	9	1	5	23
57			CF	9	1	5	24

58	1500	9	230	3	2	5	16
58			4500	9	1	5	21
58			340	9	1	5	22
58			1000	9	1	5	23
58			1200	9	1	5	24

60	1600	9	2300	3	2	5	16
60			CF	9	1	5	21
60			CF	9	1	5	22
60			CF	9	1	5	23
60			CF	9	1	5	24

62	1600	9	110	3	2	5	16
62			36	3	1	5	21
62			17	3	1	5	22
62			J		1	5	23
62			CF	9	1	5	24

64	900	9	120	3	2	5	16
64			CF	3	1	5	21
64			CF	3	1	5	22
64			CF	9	1	5	23
64			CF	9	1	5	24

66	1600	9	600	3	2	5	16
66			CF	9	1	5	21
66			CF	9	1	5	22
66			CF	9	1	5	23
66			CF	9	1	5	24

69	800	6	560	9	1	5	21
69			450	9	1	5	22

69			2000	9	1	5	23
69			1300	9	1	5	24
74	1700	9	480	3	2	5	16
76	930	9	1100	6	3	5	23
76			1000	9	3	5	24
77	1600	9	3600	6	2	5	16
77			CF	9	3	5	21
77			CF	9	3	5	22
77			CF	6	3	5	23
77			CF	9	3	5	24
91	1200	9	9600	6	4	5	22
91			CF		4	5	23
91			CF	9	4	5	24
93	1300	9	8400	6	4	5	22
93			CF		4	5	23
93			CF	9	4	5	24
94	1400	9	5500	6	2	5	16
94			J	9	4	5	21
94			CF	6	4	5	22
94			CF	9	4	5	23
94			CF	9	4	5	24
159	1250	9	1300	6	2	5	23
159			2000	9	2	5	24
1	400	9	240	3	1	6	16
1			3	9	1	6	21
1			660	9	1	6	22
1			CF		1	6	23
1			CF	9	1	6	24
4	380	9	650	3	1	6	16
4			1400	9	1	6	21
4			4	9	1	6	22

4			50	9	1	6	23
4			360	9	1	6	24
21	250	9	13	3	1	6	16
21			3	9	1	6	21
21			4300	9	1	6	22
21			900	9	1	6	23
21			15	6	1	6	24
24	500	9	5	3	1	6	16
24			400	9	1	6	21
24			320	9	1	6	22
24				9	1	6	23
24			2000	9	1	6	24
25	600	9	620	6	1	6	16
25			600	9	1	6	21
25				9	1	6	22
25			700	9	1	6	23
25			1000	9	1	6	24
35	950	6	3	9	5	6	21
35			2050	9	5	6	22
35			1100	9	5	6	23
35			500	9	5	6	24
58	150	9	40	3	2	6	16
58			73	6	1	6	21
58			74	6	1	6	22
58			40	6	1	6	23
58			31	6	1	6	24
78	400	9	480	6	2	6	16
78			600	9	3	6	21
78			900	9	3	6	22
78			550	9	3	6	23
78			420	9	3	6	24
95	450	9	3900	6	2	6	16
95			1000	9	4	6	21
95			420	9	4	6	22
95			460	9	4	6	23
95			340	9	4	6	24

2	2	9	390	6	1	8	23
2			4300	9	1	8	24
27	3000	9	3800	6	1	8	12
27			J	9	1	8	15
27			CF	9	3	8	21
27			CF	6	3	8	22
27			CF	9	3	8	23
27			CF	9	3	8	24
36	4200	9	6000	3	1	8	12
36			J	9	1	8	15
36			54	3	1	8	16
36			CF	9	2	8	21
36			CF		2	8	22
36			CF	9	2	8	23
36			CF	9	2	8	24
57	2900	9	17	3	1	8	23
57			CF	9	1	8	24
5	8200	9	38	3	1	9	16
5			31	6	1	9	21
5			23	3	1	9	22
5			23	3	1	9	23
5			4700	9	1	9	24
16	390	6	75	9	1	9	21
16			1150	9	1	9	22
16			1600	9	1	9	23
16			1900	9	1	9	24
21	5200	9	7700	6	1	9	16
21			56	6	1	9	21
21			660	6	1	9	22
21			17	6	1	9	23
21			5400	9	1	9	24
22	1100	9	2500	6	1	9	16
22			790	6	1	9	21
22			580	6	1	9	22
22			490	6	1	9	23
22			CF	9	1	9	24

24	10	6	37	3	1	9	16
24			19	6	1	9	21
24			14	6	1	9	22
24			6200	9	1	9	23
24			4800	9	1	9	24

26	4000	9	800	3	1	9	16
26			27	6	3	9	21
26			27	6	3	9	22
26			29	6	3	9	23
26			9400	9	3	9	24

27	4900	6	12	9	3	9	21
27			110	9	3	9	22
27			160	9	3	9	23
27			21	6	3	9	24

28	16	6	14	3	1	9	16
28			3800	6	3	9	21
28			17	3	3	9	22
28			16	3	3	9	23
28			82	6	3	9	24

35	15	6	8	9	5	9	22
35			22	6	5	9	23
35			16	6	5	9	24

37	2700	9	3000	6	1	9	16
37			7800	9	2	9	21
37			16	6	2	9	22
37			20	6	2	9	23
37			38	6	2	9	24

39	5000	9	21	3	1	9	16
39			11	6	2	9	21
39			24	6	2	9	22
39			19	6	2	9	23
39			21	6	2	9	24

40	17	6	33	3	1	9	16
40			70	6	2	9	21
40			150	6	2	9	22
40			170	6	2	9	23
40			160	6	2	9	24

41	30	6	16	3	1	9	16
41			1750	9	4	9	21
41			1800	9	4	9	22
41			2400	9	4	9	23
41			2400	9	4	9	24

48	5400	9	340	3	1	9	16
48			4600	9	6	9	21
48			7200	9	6	9	22
48			1500	9	6	9	23
48			1800	9	6	9	24

60	9600	9	40	3	2	9	16
60			860	6	1	9	21
60			200	6	1	9	22
60			210	6	1	9	23
60			100	6	1	9	24

61	5200	9	6700	6	2	9	16
61			110	6	1	9	21
61			23	6	1	9	22
61			68	6	1	9	23
61			7200	9	1	9	24

63	3800	9	4700	6	2	9	16
63			1800	9	1	9	21
63			3100	9	1	9	22
63			3700	9	1	9	23
63			2800	9	1	9	24

64	6800	9	13	3	2	9	16
64			14	3	1	9	21
64			320	6	1	9	22
64			330	6	1	9	23
64			14	6	1	9	24

68	230	6	12	9	1	9	21
68			13	6	1	9	22
68			13	6	1	9	23
68			11	6	1	9	24

71	18	6	130	3	2	9	16
71			130	6	1	9	21
71			43	6	1	9	22

71			25	6	1	9	23
71			1000	9	1	9	24

78	4500	9	190	3	2	9	16
78			27	6	3	9	21
78			83	6	3	9	22
78			85	6	3	9	23
78			52	6	3	9	24

82	2600	9	2700	6	5	9	24

83	2600	9	3000	6	5	9	24

90	4400	9	4600	6	2	9	16
90			5400	9	2	9	21
90			2700	9	2	9	22
90			1700	9	2	9	23
90			3400	9	2	9	24

168	15	6	5	9	6	9	22
168			1400	9	6	9	23
168			6100	9	6	9	24

APPENDIX III
COMPUTED STATISTICS SHEETS

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 AEROVOX CAPACITORS - MC605104RK

Parameter: Capacitance
 Nominal Value: (100.)
 Upper Limit: (110.)

Unit: Nanofarads
 Lower Limit: (90.0)

GROUPS: I thru V

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
88.2	98.221	106.0	4.0488	-	-	-	-	-	-	-	170	-	0	3	0	0

Initial Measurement

COMPUTED STATISTICS SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Capacitance
 Nominal Value: (100.)
 Upper Limit: (110.)

Unit: Nanofarads
 Lower Limit: (90.0)

GROUPS: I thru V

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
86.9	92.501	99.70	2.5711	-	-	-	-	-	-	-	170	-	0	26	0	0

JPL TEST PROCEDURE NUMBER 152.20-02
 GULTON CAPACITORS - CK16M104K

Parameter: Capacitance
 Nominal Value: (100.)
 Upper Limit: (110.)

Unit: Nanofarads
 Lower Limit: (90.0)

GROUPS: I thru V

Min	Mean	Max	Std	P	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
74.6	91.783	100.8	4.2964	-	-	-	-	-	-	-	167	-	0	43	3	0

GROUPS: I thru V

Parameter: Capacitance

Nominal Value: (1.0)

Upper Limit: (1.1)

Unit: Microfarads

Lower Limit: (0.9)

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
.868	.90343	1.066	.04207	-	-	-	-	-	-	-	1/0	-	0	0	0	0

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 KING ELECTRIC CAPACITORS - KC80BW104K

Parameter: Capacitance
 Nominal Value: (100.)
 Upper Limit: (110.)

Unit: Nanofarads
 Lower Limit: (90.0)

Groups: I thru V

Min	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
86.1	100.37	116.0	10.411	-	-	-	-	-	-	170	-	53*	35*	0	0

*Computed on the basis of ± 10 percent tolerance as ordered by JPL. Actual capacitors are ± 20 percent.

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Parameter: Capacitance
Nominal Value: (100.)
Upper Limit: (110.)

Unit: Nanofarads
Lower Limit: (90.0)

GROUPS: I thru V

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
88.3	100.86	105.0	2.5060	-	-	-	-	-	-	-	170	-	0	1	0	0

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter: Capacitance
Nominal Value: (100.)
Upper Limit: (110.)

Unit: Nanofarads
Lower Limit: (90.0)

GROUPS: I thru V

Min	Mean	Max	Std	P	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
89.0	94.088	105.9	2.7233	-	-	-	-	-	-	-	169	-	0	7	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

GROUPS: I thru V

Parameter: Capacitance
Nominal Value: (10.0)
Upper Limit: (11.0)

Unit: Nanofarads
Lower Limit: (9.0)

Min	Mean	Max	Std	P	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
9.00	9.8314	11.00	.35437	-	-	-	-	-	-	-	159	-	0	0	1	10

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 VITRAMON CAPACITORS - VK30MK104K

Parameter: Capacitance
 Nominal Value: (100.)
 Upper Limit: (110.)

Unit: Nanofarads
 Lower Limit: (90.0)

GROUPS: I thru V

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
89.2	96.562	105.0	3.9871	-	-	-	-	-	-	-	170	-	0	3	0	0

Initial Measurement

CAPACITOR STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 WESTCAP CAPACITORS - B758BX104K

Parameter: Capacitance
 Nominal Value: (100.)
 Upper Limit: (110.)

Unit: Nanofarads
 Lower Limit: (90.0)

GROUPS: I thru V

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
89.8	89.835	100.0	2.9797	-	-	-	-	-	-	-	170	-	0	92	0	0

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 ARKOVOK CAPACITORS - MC605104RK

Parameter: Percent Dissipation
 Unit: DF x 100
 Nominal Value: Less than 2.0 percent
 Lower Limit: None
 Upper Limit: 2.0 Percent

GROUPS: I thru V

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
0.47	.72624	1.45	.20115	-	-	-	-	-	-	-	170	-	0	0	0	0

Initial Measurement

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

GROUPS: I thru V

Unit: DF x 100

Lower Limit: None

Parameter: Percent Dissipation
Nominal Value: Less than 2.0 percent
Upper Limit: 2.0 Percent

[illegible]

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 GULTON CAPACITORS - CK16M104K

GROUPS: I thru V

Parameter: Percent Dissipation
 Unit: DP x 100
 Nominal Value: Less than 2.5 percent
 Lower Limit: None
 Upper Limit: 2.5 Percent

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt

Initial Measurement

0.46	.55645	0.78	.06452	-	-	-	-	-	-	-	166	-	0	0	3	1

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 GULFON CAPACITORS - CNO5M105K

GROUPS: I thru V

Unit: DF x 100
 Lower Limit: None

Parameter: Percent Dissipation
 Nominal Value: Less than 2.5 percent
 Upper Limit: 2.5 Percent

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt

Initial Measurement

1.27	1.5241	1.92	.10491	-	-	-	-	-	-	-	170	-	0	0	0	0

COMPUTED STATISTIC SHEET

Parameter: Percent Dissipation
Nominal Value: Less than 2.5 percent
Upper Limit: 2.5 Percent

Unit: DF x 100
Lower Limit: None

GROUPS: I thru V

Min	Mean	Max	Std	r	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
0.47	.55453	1.11	.07591	-	-	-	-	-	-	-	170	-	0	0	0	0

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 SCIONICS CAPACITORS - SC43(D)104X

GROUPS: I thru V

Parameter: Percent Dissipation
 Nominal Value: Less than 2.5 percent
 Upper Limit: 2.5 Percent
 Unit: DF x 100
 Lower Limit: None

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
1.42	1.6112	2.82	.19768	-	-	-	-	-	-	-	169	-	0	0	0	1

Initial Measurement

JPL TEST PROCEDURE NUMBER 152.20-02
EMC CAPACITORS - EK200R104K

Parameter: Percent Dissipation
Nominal Value: Less than 2.5 percent
Upper Limit: 2.5 Percent

Unit: DF x 100
Lower Limit: None

GROUPS: I thru V

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nc
0.46	.51793	0.66	.07172	-	-	-	-	-	-	-	169	-	0	0	1	0
Initial Measurement																

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 VITRAMON CAPACITORS - VL02BK103K V-LAM

GROUPS: 1 thru 5

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit: None
 Upper Limit: 2.5 Percent

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
1.25	1.4986	2.09	.07019	-	-	-	-	-	-	-	160	-	0	0	1	9

Initial Measurement

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 VITRAMON CAPACITORS - VK30RX104K

Parameter: Percent Dissipation
 Nominal Value: Less than 3.0 percent
 Upper Limit: 3.0 Percent

Unit: DF x 100
 Lower Limit: None

GROUPS: I thru V

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
1.28	1.5347	2.35	.20411	-	-	-	-	-	-	-	170	-	0	0	0	0

Initial Measurement:

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 WESTCAP CAPACITORS - B75BX104K

GROUPS: I thru V

Unit: DF x 100
 Lower Limit: None

Parameter: Percent Dissipation
 Nominal Value: Less than 2.5 percent
 Upper Limit: 2.5 Percent

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
0.06	.63041	1.76	.20451	-	-	-	-	-	-	-	170	-	0	0	0	0

Initial Measurement

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: . Insulation Leakage

GROUPS: I thru V

Min. (K megohms)	No	Nc
	Initial Measurement	
3.774	170	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
AEROVOX CAPACITORS - MC605104RK

Parameter: Insulation Leakage

GROUPS: I thru V

Min. (K megohms)	No	Nc
	Initial Measurement	
16.667	170	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
GULTON CAPACITORS - CK16M104K

Parameter: Insulation Leakage

GROUPS: I thru V

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
38.462	170	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
GULTON CAPACITORS - CN05M105K

Parameter: Insulation Leakage

GROUPS: I thru V

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
1.111	170	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
KING ELECTRIC CAPACITORS - KC80BW104K

Parameter: Insulation Leakage

GROUPS: I thru V

Min. (K megohms)	No	Nc
	Initial Measurement	
5.878	170	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Insulation Leakage

GROUPS: I thru V

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
20.000	170	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
EMC CAPACITORS - EK200R104K

Parameter: Insulation Leakage

GROUPS: I thru V

Min. (K megohms)	No	Nc
	Initial Measurement	
90.909	168	2

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter: Insulation Leakage

GROUPS: I thru V

Min. (K megohms)	No	Nc
	Initial Measurement	
16.111	168	2

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter: Insulation Leakage

GROUPS: I thru V

Min. (K megohms)	No	Nc
	Initial Measurement	
4.165	170	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
WESTCAP CAPACITORS - B758Bx104K

Parameter: Insulation Leakage

GROUPS I thru V

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
3.261	170	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
AEROVOX CAPACITORS - MC605104RK

Parameter:		Capacitance		Unit:		Nanofarads		GROUP:		I Only						
Nominal Value:		(100.0)		Lower Limit:		(90.0)										
Upper Limit:		(110.)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
91.0	100.1	106.0	3.7408	-	-	-	-	-	-	-	50	-	0	0	0	0
Post Burn-In Measurement																
94.8	103.2	111.1	4.0600	1.1780	-4.5	+3.1	+9.5	3.3919	+3.137	+6.5459	50	50	0	0	0	0

Initial Measurement

Post Burn-In Measurement

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUP: I Only								
Nominal Value:		(100.0)		Lower Limit:		(90.0)										
Upper Limit:		(110.)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
88.0	93.1	99.0	2.6604	-	-	-	-	-	-	-	50	-	0	7	0	0
Post Burn-In Measurement																
90.1	94.7	100.8	2.5570	0.9238	40.8	+1.68	+2.4	0.4278	+1.805	+27.2084	48	48	0	0	2	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CN05M105K

Parameter: Capacitance Unit: Microfarads
Nominal Value: (1.0) Lower Limit: (0.9) GROUP: I Only
Upper Limit: (1.1)

Min	Mean	Max	Std	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement															
.890	.968	1.066	.04963	-	-	-	-	-	-	50	-	0	2	0	0
Post Burn-In Measurement															
.909	1.000	1.100	0.05173	1.0861	+0.009	+0.030	0.0092	+3.098	+228.261	49	49	0	0	1	0

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 GULTON CAPACITORS - CK16M104K

Parameter: Capacitance Unit: Nanofarads GROUP: I Only
 Nominal Value: (100.) Lower Limit: (90.0)
 Upper Limit: (110.)

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	NL	Nc	Nt
81.0	92.1	100.0	3.7972	-		-	-	-	-	-	48	-	0	11	2	0
80.9	92.3	100.6	3.7688	0.9852	-1.0	+0.22	+4.1	0.8509	+0.239	+1.9693	48	48	0	10	2	0

Initial Measurement

Post Burn-In Measurement

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
KING ELECTRIC CAPACITORS - KC80BW104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUP: I Only											
Nominal Value:		(100.)		Lower Limit:		(90.)													
Upper Limit:		(110.)																	
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt			
Initial Measurement																			
87.0	100.1	116.0	10.099	-	-	-	-	-	-	-	50	-	13*	8*	0	0			
Post Burn-In Measurement																			
86.0	100.1	116.4	10.407	1.0619	-2.7	-0.18	+3.8	1.6679	-0.180	-0.7573	49	49	13	12	1	0			

Initial Measurement

Post Burn-In Measurement

*Computed on the basis of ± 10 percent as ordered by JPL. Actual capacitors are ± 20 percent.

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Capacitance Unit: Nanofarads
Nominal Value: (100.) Lower Limit: (90.0)
Upper Limit: (110.) GROUP: I ONLY

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
94.0	102.0	105.0	1.8238	-	-	-	-	-	-	-	50	-	0	0	0	0
Post Burn-In Measurement																
97.5	104.4	113.1	2.1180	1.1349	+0.4	+2.54	+3.8	1.3065	+2.491	+13.4692	48	48	1	0	2	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
EMC CAPACITORS - EK200R104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUP: I Only											
Nominal Value:		(100.)		Lower Limit:		(90.0)													
Upper Limit:		(110.)																	
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt			
Initial Measurement																			
Post Burn-In Measurement																			
89.0	94.4	105.0	2.8933	-	-	-	-	-	-	-	50	-	0	1	0	0			
92.7	97.6	105.7	2.6075	0.8122	+0.5	+3.09	+4.7	1.2116	+3.273	+16.7236	43	43	0	0	7	0			

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 VITRAMON CAPACITORS - VLO2BK103K V-LAM

Parameter: Capacitance Unit: Nanofarads GROUP: I Only
 Nominal Value: (10.0) Lower Limit: (9.0)
 Upper Limit: (11.0)

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
9.00	9.88	11.00	.38545	-	-	-	-	-	-	-	50	-	0	0	0	0
8.69	9.67	10.71	.45807	1.4123	-0.98	-0.208	+0.54	0.3689	-2.105	-3.9692	49	49	0	3	1	0

Initial Measurement

Post Burn-In Measurement

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 VITRAMON CAPACITORS - VK30BX104K

Parameter: Capacitance Unit: Nanofarads GROUP: I Only
 Nominal Value: (100.) Lower Limit: (90.0)
 Upper Limit: (110.)

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
92.0	98.9	105.0	3.8153	-	-	-	-	-	-	-	50	-	0	0	0	0
90.5	98.6	104.6	3.9990	1.0987	-8.5	-0.26	+2.4	1.4649	-0.263	-1.2550	50	50	0	0	0	0

Initial Measurement

Post Burn-In Measurement

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 WESTCAP CAPACITORS - B758BX104K

Parameter: Capacitance Unit: Nanofarads GROUP: I only
 Nominal Value: (100.) Lower Limit: (90.0)
 Upper Limit: (110.)

Min	Mean	Max	Srd	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
86.0	89.3	93.0	1.7548	-	-	-	-	-	-	-	50	-	0	24	0	0
Post Burn-In Measurement																
81.9	87.2	94.6	2.8164	2.5762	-4.9	-2.10	+3.8	2.1050	-2.351	-70543	50	50	0	42	0	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
AEROVOX CAPACITORS - MC605104RK

Parameter: Percent Dissipation Unit: DF x 100 GROUP: I Only
Nominal Value: Less than 2.0 percent Lower Limit: None
Upper Limit: 2.0 percent

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
0.64	0.96	1.45	.19456	-	-	-	-	-	-	-	50	-	0	0	0	0
Post Burn-In Measurement																
0.66	0.84	1.06	0.09762	0.2518	-0.50	-0.120	+0.12	0.1279	-12.500	-6.6422	50	50	0	-	0	0

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152-20-02
 CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:		Percent Dissipation		Unit:		DF x 100		GROUP: I Only								
Nominal Value:		Less than 2.0 percent		Lower Limit:		None										
Upper Limit:		2.0 percent														
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
0.52	.57540	0.67	0.02961	-	-	-	-	-	-	-	50	-	0	-	0	0
Post Burn-In Measurement																
0.53	0.62	1.14	0.0866	8.6322	-0.02	+0.038	+0.47	0.07183	+6.609	+3.6267	47	47	0	-	3	0

COMPUTED STATISTICS SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CK16M104K

Parameter: Percent Dissipation Unit: DF x 100 GROUP: I Only
Nominal Value: Lower Limit: None
Upper Limit: 2.5 percent

Min	Mean	Max	Std	F	MinD	MeanD	Max	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
0.55	0.64250	0.78	.04502	-	-	-	-	-	-	-	48	-	0	-	2	0
Post Burn-In Measurement																
0.53	0.60	0.72	0.0387	0.7426	-0.11	-0.041	+0.05	0.0383	-6.386	-7.4088	48	48	0	-	2	0

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 GULTON CAPACITORS -CN05M105K

Parameter: Percent Dissipation Unit: DF x 100 GROUP: I Only
 Nominal Value: Less than 2.5 percent Lower Limit: None
 Upper Limit: 2.5 percent

Min	Mean	Max	Std	F	MinD	Mean	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
1.48	1.6364	1.92	.08545	-	-	-	-	-	-	-	50	-	0	-	0	0
1.46	1.58	1.76	0.0795	0.8658	-0.15	+0.054	+0.05	0.0605	-3.301	-6.1769	48	48	0	-	2	0

Initial Measurement

Post Burn-In Measurement

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 KING ELECTRIC CAPACITORS - KC80BW104K

GROUP: I Only

DF x 100
 None

Unit:
 Lower Limit:

Percent Dissipation
 Less than 2.5 percent
 2.5 percent

Parameter:
 Nominal Value:
 Upper Limit:

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
0.53	.64240	1.11	.08969	-	-	-	-	-	-	-	50	-	0	-	0	0
Post Burn-In Measurement																
0.46	0.59	0.72	.04254	0.2524	-0.39	-0.053	+0.03	0.06671	-8.255	-5.561	49	49	0	-	1	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Percent Dissipation Unit: DF x 100
Nominal Value: Less than 2.5 percent Lower Limit: None
Upper Limit: 2.5 percent

GROUP I Only

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
1.55	2.0294	9.40	1.0768	-	-	-	-	-	-	-	50	-	1	-	0	0
1.70	1.88	2.73	0.1453	0.01821	-0.82	+0.002	+0.75	0.1833	+0.099	+0.0740	46	46	0	-	4	0

Initial Measurement

Post Burn-In Measurement

COMPUTED STATISTICS SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter:		Percent Dissipation		Unit:		DF x 100		GROUP: I Only									
Nominal Value:		Less than 2.5 percent		Lower Limit		None											
Upper Limit:		2.5 percent															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Ny	
Initial Measurement																	
0.55	.6060	0.66	.02687	-	-	-	-	-	-	-	50	-	0	-	0	0	
Post Burn-In Measurement																	
0.58	0.66	0.71	0.0877	10.6861	-0.01	+0.52	+0.10	0.0268	+8.581	12.4239	41	41	0		9	0	

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 VITRAMON CAPACITORS - VLO2BK103K V-LAM

Parameter: Percent Dissipation Unit: DF x 100 GROUP: I Only
 Nominal Value: Less than 2.5 percent Lower Limit: None
 Upper Limit: 2.5 percent

Min	Mean	Max	S _d	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
1.67	1.8554	2.09	.08722	-	-	-	-	-	-	-	50	-	0	-	0	0
1.30	1.44	2.90	0.2234	0.5658	-0.65	-0.412	+1.00	0.2309	-22.210	-12.488	49	49	0	-	1	0

Initial Measurement

Post Burn-In Measurement

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter:	Percent Dissipation	Unit:	DF x 100	GROUP: I Only												
Nominal Value:	Less than 3.0 percent	Lower Limit:	None													
Upper Limit:	3.0 percent															
Min	Mean	Max	S _d	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt

Initial Measurement

1.43	1.6774	2.35	.22493	-	-	-	-	-	-	-	50	-	0	-	0	0

Post Burn-In Measurement

1.46	1.64	1.98	0.1625	0.5220	-0.40	-0.043	+0.19	0.1052	-2.564	-2.8341	48	48	0	-	2	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
WESTCAP CAPACITORS - B758BX104K

Parameter:		Percent Dissipation	Unit:	DF x 100	GROUP: I Only											
Nominal Value:		Less than 2.5 percent	Lower Limit:	None												
Upper Limit:		2.5 percent														
Min	Mean	Max	Std	F	MinD	Meand	MaxD	Stdd	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
0.00	.70380	1.32	.21523	-	-	-	-	-	-	-	50	-	0	-	0	0
Post Burn-In Measurement																
0.59	0.74	1.05	.10719	0.2481	-0.55	+0.031	+0.64	0.1662	+4.410	+1.3192	50	50	0	-	0	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
AEROVOX CAPACITORS - NC605104RK

Parameter: **Insulation Leakage**

GROUP: **I Only**

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
55.556	50	0
	Post Burn-In Measurement	
90.910	50	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Insulation Leakage

GROUP: I Only

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
Initial Measurement		
50.000	50	0
Post Burn-In Measurement		
45.455	48	2

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CK16M104K

Parameter: Insulation Leakage

GROUP: I Only

Min. (K megohms)	No	Nc
	Initial Measurement	
62.500	50	0
	Post Burn-In Measurement	
50.000	50	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.02-20
GULTON CAPACITORS - CN05M105K

Parameter: Insulation Leakage

GROUP: I Only

Min. (K megohms)	No	Nc
	Initial Measurement	
1.111	50	0
	Post Burn-In Measurement	
0.1493	47	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
KING ELECTRIC CAPACITORS - KC80BW104K

Parameter: Insulation Leakage

GROUP: I Only

Min. (K megohms)	No	Nc
Initial Measurement		
14.706	50	0
Post Burn-In Measurement		
0.1515	49	1

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Insulation Leakage

GROUP: I Only

Min. (K megohms)	No	Nc
Initial Measurement		
25.000	50	0
Post Burn-In Measurement		
9.091	47	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter: Insulation Leakage

GROUP: I Only

Min. (K megohms)	No	Nc
	Initial Measurement	
20.000	48	2
	Post Burn-In Measurement	
90.909	48	2

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
EMC CAPACITORS - EK200R104K

Parameter: Insulation Leakage

GROUP: I Only

Min. (K megohms)	No	Nc
Initial Measurement		
100.000	50	0
Post Burn-In Measurement		
64.516	49	1

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter: Insulation Leakage

GROUP: I Only

Min. (K megohms)	No	Nc
Initial Measurement		
4.165	50	0
Post Burn-In Measurement		
7.143	47	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
WESTCAP CAPACITORS - B758BX104K

Parameter: Insulation Leakage

GROUP: I Only

Min. (K megohms)	No	Nc
	Initial Measurement	
5.000	50	0
	Post Burn-In Measurement	
7.813	50	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152-20-02

ARROVOX CAPACITORS - MC605104RK

Parameter: Capacitance

Unit: Nanofarads

Nominal Value:

Lower Limit: (90.0)

Upper Limit: (110.)

GROUPS: I and II

[illegible]

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CK16M104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS: I and II									
Nominal Value:		(100.)		Lower Limit:		(90.0)											
Upper Limit:		(110.)															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt	
Initial Measurement																	
78.3	92.3	100.8	3.9664	-	-	-	-	-	-	-	98	-	0	23	2	0	
Post Vibration Measurement																	
79.0	92.2	102.1	4.1490	1.0942	-1.6	-0.08	+1.5	1.0020	-0.087	-0.7863	97	97	0	24	3	0	
Post Mechanical Shock Measurement																	
78.8	91.9	101.5	4.1407	0.9960	-1.5	-0.28	+0.9	0.2739	-0.304	-10.0696	97	97	0	25	3	0	
Post Thermal Shock Measurement																	
81.7	94.5	103.5	4.1643	1.0114	+0.3	+2.55	+4.4	0.6716	+2.774	+37.397	97	97	0	7	3	0	
Post Moisture Resistance Measurement																	
81.3	94.0	104.0	4.2306	1.0321	-1.7	-0.48	+2.4	0.4538	-0.508	-10.416	97	97	0	10	3	0	

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CW05M105K

Parameter:		Capacitance		Unit:		Microfarads		GROUPS: I and II								
Nominal Value:		(1.0)		Lower Limit:		(0.9)										
Upper Limit:		-(1.1)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurements																
.873	.982	1.100	0.0492	-	-	-	-	-	-	-	98	-	0	2	2	0
Post Vibration Measurement																
.904	.992	1.086	0.0470	0.9127	-.021	-0.011	+0.034	0.0202	-1.070	-5.335	96	96	0	0	4	0
Post Mechanical Shock Measurement																
.901	.996	1.088	0.0469	0.9949	-.021	+0.003	+0.034	0.0129	+0.343	+2.5887	96	96	0	0	4	0
Post Thermal Shock Measurement																
.882	.991	1.083	0.0472	1.0134	+0.012	-0.007	+0.012	0.0144	-0.653	-4.4223	96	96	0	2	4	0
Post Moisture Resistance Measurement																
.896	1.009	1.088	0.04797	1.0348	+0.001	+0.018	+0.091	0.0135	+1.816	+12.820	94	94	0	1	6	0

COMPUTED STATISTIC SHEET

JIPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - KC803EW104K

Parameter:	Capacitance	Unit:	Nanofarads	GROUPS: I and II
Nominal Value:	(100.)	Lower Limit:	(90.0)	

Unit: Nanofarads
Lower Limit: (90.0)

GROUPS: I and II

[illegible]

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Capacitance Unit: Nanofarads GROUPS: I and II
Nominal Value: (100.) Lower Limit: (90.0)
Upper Limit: (110.)

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
88.3	101.7	113.1	3.5157	-	-	-	-	-	-	-	97	-	1	1	3	0
Initial Measurement																
Post Vibration Measurement																
89.9	101.8	105.4	2.2374	0.40502	-2.7	+0.25	+2.8	1.8636	+0.2458	+1.0118	91	91	0	1	7	2
Post Mechanical Shock Measurement																
89.2	101.1	104.7	2.3847	1.1360	-2.6	-0.75	+0.9	0.5394	-0.737	-13.4078	93	91	0	1	7	0
Post Thermal Shock Measurement																
90.8	103.1	101.7	2.2410	0.8831	-1.6	+1.95	+4.0	1.5323	+1.929	+12.2725	93	93	0	0	7	0
Post Moisture Resistance Measurement																
92.6	103.5	109.2	2.8431	1.6095	-3.1	+0.51	+5.5	1.3715	+0.495	+3.5081	89	89	0	0	11	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
ENC CAPACITORS - EK200R104K

Parameter:		Capacitance		Unit: Nanofarads		Lower Limit: (90.)		Upper Limit: (110.)		GROUPS: I and II						
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
90.0	95.4	105.7	3.0661	-	-	-	-	-	-	-	92	-	0	0	8	0
Post Vibration Measurement																
90.8	95.2	104.1	2.4739	0.6510	-2.6	-0.15	+1.9	-1.3748	-0.157	-1.0118	86	86	0	0	14	0
Post Mechanical Shock Measurement																
90.7	94.7	103.6	2.4376	0.9709	-0.8	-0.39	+0.4	-0.2049	-0.410	-17.5448	85	85	0	0	15	0
Post Thermal Shock Measurement																
92.3	96.8	105.5	2.3573	0.9352	+1.3	+2.07	+3.5	0.5496	+2.185	+34.317	83	83	0	0	17	0
Post Moisture Resistance Measurement																
92.3	97.3	105.4	2.3879	1.0261	-0.2	+0.46	+1.2	0.3715	+0.475	+11.213	82	82	0	0	18	0

COMPUTED STATISTIC SHEET
JEL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VLO2BK103K V-LAM

Parameter: Capacitance Unit: Nanofarads GROUPS: I and II
Nominal Value: (10.0) Lower Limit: (9.0)
Upper Limit: (11.0)

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PG	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
8.69	9.72	10.71	0.3931	-	-	-	-	-	-	-	93	-	0	3	1	0
Post Vibration Measurement																
8.83	9.77	10.72	0.4613	1.3770	-0.16	+0.03	+0.20	0.1052	+0.319	+2.7164	85	85	0	1	15	0
Post Mechanical Shock Measurement																
8.85	9.75	10.68	0.3657	0.6286	-0.09	-0.03	+0.04	0.0351	-0.266	-6.7540	83	83	0	1	17	0
Post Thermal Shock Measurement																
8.98	9.92	10.83	0.3409	0.8688	+0.02	+0.16	+0.35	0.0899	+1.651	+16.308	83	83	0	1	17	0
Post Moisture Resistance Measurement																
9.31	10.06	10.87	0.3377	0.9815	-0.05	+0.14	+1.17	0.2129	+1.371	+5.918	81	71	0	0	19	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS: I and II											
Nominal Value:		(100.)		Lower Limit:		(90.0)													
Upper Limit:		(110.)																	
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt			
Initial Measurement																			
89.0	97.4	104.6	4.0876	-	-	-	-	-	-	-	100	-	0	1	0	0			
Post Vibration Measurement																			
89.3	97.3	105.8	3.8681	0.8955	-2.7	-0.07	+1.9	1.1602	-0.072	-0.6003	99	99	0	1	1	0			
Post Mechanical Shock Measurement																			
89.1	96.7	104.9	3.8471	0.9892	-9.2	-0.62	+7.1	1.2373	-0.637	-4.9857	99	99	0	1	1	0			
Post Thermal Shock Measurement																			
89.1	98.0	106.5	4.0120	1.0876	-7.0	+1.27	+9.6	1.8336	+1.313	+6.926	99	99	0	1	1	0			
Post Moisture Resistance Measurement																			
88.8	98.3	107.2	3.9660	0.9772	-7.0	+0.37	+4.2	1.3390	+0.377	+2.749	99	99	0	3	1	0			

COMPUTED STATISTIC SHEET
 JPL TEST PROCEDURE NUMBER 152.20-02
 WESTCAP CAPACITORS -B758BX104K

Parameter:		Capacitance		Unit		Nanofarads		GROUPS: I and II									
Nominal Value:		(100.)		Lower Limit:		(90.0)											
Upper Limit:		(110.)															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt	
Initial Measurement																	
81.9	88.1	96.9	2.8759	-	-	-	-	-	-	-	97	-	0	74	3	0	
Post Vibration Measurement																	
80.9	88.0	97.6	3.5774	1.5473	-4.3	-0.12	+8.5	1.5120	-0.136	-0.7736	95	95	0	56	3	2	
Post Mechanical Shock Measurement																	
80.4	87.4	97.0	3.3192	0.8608	-1.7	-0.51	+1.3	0.4450	-0.580	-11.2882	97	95	0	77	3	0	
Post Thermal Shock Measurement																	
82.0	89.1	102.1	4.0830	1.5132	-2.5	+1.67	+6.8	1.8287	+1.910	+8.994	97	97	0	64	3	0	
Post Moisture Resistance Measurement																	
80.8	95.7	109.0	5.6070	1.8858	-4.5	+4.27	+13.7	4.8239	+4.791	+5.457	38	38	0	5	62	0	

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
AEROVOX CAPACITORS - MC605104RK

Parameter:		Percent Dissipation		Unit:	GROUPS: I and II											
Nominal Value:		Less than 2.0 percent		Lower Limit:	None											
Upper Limit:		2.0 percent														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	S _d D	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
0.50	0.75	1.06	0.1348	-	-	-	-	-	-	-	100	-	0	-	0	0
Post Vibration Measurement																
0.50	0.81	1.27	0.1615	1.4356	-0.30	+0.06	+0.44	0.1036	+8.284	+5.983	100	100	0	-	0	0
Post Mechanical Shock Measurement																
0.52	0.73	0.97	0.0972	0.3621	-0.36	-0.08	+0.22	0.0542	-9.93	-14.754	100	100	0	-	0	0
Post Thermal Shock Measurement																
0.70	0.86	1.12	0.0957	0.9693	-0.03	+0.13	+0.40	0.1251	+17.78	+10.343	100	100	0	-	0	0
Post Moisture Resistance Measurement																
0.63	0.84	1.51	0.1363	2.2095	-0.21	-0.15	+0.49	0.0978	-17.036	-14.932	100	100	0	-	0	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Percent Dissipation Unit: DF x 100
Nominal Value: Less than 2.0 percent Lower Limit: None GROUPS: I and II
Upper Limit: 2.0 percent

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
0.46	0.55	1.14	0.0853	-	-	-	-	-	-	-	97	-	0	-	3	0
Post Vibration Measurement																
0.50	0.56	0.87	0.0455	0.2847	-0.70	-0.01	+0.35	0.1060	-1.44	-0.7122	89	89	0	-	11	0
Post Mechanical Shock Measurement																
0.48	0.54	0.77	0.0398	0.7633	-0.35	-0.02	+0.13	0.0625	-3.94	-3.3192	89	89	0	-	11	0
Post Thermal Shock Measurement																
0.54	0.60	0.65	0.0212	0.2848	-0.16	+0.06	+0.12	0.0363	+11.567	+15.825	86	86	0	-	14	0
Post Moisture Resistance Measurement																
0.54	0.60	0.76	0.0406	3.6667	-0.09	+0.06	+0.17	0.0412	+1.006	+13.426	85	85	0	-	15	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CK16M104K

Parameter: Percent Dissipation Unit: DF x 100 GROUPS: I and II
Nominal Value: Less than 2.5 percent Lower Limit: None
Upper Limit: 2.5 percent

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
0.47	0.56	0.72	0.0754	-	-	-	-	-	-	-	98	-	0	-	2	0
Post Vibration Measurement																
0.50	0.60	0.79	0.0523	0.4798	-0.11	+0.03	+0.16	0.0753	+5.72	+4.1855	97	97	0	-	3	0
Post Mechanical Shock Measurement																
0.49	0.56	0.72	0.0325	0.3883	-0.12	-0.03	+0.06	0.0400	-5.70	-8.3715	97	97	0	-	3	0
Post Thermal Shock Measurement																
0.56	0.64	0.82	0.0342	1.1038	+0.01	+0.08	+0.20	0.0281	+13.352	+26.281	97	97	0	-	3	0
Post Moisture Resistance Measurement																
0.56	0.73	1.32	0.1331	15.1368	-0.13	+0.09	+0.58	0.1278	+14.420	+6.945	93	93	0	-	7	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CN05M105K

Parameter:		Percent Dissipation		Unit:		DF x 100		GROUPS: I and II								
Nominal Value:		Less than 2.5 percent		Lower Limit:		None										
Upper Limit:		2.5 percent														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
1.36	1.53	1.76	0.0873	-	-	-	-	-	-	-	97	-	0	-	3	0
Post Vibration Measurement																
1.46	1.70	1.94	0.1131	1.6798	-0.15	+0.17	+0.45	0.1498	+11.053	+11.0563	96	96	0	-	4	0
Post Mechanical Shock Measurement																
1.45	1.61	1.79	0.0858	0.5750	-0.27	-0.09	+0.06	0.0713	-5.47	-12.7720	96	96	0	-	4	0
Post Thermal Shock Measurement																
1.32	1.55	2.32	0.1053	1.505	-0.30	-0.25	+0.09	1.8708	-15.691	+1.3198	90	96	0	-	4	0
Post Moisture Resistance Measurement																
1.48	1.79	2.83	0.2644	6.3087	-0.02	+0.24	+1.10	0.2710	+15.711	+8.588	91	91	0	-	9	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Percent Dissipation
Nominal Value: Less than 2.5 percent
Upper Limit: 2.5 percent

Unit: DF x 100
Lower Limit: None

GROUPS: I and II

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
0.46	0.55	0.72	0.0502	-	-	-	-	-	-	-	98	-	0	-	1	1
Post Vibration Measurement																
0.48	0.58	0.68	0.0427	0.7222	-0.10	+0.03	+0.13	0.0638	+5.244	+4.5229	99	98	0	-	1	0
Post Mechanical Shock Measurement																
0.48	0.56	0.67	0.0324	0.5769	-0.10	-0.02	+0.02	0.0257	-3.436	-7.7461	99	99	0	-	1	0
Post Thermal Shock Measurement																
0.52	1.63	0.70	0.05459	2.8381	-0.02	+0.02	+0.11	0.2862	+4.099	+0.7751	99	99	0	-	1	0
Post Moisture Resistance Measurement																
0.53	0.64	0.86	0.0549	1.0101	-0.08	+0.04	+0.11	0.0463	+2.531	+8.499	92	92	0	-	8	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Percent Dissipation
Nominal Value: Less than 2.5 percent
Upper Limit: 2.5 percent

Unit: DF x 100
Lower Limit: None

GROUPS I and II

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
1.42	1.69	2.73	0.3970	-	-	-	-	-	-	-	95	-	0	-	5	0
Post Vibration Measurement																
1.52	1.73	2.43	0.1206	0.0923	-0.33	+0.03	+0.41	0.2537	+3.669	+2.3318	91	91	0	-	7	2
Post Mechanical Shock Measurement																
1.39	1.58	1.75	0.0768	0.4058	-0.83	-0.16	+0.02	0.0962	-9.054	-15.7339	93	91	0	-	7	0
Post Thermal Shock Measurement																
1.48	1.64	1.74	0.1030	1.7983	-2.65	+0.05	+0.18	0.3811	+3.105	+1.247	93	93	0	-	7	0
Post Moisture Resistance Measurement																
1.68	2.15	3.00	0.2922	8.0471	+0.04	+0.51	+1.44	0.4062	+31.341	+10.436	68	68	0	-	32	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
EMC CAPACITORS - EK200R104K

Parameter:		Percent Dissipation				Unit:		DS x 100		GROUPS: I and II						
Nominal Value:		Less than 2.5 percent				Lower Limit:		None								
Upper Limit:		2.5 percent														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
0.46	0.56	1.47	0.1251	-	-	-	-	-	-	-	91	-	0	-	9	0
Post Vibration Measurement																
0.50	0.56	0.62	0.0255	0.0415	-1.41	+0.00	+1.3	0.0970	+0.534	+0.2851	85	85	0	-	15	0
Post Mechanical Shock Measurement																
0.48	0.53	0.68	0.0274	1.1539	-0.09	-0.02	+0.11	0.0377	-4.144	-5.6272	85	85	0	-	15	0
Post Thermal Shock Measurement																
0.53	0.57	0.72	0.0249	0.8267	-0.09	+0.03	+0.19	0.0372	+6.403	+9.747	83	83	0	-	17	0
Post Moisture Resistance Measurement																
0.55	0.64	1.18	0.0943	14.3548	-0.09	+0.07	+0.19	0.0885	+12.389	+7.115	81	81	0	-	19	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter: Percent Dissipation
Nominal Value: Less than 2.5 percent
Upper Limit: 2.5 percent

Unit: DF x 100
Lower Limit: None

GROUPS: I and II

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
1.30	1.39	2.90	0.1710	-	-	-	-	-	-	-	92	-	0	-	1	7
Post Vibration Measurement																
1.20	1.39	1.53	0.0908	0.2721	-1.65	-0.10	+0.19	0.2194	-6.892	-3.9870	83	83	0	-	17	0
Post Mechanical Shock Measurement																
1.22	1.36	1.49	0.0562	0.3830	-0.14	-0.03	+0.14	0.0630	-2.369	-4.7427	82	82	0	-	18	0
Post Thermal Shock Measurement																
1.32	1.41	1.56	0.0445	0.6298	-0.07	+0.05	+0.17	0.0489	+3.532	+8.945	82	82	0	-	18	0
Post Moisture Resistance Measurement																
1.42	1.84	2.74	0.3249	53.0503	-0.10	+0.43	+1.36	0.3323	+30.277	+10.802	71	71	0	-	29	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter:		Percent Dissipation			Unit:		DF x 100		Lower Limit:		None		GROUPS: I and II			
Nominal Value:		Less than 3.0 percent														
Upper Limit:		3.0 percent														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
1.28	1.54	1.98	0.1849	-	-	-	-	-	-	-	98	-	0	-	1	3
Post Vibration Measurement																
1.30	1.54	1.93	0.1685	0.8304	-0.25	-0.01	+0.18	0.1574	-0.389	-0.3773	98	98	0	-	1	1
Post Mechanical Shock Measurement																
1.30	1.49	2.00	0.1691	1.0070	-0.47	-0.05	+0.20	0.1069	-3.388	-4.8425	99	98	0	-	1	0
Post Thermal Shock Measurement																
1.37	1.50	2.03	0.1710	1.0226	-0.18	+0.06	+0.32	0.0542	+4.230	+11.602	99	99	0	-	1	0
Post Moisture Resistance Measurement																
1.52	1.79	2.70	0.2206	1.0054	+0.07	+0.24	+1.07	0.1660	+15.177	+14.147	99	99	0	-	1	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
AEROVOX CAPACITORS - NC605104RK

Parameter: Insulation Leakage GROUPS: I and II

Min. (K megohms)	No.	Nc
	Initial Measurement	
16.667	100	0
	Post Vibration Measurement	
62.500	100	0
	Post Mechanical Shock Measurement	
55.555	100	0
	Post Thermal Shock Measurement	
31.250	100	0
	Post Moisture Resistance Measurement	
0.3571	84	16

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 44211-20-02
WESTCAP CAPACITORS - R758X104K

Parameter: Percent Dissipation Unit: DF x 100
Nominal Value: Less than 2.5 percent Lower Limit: None
Upper Limit: 2.5 percent

GROUPS: I and II

Min	Mean	Max	Std	F	MeanD	MaxD	StdD	FC	No	Ny	Nu	N1	Nc	Nt
Initial Measurement														
0.47	0.67	1.05	0.1403	-	-	-	-	-	97	-	0	-	3	0
Post Vibration Measurement														
0.50	0.66	1.04	0.1205	0.7374	-0.02	+0.12	0.1112	-2.526	-1.4904	95	95	0	4	1
Post Mechanical Shock Measurement														
0.47	0.62	1.14	0.1353	1.2610	-0.15	+0.34	0.0594	-6.079	-6.5964	96	95	0	4	0
Post Thermal Shock Measurement														
0.57	0.83	1.66	0.2711	4.0115	+0.22	+0.78	0.1805	+35.227	+9.390	61	61	0	39	0
Post Moisture Resistance Measurement														
0.63	0.79	1.00	0.1312	0.2342	-0.03	+0.37	0.1455	+14.885	+2.557	9	9	0	91	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Insulation Leakage

GROUPS: I and II

Min. (K megohms)	No	Nc
	Initial Measurement	
3.774	98	2
	Post Vibration Measurement	
4.167	98	2
	Post Mechanical Shock Measurement	
6.452	98	2
	Post Thermal Shock Measurement	
7.143	89	11
	Post Moisture Resistance Measurement	
2.667	87	13

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
GULTON CAPACITORS - CK16M104K

Parameter: Insulation Leakage

GROUPS: I and II

Min. (Kmegohms)	No	Nc
Initial Measurement		
50.000	100	0
Post Vibration Measurement		
45.455	99	1
Post Mechanical Shock Measurement		
52.632	100	0
Post Thermal Shock Measurement		
41.667	97	3
Post Moisture Resistance Measurement		
1.667	82	18

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
GULTON CAPACITORS - CN05M105K

Parameter: Insulation Leakage

GROUPS: I and II

Min. (K megohms)	No	Nc
	Initial Measurement	
0.1493	97	3
	Post Vibration Measurement	
0.6250	95	5
	Post Mechanical Shock Measurement	
0.0711	97	3
	Post Thermal Shock Measurement	
0.2083	95	5
	Post Moisture Resistance Measurement	
0.1177	72	28

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
KING ELECTRIC CAPACITORS - KC80BW104K

Parameter: Insulation Leakage

GROUPS: I and II

Min. (K megohms)	No	Nc
	Initial Measurement	
0.1515	99	1
	Post Vibration Measurement	
0.1389	99	1
	Post Mechanical Shock Measurement	
0.1613	99	1
	Post Thermal Shock Measurement	
1.923	98	2
	Post Moisture Resistance Measurement	
2.778	97	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Insulation Leakage

GROUPS: I and II

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
9.091	97	3
	Post Vibration Measurement	
10.204	96	4
	Post Mechanical Shock Measurement	
12.500	96	4
	Post Thermal Shock Measurement	
0.0555	94	6
	Post Moisture Resistance Measurement	
0.4546	61	39

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
EMC CAPACITORS - EK200R104K

Parameter: Insulation Leakage

GROUPS: I and II

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
64.516	97	3
	Post Vibration Measurement	
44.444	97	3
	Post Mechanical Shock Measurement	
15.385	99	1
	Post Thermal Shock Measurement	
80.000	84	16
	Post Moisture Resistance Measurement	
2.105	74	26

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter: Insulation Leakage

GROUPS: I and II

Min. (K megohms)	No	Nc
	Initial Measurement	
16.129	98	2
	Post Vibration Measurement	
14.106	94	6
	Post Mechanical Shock Measurement	
19.231	94	6
	Post Thermal Shock Measurement	
20.833	85	15
	Post Moisture Resistance Measurement	
12.500	84	16

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter: Insulation Leakage

GROUPS: I and II

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
6.667	100	0
	Post Vibration Measurement	
0.0131	97	3
	Post Mechanical Shock Measurement	
2.081	97	3
	Post Thermal Shock Measurement	
1.852	97	3
	Post Moisture Resistance Measurement	
1.786	97	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
WESTCAP CAPACITORS - B758BX104K

Parameter: Insulation Leakage

GROUPS: I and II

Min. (K megohms)	No	Nc
	Initial Measurement	
7.813	100	0
	Post Vibration Measurement	
0.750	98	2
	Post Mechanical Shock Measurement	
6.250	98	2
	Post Thermal Shock Measurement	
2.500	98	2
	Post Moisture Resistance Measurement	
0.1363	75	25

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Unit: Nanofarads
Life - 1
50V 85°C

Parameter:

Nominal Value:

Upper Limit:

Lower Limit (90.0)

(100.)

(110.)

GROUPS:

Mo Ny Nu N1 Nc Nt

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	N1	Nc	Nt

Initial Measurement

91.9	101.49	111.7	4.604	-	-	-	-	-	-	-	75	-	2	0	0	0

168 Hour Measurement

91.7	103.68	111.5	4.573	.98641	-4.7	+2.1830	+10.6	4.159	+2.156	4.556	75	75	4	0	0	0

500 Hour Measurement

90.6	103.58	112.5	4.802	1.10272	-1.5	+1.1000	+2.0	1.167	+0.096	0.742	75	75	3	0	0	0

1000 Hour Measurement

93.8	107.12	116.6	5.044	1.10317	+2.5	+3.586	+4.7	0.4701	+3.416	65.188	75	75	26	0	0	0

2000 Hour Measurement

92.7	106.21	115.8	5.104	1.02425	-10.5	-9.080	+0.6	1.279	-0.848	6.148	75	75	22	0	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE		50V 85°C				
Nominal Value:		(100.0)		Lower Limit		(90.0)										
Upper Limit:		(110.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
168 hour Measurement																
87.2	93.38	96.2	2.605	-	-	-	-	-	-	-	71	-	0	6	4	0
88.2	92.87	97.9	2.472	.90067	-1.8	-.4036	+1.2	.9290	-4.37	3.653	69	69	0	8	6	0
500 hour Measurement																
87.8	92.55	97.4	2.458	.98854	-1.1	-.2029	+6.4	.8319	-2.18	2.011	68	68	0	11	6	1
1000 Hour Measurement																
88.7	93.50	98.4	2.449	.99271	+0.7	+97.7	+1.7	.2000	+1.051	39.511	66	66	0	6	7	2
2000 Hour Measurement																
88.8	93.68	98.5	2.367	.93447	-0.2	+1.16	+0.5	.1871	+1.621	6.277	60	60	0	4	12	3

COMPUTED STATISTIC SHEET
JVA TEST PROCEDURE NUMBER 152-20-02
GULTON CAPACITORS - CK18M104K

JWL TEST PROCEDURE NUMBER 152-20-02

WULFON CAPACITORS - CK16M104K

Parameter:	Capacitance	Unit:	Nanofarads
Nominal Value:	(100.0)	Lower Limit:	(90.0)
Upper Limit:	(110.0)	GROUP:	LIFE-1
			50V 85°C

[illegible]

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter:		Capacitance		Unit:		Microfarads		GROUPS:		LIFE - 1						
Nominal Value:		(1.0)		Lower Limit		(0.9)				50V 85°C						
Upper Limit:		(1.1)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.896	.9908	1.015	.04924	-	-	-	-	-	-	-	73	-	0	1	2	0
168 Hour Measurement																
.893	.9964	1.089	.0429	.75965	-.033	+0.00602	+0.045	.0236	+0.666	2.311	68	68	0	1	7	0
500 Hour Measurement																
.897	.9986	1.098	.0290	.99810	-.004	+0.00191	+0.010	.0030	+0.220	5.957	68	68	0	1	7	0
1000 Hour Measurement																
.912	1.0112	1.119	.0439	1.04644	+0.008	+0.012602	+0.021	.0025	+1.262	41.402	68	68	1	0	7	0
2000 Hour Measurement																
.900	.9993	1.106	.0438	.99636	-.059	-.01048	-.006	.00657	-1.036	12.973	64	64	1	0	11	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 1		50V 85°C				
Nominal Value:		(100.0)		Lower Limit		(90.0)										
Upper Limit:		(110.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
91.8	102.59	109.2	3.686	-	-	-	-	-	-	-	67	-	0	0	8	0
Initial Measurement																
168 Hour Measurement																
95.3	102.77	105.7	2.061	.31250	-3.2	+1.4295	+4.5	2.383	+1.393	3.978	44	44	0	0	31	0
500 Hour Measurement																
96.3	102.99	106.6	2.119	1.05793	-0.7	+2.2465	+2.0	.6641	+0.240	2.434	43	43	0	0	32	0
1000 Hour Measurement																
96.8	103.41	107.2	2.314	1.19167	-0.4	+4.139	+4.2	.7563	+0.402	3.589	43	43	0	0	32	0
2000 Hour Measurement																
95.9	102.83	106.3	2.187	.89314	-4.3	-.6710	0.0	.7523	-0.649	5.498	38	38	0	0	37	0

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter: Capacitance

Nominal Value:

(100.0)

Lower Limit

(0.06)

Unit: Nanofarads

GROUPS: LIFE - 1

Upper Limit:

 (110.0)

	Min	Mean	Max	Std	F	Mind	Meand	MaxD	Stdd	t	Nc
	Min	Mean	Max	Std	F	Mind	Meand	MaxD	Stdd	t	Nc

Initial Measurement

89.7	95.62	101.0	2.831	-	-	-	-	-	67	0
89.7	95.62	101.0	2.831	-	-	-	-	-	67	0

168 Hour Measurement

91.5	95.78	100.4	2.340	.68309	-1.9	+1.230	+3.4	1.973	+1.29	.502	65	0	8	2

500 Hour Measurement

[illegible]

1000 Hour Measurement

	91	96	101	2	1	-0.387	+0.3	+6173	-40.8	12,512	+647	60	382	5
	91	96	101	2	1	-0.387	+0.3	+6173	-40.8	12,512	+647	60	382	5

2000 Hour Measurement

[illegible]

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter:		Capacitance		Unit:		NanoFarads		GROUPS: LIFE - 1								
Nominal Value:		(10.0)		Lower Limit		(9.0)		50V 85°C								
Upper Limit:		(11.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
9.01	9.952	10.93	.4102	-	-	-	-	-	-	-	63	-	0	0	10	2
168 Hour Measurement																
9.10	9.730	10.46	.3593	.76731	-1.44	-.21879	+ .33	.2927	-2.198	5.693	58	58	0	0	11	6
500 Hour Measurement																
9.13	9.805	10.55	.3723	1.07358	-.01	+ .07543	+ .15	.0310	+0.775	18.380	57	57	0	0	12	6
1000 Hour Measurement																
9.09	9.792	10.54	.3729	1.00353	-0.04	-.01280	+0.01	.0114	-0.131	8.476	57	57	0	0	12	6
2000 Hour Measurement																
9.10	9.778	10.53	.3727	.99877	-0.05	-.01535	+0.0;	.0138	-.1568	8.333	56	56	0	0	19	0

COMPUTED STATISTIC SHEET

JEL TEST PROCEDURE NUMBER 152-20-02

VITAMON CAPACITORS - VK30BX104K

Parameter: Capacitance

Unit: Nanofarads

Nominal Value: (100.0)

Lower Limit (90.0)

Upper Limit: (110.0)

Life = 1

50V 85°C

Min	Mean	Max	Std	F	MinD	MaxD	StdD	PC	CV	MS	MI	MR	MR

Initial Measurement

88.8	96.98	103.9	3.997	-	-	-	-	-	74	-	0	4	1	0

168 Hour Measurement

85.4	95.10	104.5	3.931	.96701	-6.0	-1.9513	+2.5	2.161	-2.012	7.563	72	0	6	3	0

500 Hour Measurement

85.8	95.27	104.0	3.905	.98686	-1.0	+1.680	+1.0	.4037	+0.177	3.531	72	0	6	3	0

1000 Hour Measurement

85.5	94.97	102.9	3.878	.98616	-1.3	-.3013	+0.3	.3209	-0.316	7.966	72	0	6	3	0

2000 Hour Measurement

85.5	95.07	103.4	3.920	1.02181	-1.8	+2.085	+0.9	.3860	+2.195	4.519	70	0	6	5	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B758BX104K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0) GROUPS: LIFE - 1
 Upper Limit: (110.0) 50V 85°C.

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
87.5	94.27	106.1	3.997	-	-	-	-	-	-	-	38	-	0	4	37	0
Initial Measurement																
168 Hour Measurement																
81.1	94.93	105.7	5.506	1.89764	-14.2	+3.3600	+5.7	6.517	+0.382	0.326	35	35	0	8	40	0
500 Hour Measurement																
81.1	94.73	105.0	5.382	.95543	-0.9	-.0200	+0.9	.4940	-0.021	0.239	35	35	0	8	40	0
1000 Hour Measurement																
81.5	95.41	106.5	5.670	1.11017	+0.1	+1.0428	+1.5	.4037	+1.105	15.281	35	35	0	8	40	0
2000 Hour Measurement																
82.1	95.88	106.8	5.750	1.02833	-0.2	+4.4657	+1.1	.2449	+4.881	11.248	35	35	0	7	40	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Parameter:		Capacitance		Unit:		Nanofarads		Lower Limit		(90.0)		GROUPS:		LIFE - 2		50V 125°C	
Nominal Value:		(100.0)															
Upper Limit:		(110.0)															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt	
Initial Measurement																	
95.7	102.97	109.9	4.060	-	-	-	-	-	-	-	15	-	0	0	0	0	
168 Hour Measurement																	
97.2	108.82	117.7	5.748	2.00418	-0.4	+5.7785	+15.0	5.586	+5.612	3.871	14	14	14	5	0	1	0
500 Hour Measurement																	
96.1	107.42	116.2	5.398	.88210	-3.2	-1.3928	-0.6	.7817	-1.280	6.667	14	14	14	3	0	1	0
1000 Hour Measurement																	
99.5	110.82	118.2	5.281	.95693	+2.0	+3.3928	+4.1	.5206	+3.158	24.386	14	14	14	10	0	1	0
2000 Hour Measurement																	
102.1	114.32	121.8	5.439	1.06092	+2.5	+3.5000	+4.9	.6768	+3.158	19.351	14	14	14	12	0	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:	Capacitance	Unit:	Nanofarads																
Nominal Value:	(100.0)	Lower Limit	(90.0)																
Upper Limit:	(110.0)																		
Min	Mean	Max	Std	F	MinD	MaxD	StdD	PC	t	Py	Ms	Ml	Mc	Mc	Mc	Mc	Mc	Mc	Mc
Initial Measurement																			
89.0	93.31	96.2	2.141	-	-	-	-	-	-	15	-	0	2	0	0	0	0	0	0
168 Hour Measurement																			
90.1	94.30	96.5	2.051	.91755	-0.1	+ .9933	.8849	+1.065	4.348	15	15	0	0	0	0	0	0	0	0
500 Hour Measurement																			
90.2	94.22	96.5	2.080	1.02804	-0.2	+ .0500	.1581	+ .053	1.183	15	15	0	0	1	0	0	0	0	0
1000 Hour Measurement																			
90.9	95.25	97.7	2.275	1.19699	+0.7	+1.0538	.1483	+1.118	25.616	13	13	0	0	2	0	0	0	0	0
2000 Hour Measurement																			
92.1	96.65	99.3	2.356	1.07204	+1.1	+1.3545	.2097	+1.422	21.417	11	11	0	0	4	0	0	0	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK16ML04K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0) GROUP: LIFE - 2
 Upper Limit: (110.0) 50V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Mu	Nl	Mc	Nt
Initial Measurement																
74.6	92.88	104.0	6.631	-	-	-	-	-	-	-	14	-	0	2	1	0
108 Hour Measurement																
77.0	93.90	103.2	6.285	.89818	-1.2	+1.0214	+3.2	1.663	+1.100	2.298	15	15	0	1	1	0
500 Hour Measurement																
76.4	92.75	102.7	6.277	.99767	-1.4	-0.6923	-0.3	.2983	-0.737	3.367	13	13	0	1	1	1
1000 Hour Measurement																
77.2	94.11	103.7	6.350	1.02344	+0.8	+1.3615	+2.2	.4231	+1.468	11.603	13	13	0	1	1	1
2000 Hour Measurement																
78.4	95.46	104.6	6.616	1.08554	+0.5	+1.15500	+2.4	.6481	+1.647	0.828	12	12	0	1	3	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter: Capacitance Unit: Microfarads

Nominal Value: (1.0)

Lower Limit(0.9)

Upper Limit: (1.1)

GROUPS: LIFE - 2
50V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
.890	1.0012	1.088	.0615	-	-	-	-	-	-	-	14	-	0	1	1	0
168 Hour Measurement																
.937	1.0143	1.083	.0423	.4748/	-.010	+.017307	+.053	.0257	+1.729	2.430	13	13	0	0	2	0
500 Hour Measurement																
.935	1.0098	1.084	.0433	1.04662	-.003	-.001333	+.001	.0013	-0.131	3.442	12	12	0	0	3	0
1000 Hour Measurement																
.941	1.0175	1.090	.0457	1.11175	+.004	+.007090	+.010	.0018	+0.702	12.753	11	11	0	0	3	1
2000 Hour Measurement																
.941	1.0197	1.096	.0461	1.02032	-.003	+.002090	+.007	.0031	+2.054	2.214	11	11	0	0	4	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02
KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Capacitance Unit: Nanofarads
Nominal Value: (100.0) Lower Limit (90.0) GROUPS: LIFE - 2
Upper Limit: (110.0) 50V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Nu	N1	Mc	Nt
Initial Measurement																
90.5	104.16	117.5	9.9647	-	-	-	-	-	-	-	15	-	6	0	0	0
168 Hour Measurement																
91.1	104.78	116.9	10.311	1.07078	-1.3	+6266	+3.7	1.268	+0.602	1.913	15	15	6	0	0	0
500 Hour Measurement																
90.7	104.40	116.4	10.289	.99565	-0.7	-.3800	-0.1	.1012	-0.363	9.127	15	15	6	0	0	0
1000 Hour Measurement																
91.4	105.16	117.0	10.250	.99244	+0.4	+7000	+1.1	.1844	+0.728	15.963	15	15	6	0	0	0
2000 Hour Measurement																
92.6	106.34	118.0	10.108	.97254	+0.6	+1.1800	+2.0	.5683	+1.122	8.041	15	15	9	0	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VL02BK103K V-LAM.

Parameter:		Capacitance		Unit:		Nanofarads		Circuits:		LIFE - 2		50V 125°C				
Nominal Value:		(10.0)		Lower Limit		(9.0)										
Upper Limit:		(11.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
9.01	10.056	10.93	.3045	-	-	-	-	-	-	-	63	-	0	0	10	2
168 Hour Measurement																
9.57	10.049	10.78	.3394	1.24293	-0.37	+0.00384	+0.28	.1940	+0.038	0.071	13	13	0	0	1	1
500 Hour Measurement																
9.55	10.028	10.81	.3474	1.04747	-0.08	-0.02076	+0.04	.0361	-0.207	2.076	13	13	0	0	1	1
1000 Hour Measurement																
9.64	10.130	10.92	.4036	1.40218	-0.12	+1.0164	+0.89	.2428	+1.012	1.508	13	13	0	0	1	1
2000 Hour Measurement																
9.68	10.168	10.91	.3296	.64190	-0.79	-0.00250	+0.26	.2570	-0.02468	.0316	12	12	0	0	3	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30EX104K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0)
 Upper Limit: (110.0)

CONSP: LIFE - 2
 50V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Mc	Nt
92.0	97.40	103.4	4.149	-	-	-	-	-	-	-	15	-	0	0	0	0
Initial Measurement																
100 Hour Measurement																
93.4	98.20	103.4	2.804	.45655	-2.6	+1.1461	+3.2	2.407	+0.150	0.217	13	13	0	0	1	1
500 Hour Measurement																
91.9	97.48	102.2	2.732	.94987	-1.2	-.7153	-0.2	.3256	-0.728	7.921	13	13	0	0	1	1
1000 Hour Measurement																
93.3	98.02	102.8	2.736	1.00281	-0.2	+0.9357	+2.4	.5916	+0.960	5.918	14	13	0	0	1	0
2000 Hour Measurement																
95.1	99.21	103.4	2.665	.94884	+0.4	+1.1000	+2.6	.5621	+1.122	7.055	13	13	0	0	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B758BX104K

Parameter: Capacitance Unit: Nanofarads

Nominal Value: (100.0)

Lower Limit (90.0)

LIFE - 2

Upper Limit: (110.0)

50V 125°C

GROUPS:

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Nu	N1	Nc	Nt

Initial Measurement

87.0	89.67	97.3	3.064	-	-	-	-	-	-	-	10	0	0	5	5	0

168 Hour Measurement

85.5	90.27	96.2	3.372	1.21148	-8.9	+6000	+8.0	5.182	+0.669	0.366	10	10	0	6	5	0

500 Hour Measurement

85.9	90.37	95.4	3.193	.89657	-1.6	+1000	+8.5	2.968	+0.111	0.105	10	10	0	6	5	0

1000 Hour Measurement

86.0	91.30	97.9	3.653	1.30926	-8.0	+9300	+3.3	3.193	+1.029	0.921	10	10	0	5	5	0

2000 Hour Measurement

87.6	93.50	99.8	3.468	.90080	+0.3	+2.2000	+3.0	.9039	+2.410	7.697	10	10	0	1	5	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 3						
Nominal Value:		(100.0)		Lower Limit		(90.0)				100V 85°C						
Upper Limit:		(110.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Nu	Nl	Nc	Nt
Initial Measurement																
91.1	101.98	109.6	5.513	-	-	-	-	-	-	-	15	-	0	0	0	0
168 Hour Measurement																
92.7	100.15	109.2	5.047	.83794	-7.3	-1.8333	+6.9	3.687	-1.798	1.926	15	15	0	0	0	0
500 Hour Measurement																
90.6	98.39	106.6	4.928	.95328	-2.6	-1.1466	+6.9	2.325	-1.145	1.910	15	15	0	0	0	0
1000 Hour Measurement																
91.2	98.60	107.1	4.921	.99715	-0.2	+2.133	+0.9	.3376	+0.217	2.447	15	15	0	0	0	0
2000 Hour Measurement																
92.0	99.73	108.9	5.122	1.08338	+0.6	+1.1266	+1.9	.3962	+1.143	11.012	15	15	0	0	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 3						
Nominal Value:		(100.0)		Lower Limit		(90.0)				100V 85°C						
Upper Limit:		(110.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
90.0	93.80	98.0	2.206	-	-	-	-	-	-	-	13	-	0	0	2	0
168 Hour Measurement																
89.3	91.60	95.4	1.804	.66837	-3.5	-2.2076	-0.7	.8832	-2.354	9.012	13	13	0	3	2	0
500 Hour Measurement																
89.2	91.31	95.0	1.739	.92929	-0.7	-.2846	-0.1	.1897	-0.311	5.408	13	13	0	4	2	0
1000 Hour Measurement																
89.0	91.22	100.5	1.727	.98676	-0.6	-.2416	-0.1	.1483	-0.265	5.643	12	12	0	3	2	1
2000 Hour Measurement																
89.8	91.56	93.8	1.358	.61816	+0.5	+7.818	+1.0	.1703	+8.570	15.226	11	11	0	1	4	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK16M104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 3		100V 85°C				
Nominal Value:		(100.0)		Lower Limit		(90.0)										
Upper Limit:		(110.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	N1	Nc	Nt
Initial Measurement																
83.2	94.08	102.9	5.305	-	-	-	-	-	-	-	13	-	0	2	1	1
168 Hour Measurement																
81.7	93.10	101.9	5.587	1.10910	-3.4	-9769	+1.7	1.490	-1.038	2.364	13	13	0	4	1	1
500 Hour Measurement																
81.4	92.96	102.1	5.713	1.04568	-0.4	-1384	+0.2	.1732	-0.149	2.881	13	13	0	4	1	1
1000 Hour Measurement																
81.7	93.05	102.1	5.651	.97828	-0.3	+0846	+0.7	.2569	+0.091	1.187	13	13	0	4	1	1
2000 Hour Measurement																
82.2	93.51	102.5	5.605	.98371	+0.3	+4615	+0.9	.1549	+4960	10.741	13	13	0	3	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter:	Capacitance	Unit:	Microfarads																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																

Initial Measurement

.915	.9895	1.088	.0555	-	-	-	-	-	-	-	14	-	0	0	1	0

168 Hour Measurement

.913	.9880	1.075	.0526	.90103	-.038	-.006615	+.035	.0269	-0.669	0.886	13	13	0	0	2	0

500 Hour Measurement

.907	.9817	1.067	.0523	.98686	-.010	-.006307	-.004	.0015	-0.638	15.331	13	13	0	0	2	0

1000 Hour Measurement

.899	.9746	1.060	.0526	1.01049	-.008	-.007076	-.006	.0008	-0.721	30.494	13	13	0	1	2	0

2000 Hour Measurement

.908	.9814	1.066	.05261	1.00137	+.004	+.006769	+.009	.00145	+.6946	16.842	13	13	0	0	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - KC80BW104K

Parameter:	Capacitance	Unit:	Nanofarads														
Nominal Value:	(100.0)	Lower Limit	(90.0)														
Upper Limit:	(110.0)																
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt	
87.0	100.51	116.4	11.839	-	-	-	-	-	-	-	15	-	6	3	0	0	
Initial Measurement																	
168 Hour Measurement																	
87.2	99.62	114.5	11.124	.88282	-3.9	-.8933	+6.8	2.463	-0.889	1.404	15	15	5	4	0	0	
500 Hour Measurement																	
86.4	98.58	114.3	11.705	1.10720	-10.4	-1.0400	-0.1	2.596	-1.044	1.551	15	15	5	5	0	0	
1000 Hour Measurement																	
86.1	98.19	113.8	11.726	1.00359	-0.8	-.3866	-0.1	.1703	-0.392	8.792	15	15	5	5	0	0	
2000 Hour Measurement																	
86.8	98.94	114.5	11.588	.97662	+0.4	+7.466	+1.2	.2214	+7.604	13.063	15	15	5	5	0	0	

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Parameter:	Capacitance	Unit:	Nanofarads														
Nominal Value:	(100.0)	Lower Limit	(90.0)	GROUPS:	LIFE	-	3										
Upper Limit:	(110.0)				100V	85°C											
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Mu	N1	Nc	Nt	
93.4	100.61	103.4	2.666	-	-	-	-	-	-	-	14	-	0	0	1	0	
Initial Measurement																	
168 Hour Measurement																	
91.9	97.40	99.7	2.357	.78126	-5.4	-2.5454	-0.1	2.060	-2.530	4.098	11	11	0	0	4	0	
500 Hour Measurement																	
90.3	95.82	98.3	2.346	.99135	-2.0	-1.5727	-1.3	.2049	-1.615	25.452	11	11	0	0	4	0	
1000 Hour Measurement																	
89.1	94.83	97.2	2.402	1.04758	-1.2	-0.9909	-0.7	.1844	-1.034	17.823	11	11	0	1	4	0	
2000 Hour Measurement																	
93.6	95.84	97.9	1.846	.59101	+0.4	+6.285	+0.8	.1483	+6.628	-11.211	7	7	0	0	8	0	

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter:	Capacitance	Unit:	Nanofarads
Nominal Value:	(100.0)	Lower Limit	(90.0)
Upper Limit:	(110.0)		
		GROUPS:	LIFE - 3
			100V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
92.6	97.07	105.4	3.509	-	-	-	-	-	-	-	14	-	0	0	1	0
168 Hour Measurement																
91.3	95.43	102.1	2.804	.63856	-3.5	-1.6428	+1.3	2.133	-1.692	2.881	14	14	0	0	1	0
500 Hour Measurement																
90.7	94.90	101.5	2.884	1.05800	-0.6	.5384	-0.4	.0707	-0.564	27.453	13	13	0	0	2	0
1000 Hour Measurement																
90.5	94.80	101.1	2.864	.98641	-0.4	-.1000	+1.0	1.414	-0.105	.2550	13	13	0	0	2	0
2000 Hour Measurement																
91.2	95.34	101.9	2.877	1.00865	+0.4	+5.461	+0.8	.1265	+5.761	.15.566	13	13	0	0	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter:	Capacitance			Unit:	Nanofarads			GROUPS:			LIFE - 3					
Nominal Value:	(10.0)			Lower Limit	(9.0)						100V 85°C					
Upper Limit:	(11.0)															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Mc	Nt
9.32	9.921	10.87	.4852	-	-	-	-	-	-	-	11	-	0	0	4	0
Initial Measurement																
9.20	9.601	10.52	.3571	.54161	-1.20	-2.6909	-0.02	.3965	-2.712	2.251	11	11	0	0	4	0
168 Hour Measurement																
9.22	9.810	10.43	.3442	.92943	-0.04	+0.0818	+0.62	.0356	+0.085	0.761	11	11	0	0	4	0
500 Hour Measurement																
9.13	9.520	10.37	.3378	.96303	-0.11	-0.09000	-0.08	.0118	-0.937	25.228	11	11	0	0	4	0
1000 Hour Measurement																
9.20	9.585	10.47	.3451	1.04328	+0.04	+0.06545	+0.10	.0155	+6875	14.012	11	11	0	0	4	0
2000 Hour Measurement																

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30BX104K

Unit: Nanofarads

Lower Limit (90.0)

LIFE - 3

100V 85°C

Capacitance

(100.0)

Nominal Value:

(110.0)

Upper Limit:

GROUPS:

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Nu	N1	Mc	Nt

Initial Measurement

89.8	96.31	104.1	4.581	-	-	-	-	-	-	-	15	-	0	1	0	0

168 Hour Measurement

89.3	92.99	99.2	3.119	.46355	-6.4	-3.4153	+0.2	2.622	-3.546	4.696	13	13	0	3	2	0

500 Hour Measurement

88.8	92.28	98.6	3.073	.97060	-1.1	-.7076	-0.2	.2720	-0.761	9.379	13	13	0	3	2	0

1000 Hour Measurement

85.8	90.70	97.4	3.225	1.10113	-3.4	-1.2307	+2.3	1.225	-1.334	3.619	13	13	0	4	2	0

2000 Hour Measurement

87.6	92.20	98.8	3.334	1.06905	+0.9	+1.3166	+1.8	.2646	+1.452	.17.238	12	12	0	3	3	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B758BX104K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0) GROUPS: LIFE - 3
 Upper Limit: (110.0) 100V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
85.7	88.64	94.8	3.491	-	-	-	-	-	-	-	7	-	0	5	8	0
Initial Measurement																
168 Hour Measurement																
83.8	85.30	87.3	1.376	.15530	-7.5	-3.3428	-1.5	2.414	-3.771	3.664	7	.7	0	7	8	0
500 Hour Measurement																
82.7	84.58	86.5	1.324	.92657	-1.1	-.7142	-0.3	.2793	-0.837	6.766	7	7	0	7	8	0
1000 Hour Measurement																
83.1	84.84	86.4	1.112	.70467	-2.2	+2.571	+0.8	.3194	+0.304	2.130	7	7	0	7	8	0
2000 Hour Measurement																
83.3	85.34	87.3	1.381	1.54207	+0.1	+5.000	+0.9	.3742	+5.893	3.536	7	7	0	7	8	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Unit: Nanofarads

Lower Limit (90.0)

LIFE - 4

100V 125°C

GROUPS:

Capacitance

(100.0)

(110.0)

Parameter:

Nominal Value:

Upper Limit:

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	N1	Nc	Nt

Initial Measurement

96.4	101.06	107.8	3.802	-	-	-	-	-	-	-	15	-	0	0	0	0

168 Hour Measurement

94.1	102.21	107.7	4.224	1.23426	-4.1	+1.1466	+8.5	3.747	+1.135	1.185	15	15	0	0	0	0

500 Hour Measurement

92.1	100.43	105.5	4.127	.95460	-2.3	-1.7800	-1.0	.4278	-1.742	16.115	15	15	0	0	0	0

1000 Hour Measurement

94.0	102.84	108.9	4.442	1.15832	+1.6	+2.4066	+3.4	.5568	+2.396	16.740	15	15	0	0	0	0

2000 Hour Measurement

99.2	108.45	114.8	4.952	1.24285	+5.2	+5.7500	+6.8	.5225	+5.591	41.177	14	14	6	0	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 4						
Nominal Value:		(100.0)		Lower Limit		(90.0)				100V 125°C						
Upper Limit:		(110.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Nu	Nl	Nc	Nt
Initial Measurement																
91.2	94.36	97.6	1.587	-	-	-	-	-	-	-	13	-	0	0	2	0
168 Hour Measurement																
90.0	94.30	96.4	1.719	1.17401	-1.2	+.2500	+.09	.7688	-0.265	1.126	12	12	0	0	2	1
500 Hour Measurement																
89.0	93.51	95.7	1.851	1.15905	-1.0	-.7916	-0.3	.3493	-0.839	7.851	12	12	0	1	2	1
1000 Hour Measurement																
90.4	94.74	97.1	1.963	1.12467	-2.1	+1.4923	+6.2	1.719	+1.596	3.130	13	12	0	0	2	0
2000 Hour Measurement																
93.0	97.45	99.8	1.876	,91329	-2.2	+2.0363	+3.1	1.455	+2.149	4.643	11	11	0	0	4	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK10M104K

Parameter:	Capacitance	Unit: Nanofarads															
Nominal Value:	(100.0)	Lower Limit	(90.0)	GROUPS: LIFE - 4 100V 125°C													
Upper Limit:	(110.0)																
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt	
Initial Measurement																	
83.8	92.04	98.0	3.948	-	-	-	-	-	-	-	15	-	0	4	0	0	
168 Hour Measurement																	
84.7	91.98	97.5	3.522	.79595	-2.8	-.0533	+1.7	1.452	-0.058	0.141	15	15	0	3	0	0	
500 Hour Measurement																	
83.6	90.86	96.1	3.541	1.01080	-1.7	-1.1200	-0.7	.2933	-1.218	14.792	15	15	0	5	0	0	
1000 Hour Measurement																	
84.5	91.95	97.5	3.560	1.01060	+0.7	+1.0863	+1.5	.2550	+1.196	16.507	15	15	0	3	0	0	
2000 Hour Measurement																	
87.1	94.49	101.2	3.609	1.02761	+1.1	+2.5400	+3.9	.8933	+2.762	11.012	15	15	0	0	0	0	

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M1105K

Parameter:	Capacitance	Unit:	Microfarads														
Nominal Value	(1.0)	Lower Limit	(0.9)														
Upper Limit:	(1.1)																
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	Mo	My	Nu	Nl	Mc	Nt	
Initial Measurement																	
.912	1.0015	1.069	.0521	-	-	-	-	-	-	-	13	-	0	0	2	0	
168 Hour Measurement																	
.912	1.0078	1.058	.0451	.74793	-.032	+.010333	+.047	.0285	+1.032	1.250	12	12	0	0	3	0	
500 Hour Measurement																	
.871	.9850	1.042	.0456	1.02011	-.047	-.022750	-.008	.0146	-2.257	5.410	12	12	0	1	3	0	
1000 Hour Measurement																	
.884	.9935	1.052	.0466	1.04482	+.006	+.010363	+.013	.0023	+1.052	15.072	11	11	0	1	4	0	
2000 Hour Measurement																	
.903	.9972	1.056	.0475	1.03944	+.001	+.005555	+.019	.00539	+.5586	3.095	9	9	0	0	6	0	

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0) LIFE - 4
 Upper Limit: (110.0) GROUPS: 100V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	N1	Nc	Nt
Initial Measurement																
88.5	101.96	114.4	10.881	-	-	-	-	-	-	-	15	-	6	3	0	0
168 Hour Measurement																
87.1	101.25	113.5	11.169	1.05359	-2.7	-7133	+1.1	1.331	-0.700	2.076	15	15	6	4	0	0
500 Hour Measurement																
87.1	101.07	112.0	10.806	.93595	-1.5	-1.1928	-0.9	.2121	-1.178	21.039	14	14	6	3	1	0
1000 Hour Measurement																
88.1	102.11	113.0	10.809	1.00059	+0.9	+1.0428	+1.3	.1140	+1.032	34.221	14	14	6	3	1	0
2000 Hour Measurement																
90.6	104.42	114.6	10.436	.93220	+1.1	+2.3142	+4.1	.9268	+2.266	9.343	14	14	7	0	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0) GROUPS: LIFE - 4
 Upper Limit: (110.0) 100V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
99.3	102.05	104.9	1.862	-	-	-	-	-	-	-	15	-	0	0	0	0
168 Hour Measurement																
98.1	100.47	107.4	2.640	2.01125	-4.6	-1.5000	+2.5	2.508	-1.470	1.892	10	-10	0	0	5	0
500 Hour Measurement																
94.5	95.75	97.5	1.261	.22815	-4.0	-3.7500	-3.6	.1897	-3.132	23.717	4	4	0	0	11	0
1000 Hour Measurement																
-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	15	0
2000 Hour Measurement																
-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	15	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 4						
Nominal Value:		(100.0)		Lower Limit		(90.0)				100V 125°C						
Upper Limit:		(110.0)														
Min	Mean	Max	Std	F	Mind	Meand	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
91.5	95.20	99.9	2.167	-	-	-	-	-	-	-	12	-	0	0	3	0
168 Hour Measurement																
92.5	94.90	98.3	1.960	.81789	-2.2	-.3000	+2.4	2.131	-0.315	0.487	12	12	0	0	3	0
500 Hour Measurement																
91.0	93.98	97.2	1.914	.95442	-1.1	-.9250	-0.9	.0707	-0.975	45.316	12	12	0	0	3	0
1000 Hour Measurement																
92.0	94.93	98.2	1.990	1.08049	+0.8	+1.0090	+1.2	.1095	+1.074	30.549	11	11	0	0	4	0
2000 Hour Measurement																
94.9	97.16	100.7	2.092	1.10555	+1.8	+2.2272	+2.5	.2683	+2.346	27.529	11	11	0	0	4	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Parameter:	Capacitance			Unit:	Nanofarads			GROUPS:			LIFE - 5					
Nominal Value:	(100.0)			Lower Limit	(90.0)						200V 85°C					
Upper Limit:	(110.0)															
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
91.9	99.72	108.8	5.673	-	-	-	-	-	-	-	15	-	0	0	0	0
Initial Measurement																
168 Hour Measurement																
87.1	92.98	99.2	4.759	.70365	-11.5	-6.7400	+0.9	3.733	-6.759	6.992	15	15	0	7	0	0
500 Hour Measurement																
84.2	89.60	96.8	4.703	.97677	-5.0	-3.3800	-2.3	.7570	-3.635	17.294	15	15	0	8	0	0
1000 Hour Measurement																
83.7	89.12	95.8	4.624	.96686	-0.9	-.4800	-0.2	.2258	-0.536	8.232	15	15	0	8	0	0
2000 Hour Measurement																
84.8	90.61	98.8	5.007	1.17244	+0.8	+1.4866	+3.0	.5310	+1.668	10.842	15	15	0	8	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Unit: Nanofarads

Capacitance

GROUPS: LIFE - 5
200V 85°C

Lower Limit (90.0)

Nominal Value: (100.0)

Upper Limit: (110.0)

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Mu	N1	Nc	Nt

Initial Measurement

89.9	92.80	100.9	3.094	-	-	-	-	-	-	-	13	-	0	1	2	0

168 Hour Measurement

85.3	88.66	95.1	2.909	.88415	-5.8	-4.0833	-2.5	1.087	-4.400	13.016	12	12	0	8	2	1

500 Hour Measurement

84.1	87.18	93.7	2.917	1.00496	-1.9	-1.4833	-1.2	.2387	-1.673	21.522	12	12	0	10	2	1

1000 Hour Measurement

83.7	86.93	93.2	2.843	.95015	-1.2	-.7900	-0.4	.2683	-0.906	9.310	10	10	0	9	2	3

2000 Hour Measurement

84.7	88.62	94.2	2.766	.94667	+1.0	+1.3333	+1.7	.2828	+1.534	14.142	9	9	0	6	6	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK16M104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 5		200V 85°C				
Nominal Value:		(100.0)		Lower Limit		(90.0)										
Upper Limit:		(110.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	ε	Mo	My	Nu	Nl	Nc	Nt
Initial Measurement																
88.0	93.78	101.1	3.397	-	-	-	-	-	-	-	15	-	0	1	0	0
168 Hour Measurement																
85.8	89.40	95.3	2.671	.61819	-7.6	-4.3800	-2.0	1.854	-4.671	9.152	15	15	0	9	0	0
500 Hour Measurement																
84.5	87.81	94.2	2.691	1.01471	-2.3	-1.5866	-1.1	.3536	-1.775	17.380	15	15	0	13	0	0
1000 Hour Measurement																
84.1	87.12	93.3	2.549	.89777	-1.2	-6866	-0.1	.3348	-0.782	7.946	15	15	0	13	0	0
2000 Hour Measurement																
85.2	88.50	94.5	2.692	1.11524	+0.8	1.2571	+1.6	.2490	+1.443	18.891	14	14	0	12	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter: Capacitance Unit: Microfarads
 Nominal Value: (1.0) Lower Limit (0.9) GROUPS: LIFE - 5
 Upper Limit: (1.1) 200V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Nu	N1	Nc	Nt
Initial Measurement																
.902	.9805	1.051	.0451	-	-	-	-	-	-	-	15	-	0	0	0	0
168 Hour Measurement																
.882	.9580	1.038	.0519	1.32520	-.053	-.030692	+0.013	.0256	-3.130	4.321	13	13	0	2	2	0
500 Hour Measurement																
.860	.9269	1.011	.0540	1.08035	-.051	-.025500	+0.010	.0142	-2.662	6.226	12	12	0	4	3	0
1000 Hour Measurement																
.826	.8996	.994	.0546	1.02314	-.035	-.019400	-.015	.0060	-2.093	10.168	10	10	0	5	5	0
2000 Hour Measurement																
.837	.9143	1.012	.0590	1.16995	+0.011	+0.016333	+0.020	.00249	+1.815	19.678	9	9	0	4	6	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - KC80BW104K

Parameter:	Capacitance			Unit:	Nanofarads			GROUPS:			LIFE - 5					
Nominal Value:	(100.0)			Lower Limit	(90.0)						200V 85°C					
Upper Limit:	(110.0)															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	N1	Nc	Nt
Initial Measurement																
88.0	100.31	116.1	10.332	-	-	-	-	-	-	-	15	-	4	2	0	0
168 Hour Measurement																
84.6	96.04	111.0	10.147	.13197	-6.8	-3.5800	+2.0	2.726	-3.800	5.087	15	15	3	5	0	0
500 Hour Measurement																
82.5	94.30	112.2	10.642	1.09997	-2.4	-1.7466	+1.2	.8955	-1.819	7.554	15	15	1	6	0	0
1000 Hour Measurement																
81.0	93.64	114.2	10.673	1.00572	-7.9	-.6533	+6.9	3.361	-0.693	0.752	15	15	1	8	0	0
2000 Hour Measurement																
83.2	95.40	109.7	9.531	.79747	-5.6	1.7600	+5.4	7.817	+1.880	5.8720	15	15	0	4	0	0

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Parameter:	Capacitance			Unit:	Nanofarads			GROUPS:			LIFE - 5					
Nominal Value:	(100.0)			Lower Limit	(90.0)						200V 85°C					
Upper Limit:	(110.0)															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
92.9	100.80	104.8	2.863	-	-	-	-	-	-	-	15	-	0	0	0	0
Initial Measurement																
168 Hour Measurement																
89.4	95.34	105.4	5.062	3.12638	-9.6	-5.0800	+3.7	4.946	-5.040	3.248	10	10	0	1	5	0
500 Hour Measurement																
86.2	91.42	103.3	5.807	1.31599	-11.4	-4.0285	-3.2	3.554	-4.225	2.999	7	7	0	4	7	1
1000 Hour Measurement																
84.9	91.43	101.0	7.471	1.65494	-5.2	-4.600	+7.0	4.489	-0.503	2.291	5	4	0	3	10	0
2000 Hour Measurement																
85.6	89.10	92.6	4.950	.43896	-5.5	-2.4000	+0.7	4.384	-2.622	.7740	2	2	0	1	13	0

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter: Capacitance

Parameter:	Capacitance
Nominal Value:	(100.0)

Upper Limit: (110.0)

Unit:

Nanofarads

Lower Limit

GROUPS:

LIFE - 5

200V 85°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	Stdd	PC	t	No	Ny	Nu	Nl	Nc	Nt
91.5	97.24	100.8	2.628													
Initial Measurement																
90.0	93.12	95.4	1.683	.41024	-6.7	-4.4500	-1.5	1.994	-4.576	8.350	14	14	0	0	0	1
168 Hour Measurement																
88.3	91.95	96.6	2.420	2.06669	-2.0	-1.0769	+4.1	1.806	-1.156	2.150	13	13	0	4	0	2
500 Hour Measurement																
87.9	93.16	98.2	3.655	2.28068	-0.7	+1.2666	+6.4	.2663	+1.377	1.648	12	12	0	3	0	3
1000 Hour Measurement																
90.9	95.85	99.9	2.901	.62995	-5.7	+2.6833	+6.9	4.507	+2.880	2.063	12	12	0	0	3	0
2000 Hour Measurement																

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VL02BK1.03K V-LAM

Parameter:	Capacitance	Unit:	Nanofarads														
Nominal Value:	(10.0)	Lower Limit	(9.0)	GROUPS:													
Upper Limit:	(11.0)			LIFE -- 5 200V 85°C													
Min	Mean	Max	Std.	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	N1	Nc	Nt	
9.42	9.807	10.21	.2442	-	-	-	-	-	-	-	14	-	0	0	1	0	
Initial Measurement																	
9.13	9.562	9.84	.1800	.54333	-.47	-.24500	+.03	.1756	-2.498	5.222	14	14	0	0	1	0	
168 Hour Measurement																	
8.88	9.362	9.64	.1870	1.07867	-.26	-.19928	-.16	.0336	-2.084	22.181	14	14	0	1	1	0	
500 Hour Measurement																	
9.02	9.229	9.61	.1618	.74914	-.26	-.13357	+.30	.1673	-1.427	2.987	14	14	0	0	1	0	
1000 Hour Measurement																	
8.73	9.266	9.53	.1912	1.39633	-0.39	+.03714	+.016	.1762	+.4024	.7880	14	14	0	1	1	0	
2000 Hour Measurement																	

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30BX104K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0)
 Upper Limit: (110.0)

GROUPS:
 LIFE - 5
 200V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
90.8	97.76	103.5	4.685	-	-	-	-	-	-	-	15	-	0	0	0	0
158 Hour Measurement																
87.0	91.33	96.0	3.299	.49580	-10.2	-6.433	-3.0	2.427	-6.581	10.268	15	15	0	6	0	0
500 Hour Measurement																
84.1	89.92	96.0	3.592	1.18561	-3.8	-1.6928	+3.3	2.349	-1.853	2.696	14	14	0	5	0	1
1000 Hour Measurement																
80.0	87.51	97.4	5.336	2.20669	-5.9	-1.9384	+5.7	3.303	-2.156	2.116	13	13	0	10	1	1
2000 Hour Measurement																
82.7	88.86	98.4	4.257	.63635	-6.5	+1.3461	+3.0	2.451	+1.538	1.980	13	13	0	8	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVEX CAPACITORS - MC605104RK

Parameter: Capacitance

Unit: Nanofarads

Nominal Value: (100.0)

Lower Limit

(90.0)

Upper Limit: (110.0)

LIFE - 6
200V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	L	Mo	Ny	Ma	Nl	Nc	Nt
Initial Measurement																
96.5	101.53	109.2	4.311	-	-	-	-	-	-	-	15	-	0	0	0	0
168 Hour Measurement																
90.1	99.87	112.3	6.390	2.19725	-7.7	-2.1461	44.8	4.343	-2.114	1.782	13	13	1	0	2	0
500 Hour Measurement																
85.7	95.53	111.8	7.226	1.27865	-6.7	-4.3461	+0.4	2.103	-4.352	7.453	13	13	1	3	2	0
1000 Hour Measurement																
80.6	91.52	115.5	10.073	1.94315	-6.7	-4.2333	+1.8	3.349	-4.431	4.379	12	12	1	6	3	0
2000 Hour Measurement																
90.5	101.62	113.6	6.547	.42242	-1.9	+9.1090	+12.5	5.340	+9.953	5.658	11	11	1	0	4	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 6		200V 125°C				
Nominal Value:		(100.0)		Lower Limit		(90.0)										
Upper Limit:		(110.0)														
MIn	Mean	Max	Std	F	MInD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
86.9	91.63	96.5	-	-	-	-	-	-	-	-	13	-	0	5	2	0
168 Hour Measurement																
86.1	90.81	96.7	2.930	1.13018	-4.0	-.9833	+0.2	1.191	-1.073	2.859	12	12	0	5	3	0
500 Hour Measurement																
84.5	89.15	94.7	2.805	.91660	-2.6	-1.666	-1.2	.3912	-1.835	14.760	12	12	0	7	3	0
1000 Hour Measurement																
82.1	85.61	89.5	2.563	.83456	-5.2	-3.533	-2.2	.9466	-3.963	12.931	12	12	0	12	3	0
2000 Hour Measurement																
87.7	91.80	96.7	2.632	1.05511	+5.0	+6.1833	+8.2	.8922	+7.223	24.008	12	12	0	2	3	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS CK16M104K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0) GROUPS: LIFE - 6
 Upper Limit: (110.0) 200V 125°C

MIn	Mean	Max	Std	F	MInD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
86.7	94.04	101.5	3.403	-	-	-	-	-	-	-	15	-	0	2	0	0
168 Hour Measurement																
84.9	95.44	102.8	4.329	1.61834	-2.3	+1.4066	+5.7	2.539	+1.496	2.146	15	15	0	2	0	0
500 Hour Measurement																
82.1	94.17	102.4	5.171	1.42684	-2.9	-1.2733	-0.2	1.283	-1.334	3.843	15	15	0	2	0	0
1000 Hour Measurement																
79.4	93.88	103.3	6.868	1.76370	-4.4	-2.866	+1.8	2.150	-0.304	5.163	15	15	0	5	0	0
2000 Hour Measurement																
86.4	95.72	102.6	3.882	.31953	-0.8	+1.8333	+7.0	3.716	+1.953	1.910	15	15	0	2	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter: Capacitance Unit: Microfarads
 Nominal Value: (1.0) Lower Limit (0.9) LIFE - 6
 Upper Limit: (1.1) GROUPS: 200V 125°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.920	.9867	1.087	.0515	-	-	-	-	-	-	-	15	-	0	0	0	0
168 Hour Measurement																
.842	.9395	1.024	.0483	.87843	-1.29	-.046500	+0.011	.0414	-4.713	3.895	12	12	0	1	3	0
500 Hour Measurement																
.863	.9214	.997	.0427	.78162	-.040	-.026100	-.023	.0050	-2.778	16.441	10	10	0	3	5	0
1000 Hour Measurement																
.844	.8742	.938	.0297	.48352	-.057	-.045000	-.034	.0071	-4.884	17.805	8	8	0	7	7	0
2000 Hour Measurement																
.884	.9121	.980	.0322	1.18132	+0.037	+0.039857	+0.042	.00176	+4.560	59.893	7	7	0	3	8	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - CK80BW104K

Parameter:	Capacitance	Unit:	Nanofarads	GROUPS:	LIFE - 6											
Nominal Value:	.(100.0)	Lower Limit	(90.0)		200V 125°C											
Upper Limit:	(110.0)															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	NI	Nc	Nt

Initial Measurement

88.0	102.16	116.2	10.468	-	-	-	-	-	-	-	15	-	5	2	0	0

168 Hour Measurement

87.9	101.06	113.3	9.881	.89105	-4.0	-1.0933	+2.4	1.828	-1.070	2.317	15	15	5	3	0	0

500 Hour Measurement

85.4	96.30	110.5	8.927	.81613	-4.1	-2.9615	+0.2	1.319	-2.930	8.097	13	13	1	3	1	1

1000 Hour Measurement

82.4	93.21	107.7	8.527	.91248	-4.7	-3.0923	+1.0	1.414	-3.211	7.884	13	13	0	6	1	1

2000 Hour Measurement

89.1	100.89	113.4	9.404	1.21601	-0.5	+6.6428	+9.9	2.872	+7.127	8.655	14	14	4	1	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Parameter:	Capacitance			Unit:			Nanofarads			GROUPS:			LIFE - 6			
Nominal Value:	(100.0)			Lower Limit			(90.0)						200V 125°C			
Upper Limit:	(110.0)															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
168 Hour Measurement																
98.3	102.04	107.5	2.379	-	-	-	-	-	-	-	15	-	0	0	0	0
98.4	105.06	108.8	2.361	.98480	-2.6	+3.0266	+6.4	2.721	+2.955	4.308	15	15	0	0	0	0
500 Hour Measurement																
97.3	103.83	107.3	2.296	.94580	-1.7	-1.2428	-0.4	.4159	-1.183	11.180	14	14	0	0	1	0
1000 Hour Measurement																
103.0	105.79	109.1	1.433	.38975	+0.6	+1.9571	+9.1	2.108	+1.885	3.474	14	14	0	0	1	0
2000 Hour Measurement																
102.7	105.30	108.3	1.393	.94498	-1.1	-.4928	-0.1	.3066	-.4658	6.014	14	14	0	0	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter: Capacitance Unit: Nanofarads
 Nominal Value: (100.0) Lower Limit (90.0) GROUPS: LIFE - 6
 Upper Limit: (110.0) 200V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
89.6	95.10	98.9	3.749	-	-	-	-	-	-	-	12	-	0	1	3	0
168 Hour Measurement																
93.0	97.16	99.5	2.263	.36447	+1.0	+2.0583	+5.1	2.054	+2.164	3.472	12	12	0	0	3	0
500 Hour Measurement																
92.9	97.00	99.5	2.272	1.00780	-0.2	-.0272	+0.3	.1612	-0.028	0.559	11	11	0	0	4	0
1000 Hour Measurement																
94.1	98.01	100.5	2.356	1.07497	+0.9	+1.1900	+1.5	.2074	+1.227	18.147	10	10	0	0	4	1
2000 Hour Measurement																
93.6	97.50	100.1	2.295	.94936	-0.8	-.5100	-0.3	.1581	-.5203	10.200	10	10	0	0	5	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VLO2BK103K V-LAM

Parameter:		Capacitance		Unit:		Nanofarads		GROUPS:		LIFE - 6						
Nominal Value:		(10.0)		Lower Limit		(9.0)		200V 125°C								
Upper Limit:		(11.0)														
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
9.63	10.040	10.32	.2273	-	-	-	-	-	-	-	11	-	0	0	4	0
168 Hour Measurement																
9.62	10.164	10.65	.3831	2.84126	-.16	+1.2454	+33	.1797	+1.240	2.299	11	11	0	0	4	0
500 Hour Measurement																
9.59	10.121	10.56	.3775	.97063	-.10	-.04272	-.01	.0310	-.0420	4.573	11	11	0	0	4	0
1000 Hour Measurement																
9.66	10.202	10.66	.3827	1.02815	+.05	+.08090	+.15	.0361	+.080	7.442	11	11	0	0	4	0
2000 Hour Measurement																
9.59	10.146	10.59	.3818	.99508	-0.11	-.05636	-0.02	.03347	-.5524	5.585	11	11	0	0	4	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30BX104K

Parameter: Capacitance Unit: Nanofarads GROUPS: LIFE - 6
 Nominal Value: (100.0) Lower Limit (90.0) 200V 125°C
 Upper Limit: (110.0)

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
90.2	96.91	107.2	5.121	-	-	-	-	-	-	-	15	-	0	0	0	0
168 Hour Measurement																
90.6	97.86	106.5	4.914	.92069	-3.1	+ .9466	+5.2	3.049	+0.977	1.202	15	15	0	0	0	0
500 Hour Measurement																
90.7	97.91	109.1	4.973	1.02414	-1.7	+ .0533	+2.6	1.141	+0.054	0.179	15	15	0	0	0	0
1000 Hour Measurement																
92.9	99.29	110.5	4.863	.95600	+0.3	+1.3800	+3.3	.7141	+1.409	7.484	15	15	1	0	0	0
2000 Hour Measurement																
92.9	98.83	109.9	4.779	.96608	-1.1	-.4600	+0.5	.4099	-.4633	4.346	15	15	0	0	0	0

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B758BX104K

Parameter:	Capacitance	Unit:	Nanofarads
Nominal Value:	(100.0)	Lower Limit:	(90.0)
Upper Limit:	(110.0)	GROUPS:	LIFE - 6
			200V 125°C

[illegible]

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.0 percent Lower Limit None GROUPS: Life - 1
 Upper Limit: 2.0 percent 50V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
.48	.790	1.51	.1841	-	-	-	-	-	-	-	75	-	0	-	0	0
168 Hour Measurement																
.58	.760	1.04	.1202	.42680	-.55	-.03026	+20	.1449	-3.830	1.809	75	75	0	-	0	0
500 Hour Measurement																
.60	.768	1.01	.1150	.91493	-.09	-.01027	+10	.0443	-1.351	1.995	74	74	0	-	1	0
1000 Hour Measurement																
.92	1.134	1.42	.1230	1.14285	+23	+36581	+51	.0536	+47.632	58.709	74	74	0	-	1	0
2000 Hour Measurement																
.80	1.068	1.45	.1612	1.71957	-.30	-.06418	+15	.0885	-5.660	6.235	74	74	0	-	1	0

IDENTIFICATION NUMBER 152-20-02

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:	Percent Dissipation			Unit:	DF x 100											
Nominal Value:	Less than 2.0 percent			Lower Limit	None											
Upper Limit:	2.0 percent			GROUPS: LIFE - 1 50V 85°C												
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
.46	.565	.76	.0724	-	-	-	-	-	-	-	69	-	0	-	6	0
Initial Measurement																
.48	.534	.94	.0536	.54770	-.23	-.03086	+.30	.2737	-5.462	.9366	69	69	0	-	6	0
168 Hour Measurement																
.49	.533	.60	.0190	.12543	-.38	-.00161	+.05	.0497	-0.301	0.266	68	68	0	-	6	1
500 Hour Measurement																
.55	.603	.93	.0549	8.36110	+0.1	+.07076	+.29	.0527	+13.276	10.820	65	65	0	-	8	2
1000 Hour Measurement																
.54	.600	.90	.0496	.81727	-.08	+.00600	+.27	.1356	+0.995	3.427	60	60	0	-	12	3
2000 Hour Measurement																

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 1
 Upper Limit: 2.5 percent 50V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
1.29	1.615	2.40	.1667	-	-	-	-	-	-	-	72	-	0	-	3	0
168 Hour Measurement																
1.37	1.552	1.72	.0794	.22706	-.88	-.06626	+1.12	.1618	-4.103	3.352	67	67	0	-	8	0
500 Hour Measurement																
1.41	1.596	1.79	.0802	1.01901	-.03	+0.04417	+1.16	.0308	+2.846	11.730	67	67	0	-	8	0
1000 Hour Measurement																
1.52	1.743	2.00	.0913	1.29548	-.08	+1.14761	+1.25	.0529	+9.249	22.834	67	67	0	-	8	0
2000 Hour Measurement																
1.35	1.544	1.73	.0813	.79351	-.31	-.20031	+1.05	.1863	-11.492	8.534	63	63	0	-	12	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 1
 Upper Limit: 2.5 percent 50V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.47	.592	.80	.0738	-	-	-	-	-	-	-	69	-	0	-	6	0
168 Hour Measurement																
.52	.576	.83	.0446	.36513	-.15	-.01057	+.21	.0703	-1.785	1.249	69	69	0	-	6	0
500 Hour Measurement																
.52	.570	.63	.0261	.34170	-.30	-.00623	+.08	.0449	-1.082	1.151	69	69	0	-	6	0
1000 Hour Measurement																
.53	.619	.68	.0330	1.60294	-.05	+.04927	+.11	.0259	+8.644	15.811	69	69	0	-	6	0
2000 Hour Measurement																
.56	.635	.77	.0341	1.06422	-.03	+.01544	+.05	.0648	+2.494	1.965	68	68	0	-	7	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 1
 Upper Limit: 2.5 percent 2.5 percent 50V 85°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.46	.573	.97	.0956	-	-	-	-	-	-	-	66	-	0	-	9	0
168 Hour Measurement																
.51	.543	.89	.0480	.25164	-.43	-.02920	+.41	.1130	-5.096	2.052	63	63	0	-	10	2
500 Hour Measurement																
.49	.531	.57	.0141	.08695	-.03	-.00459	+.02	.0126	-0.845	2.834	61	61	0	-	11	3
1000 Hour Measurement																
.55	.592	.63	.0173	1.55000	+.03	+.05966	+.11	.0288	+11.235	15.906	59	59	0	-	13	3
2000 Hour Measurement																
.55	.606	.67	.0256	2.09677	-.05	+.01406	+.07	.0700	+2.375	1.543	59	59	0	-	16	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VL02BK103 V-1AM

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE --1
 Upper Limit: 2.5 percent 50V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	My	Nu	N1	Mc	Nt
Initial Measurement																
1.27	1.569	1.27	1.5907	-	-	-	-	-	-	-	60	-	0	-	14	1
168 Hour Measurement																
1.28	1.372	1.64	.0529	.00110	-.90	-.23945	+.08	.2876	-15.261	6.174	55	55	0	-	15	5
500 Hour Measurement																
1.29	1.382	1.62	.0447	.71428	-.12	+.00925	+.14	.0411	+.0674	1.653	54	54	0	-	15	6
1000 Hour Measurement																
1.30	1.383	1.48	.0321	.51500	-.12	+.00979	+.07	.0315	+.0708	2.155	48	48	0	-	15	12
2000 Hour Measurement																
1.35	1.430	1.52	.0285	.78640	.00	+.04787	+.15	.0849	+.3461	3.866	47	47	0	-	28	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30BX104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 3.0 percent Lower Limit None GROUPS: LIFE - 1
 Upper Limit: 3.0 percent 50V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Mu	N1	Nc	Nt
1.32	1.706	2.70	.2587	-	-	-	-	-	-	-	.74	-	1	-	1	0
Initial Measurement																
168 Hour Measurement																
1.30	1.536	2.32	.1985	.58878	-.95	-.16541	+.36	.2254	-9.696	6.227	72	72	0	-	3	0
500 Hour Measurement																
1.27	1.457	1.97	.1651	.69230	-.38	-.07875	+.11	.0949	-5.127	7.040	72	72	0	-	3	0
1000 Hour Measurement																
1.32	1.475	1.90	.1439	.75980	-.47	+.01861	+.14	.0903	+1.277	1.748	72	72	0	-	3	0
2000 Hour Measurement																
1.30	1.477	1.95	.1524	1.11969	-.25	+.00014	+.40	.2322	+.0095	0.000	70	70	0	-	5	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02
WESTCAP CAPACITORS - B758BX104K

Parameter:	Percent Dissipation	Unit:	DF x 100														
Nominal Value:	Less than 2.5 percent	Lower Limit	None														
Upper Limit:	2.5 percent																
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	Mo	Ny	Nu	N1	Nc	Nt	
.48	.600	.89	.1322	-	-	-	-	-	-	-	27	-	0	-	48	0	
Initial Measurement																	
168 Hour Measurement																	
.59	.658	.88	.0686	.26960	-.17	+.05346	+.14	.0939	+8.910	2.902	26	26	0	-	49	0	
500 Hour Measurement																	
.56	.625	.91	.0752	1.20169	-.16	-.03384	+.22	.0657	-5.143	2.625	26	26	0	-	49	0	
1000 Hour Measurement																	
.68	.737	.95	.0584	.60247	+.04	+.11307	+.16	.0889	+18.120	6.485	26	26	0	-	49	0	
2000 Hour Measurement																	
.66	.753	.87	.0447	.58651	-.14	+.01653	+.08	.1414	+2.243	.5961	26	26	0	-	49	0	

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Parameter: Percent Dissipation Unit: DF x 100 -
 Nominal Value: Less than 2.0 percent Lower Limit None GROUPS: LIFE - 2
 Upper Limit: 2.0 percent 50V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.48	.700	.93	.1444	-	-	-	-	-	-	-	15	-	0	-	0	0
168 Hour Measurement																
.73	.850	1.31	.1459	1.02207	-.04	+1.5066	+54	.1695	+21.523	3.442	15	15	0	-	0	0
500 Hour Measurement																
.62	.723	.92	.0943	.41737	-.39	-.12733	-.06	.0918	-14.980	5.374	15	15	0	-	0	0
1000 Hour Measurement																
.86	1.008	1.37	.1516	2.58492	+12	+2.8466	+45	.0951	+39.372	11.595	15	15	0	-	0	0
2000 Hour Measurement																
.95	1.162	1.45	.1400	.85291	+05	+1.15466	+30	.2581	+15.343	2.321	15	15	0	-	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM ELECTRO RESEARCH CAPACITORS - CK2R10AX

Parameter: Percent Dissipation

Unit: DF x 100

Nominal Value: Less than 2.0 percent

Lower Limit

Upper Limit: 2.0 percent

GROUPS:

LIFE - 2
50V 125°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	Stdd	PC	t	Mo	Ny	Nu	Nl	Nc	Nt

Initial Measurement

.45	.562	.72	.0701	-	-	-	-	-	-	-	15	-	0	-	0	0

168 Hour Measurement

.54	.568	.59	.0161	.05284	-.14	+.00533	+.11	.0677	+.0948	0.303	15	15	0	-	0	0

500 Hour Measurement

.52	.542	.56	.0105	.42307	-.04	-.02769	-.02	.0114	-4.875	8.756	13	13	0	-	2	0

1000 Hour Measurement

.50	.587	.62	.0335	.18181	-.04	+.04500	+.08	.0322	+.8303	4.834	12	12	0	-	2	1

2000 Hour Measurement

.62	.654	.68	.0241	.51785	+.04	+.06800	+.13	.0900	+.11.584	2.389	10	10	0	-	5	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK16M104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit: None
 Upper Limit: 2.5 percent

GROUPS: LIFE - 2
 50V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.48	.656	1.32	.2132	-	-	-	-	-	-	-	14	-	0	-	1	0
168 Hour Measurement																
.57	.627	.67	.0359	.02838	-.65	-.02857	+.17	.1984	-4.355	0.539	14	14	0	-	1	0
500 Hour Measurement																
.54	.568	.63	.0261	.52713	-.11	-.05692	-.03	.0261	-9.078	7.870	13	13	0	-	1	1
1000 Hour Measurement																
.60	.636	.70	.0332	1.61764	+.03	+.06846	+.13	.0330	+12.053	7.476	13	13	0	-	1	1
2000 Hour Measurement																
.65	.719	.80	.0360	1.17272	+.05	+.08083	+.12	.0866	+12.709	3.233	12	12	0	-	3	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - GN05M105K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 2
 Upper Limit: 2.5 percent 50V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mb	Ky	Nu	N1	Mc	Nt

Initial Measurement

1.43	1.660	2.04	.1840	-	-	-	-	-	-	-	14	-	1	-	1	0

168 Hour Measurement

1.44	1.532	1.65	.0564	.09391	-.54	-.12230	+ .08	.1989	-7.367	2.217	13	13	0	-	2	0

500 Hour Measurement

1.47	1.568	1.65	.0540	.91823	+ .01	+ .03250	+ .07	.0217	+2.121	5.193	12	12	0	-	3	0

1000 Hour Measurement

1.54	1.610	1.67	.0482	.79452	-.01	+ .04636	+ .11	.0346	+2.957	4.439	11	11	0	-	3	1

2000 Hour Measurement

1.40	1.528	1.60	.0645	1.78879	-.15	-.08181	-.03	.1153	-5.081	2.353	11	11	0	-	4	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - CK80BW104K

Unit:

DF x 100

Parameter: Percent Dissipation

Nominal Value: Less than 2.5 percent

Upper Limit: 2.5 percent

Lower Limit

None

GROUPS:

LIFE - 2

50V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt

Initial Measurement

.48	.601	.73	.0689	-	-	-	-	-	-	-	15	-	0	-	0	0

168 Hour Measurement

.55	.602	.66	.0300	.18987	-.10	+.00066	+.12	.0685	+0.110	0.032	15	15	0	-	0	0

500 Hour Measurement

.53	.604	.67	.0330	1.21111	-.02	+.00266	+.04	.0182	+0.442	0.567	15	15	0	-	0	0

1000 Hour Measurement

.55	.594	.62	.0219	.44036	-.07	-.01066	+.04	.0300	-1.705	1.376	15	15	0	-	0	0

2000 Hour Measurement

.60	.658	.72	.0398	3.29166	+.02	+.06466	+.12	.0995	+10.886	2.458	15	15	0	-	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Parameter:	Percent Dissipation	Unit:	DF x 100														
Nominal Value:	Less than 2.5 percent	Lower Limit	None														
Upper Limit:	2.5 percent																
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Mu	Nl	Nc	Nt	
1.47	1.798	2.17	.3077	-	-	-	-	-	-	-	12	-	0	-	3	0	
Initial Measurement																	
168 Hour Measurement																	
1.53	1.637	1.76	.0693	.05068	-.51	-.16083	+1.15	.2543	-8.945	2.190	12	12	0	-	3	0	
500 Hour Measurement																	
1.52	1.578	1.63	.0371	.28750	-.14	-.08777	-.05	.0318	-5.362	8.285	9	9	0	-	6	0	
1000 Hour Measurement																	
1.63	1.673	1.73	.0333	.80434	+0.02	+0.09250	+1.16	.0495	+5.862	5.286	8	8	0	-	7	0	
2000 Hour Measurement																	
1.80	1.810	1.82	.0141	.18018	+0.12	+0.12500	+0.13	.0224	+7.472	7.892	2	2	0	-	13	0	

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter: Percent Dissipation Unit: DF x 100 LIFE - 2
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: 50V 125°C
 Upper Limit: 2.5 percent

Min	Mean	Max	Std	F'	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.47	.554	.68	.0734	-	-	-	-	-	-	-	12	-	0	-	3	0
168 Hour Measurement																
.54	.562	.61	.0212	.08348	-.07	+.00833	+.10	.0736	+1.504	0.391	12	12	0	-	3	0
500 Hour Measurement																
.52	.551	.57	.011	.57777	-.04	-.01083	+.03	.0197	-1.927	1.899	12	12	0	-	3	0
1000 Hour Measurement																
.53	.566	.62	.0310	3.69230	-.02	+.01636	+.06	.0265	+2.969	2.051	11	11	0	-	3	1
2000 Hour Measurement																
.62	.641	.65	.0136	.18750	+.03	+.0833	+.11	.0741	+14.723	3.374	9	9	0	-	6	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS : VL02BK103 V-LAM

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit: None
 Upper Limit: 2.5 percent

GROUPS: LIFE - 2
 50V 125°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	-N1	Nc	Nt
1.31	1.653	2.13	.2873	-	-	-	-	-	-	-	13	-	0	-	2	0
Initial Measurement																
168 Hour Measurement																
1.35	1.411	1.45	.0378	.01732	-.68	-.25750	+.08	.2878	-15.578	3.100	12	12	0	-	2	1
500 Hour Measurement																
1.32	1.377	1.47	.0460	1.48251	-.10	-.03416	+.06	.0503	-2.421	2.352	12	12	0	-	2	1
1000 Hour Measurement																
1.27	1.344	1.50	.0559	1.47641	-.12	-.03333	+.03	.0476	-2.420	2.423	12	12	0	-	2	1
2000 Hour Measurement																
1.35	1.408	1.45	.0289	.26517	-.08	+.06636	+.11	.1679	+4.938	1.311	11	11	0	-	4	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30BX104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 3.0 percent Lower Limit None GROUPS: LIFE - 2
 Upper Limit: 3.0 percent 50V 125°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	Mo	Ny	Ni	Nc	Nt
Initial Measurement															
1.29	1.634	2.33	.2758	-	-	-	-	-	-	-	15	-	0	-	0
168 Hour Measurement															
1.36	1.588	1.97	.1881	.46528	-.21	+.01461	+.60	.2204	+.0894	0.239	13	13	0	-	1
500 Hour Measurement															
1.28	1.469	1.97	.2167	1.32768	-.24	-.11923	-.01	.0865	-7.508	4.967	13	13	0	-	1
1000 Hour Measurement															
1.25	1.462	1.85	.1728	.63572	-.47	-.03857	+.08	.1332	-2.626	1.083	14	13	0	-	0
2000 Hour Measurement															
1.40	1.554	2.00	.1836	1.12826	+.03	+.09769	+.17	.1500	+6.728	2.348	13	13	0	-	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B758BX104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 2
 Upper Limit: 2.5 percent 50V 125°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	My	Nu	N1	Mc	Nt
Initial Measurement																
.45	.638	.86	-	-	-	-	-	-	-	-	6	-	0	-	9	0
168 Hour Measurement																
.56	.646	.85	.1071	.37195	-.20	+0.00833	+0.13	.1180	+1.306	0.170	6	6	0	-	9	0
500 Hour Measurement																
.60	.636	.69	.0326	.09249	-.19	-.01000	+0.07	.0914	-1.548	0.266	6	6	0	-	9	0
1000 Hour Measurement																
.63	.700	.80	.0636	3.81132	+0.02	+0.06333	+0.17	+0.0557	+9.958	2.786	6	6	0	-	9	0
2000 Hour Measurement																
.72	.778	.82	.0371	.33910	-.08	+0.07833	+0.17	.2737	+11.190	.7010	6	6	0	-	9	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Parameter: Percent Dissipation Unit: DF x 100

Nominal Value: Less than 2.0 percent

Lower Limit

GROUPS:

LIFE- 3

Upper Limit: 2.0 percent

100V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Nu	Nl	Mc	Nt

Initial Measurement

.52	.804	1.06	.1525	-	-	-	-	-	-	-	15	-	0	-	0	0

168 Hour Measurement

.65	.810	.98	.1007	.43655	-.21	+.00600	+.17	.1199	+.0746	0.192	15	15	0	-	0	0

500 Hour Measurement

.56	.697	.86	.0943	.87586	-.32	-.12533	-.04	.0752	-15.473	6.452	15	15	0	-	0	0

1000 Hour Measurement

.87	1.031	1.24	.0957	1.02924	+.27	+.33400	+.44	.0471	+.47.920	27.455	15	15	0	-	0	0

2000 Hour Measurement

.85	1.080	1.30	.1084	1.28306	-.05	+.04933	+.12	.1556	+.4.785	1.228	15	15	0	-	0	0

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

$$DE \times 100$$

None

100 V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	My	Nu	N1	Nc	Nt
Initial Measurement																
.47	.563	.63	.0689	-	-	-	-	-	-	-	13	-	0	-	2	0
168 Hour Measurement																
.52	.543	.66	.0381	.30526	-.11	-.0200	+ .19	.0877	-3.552	0.822	13	13	0	-	2	0
500 Hour Measurement																
.52	.536	.57	.0157	.17241	-.14	-.0092	+ .05	.0451	-1.274	0.553	13	13	0	-	2	0
1000 Hour Measurement																
.52	.550	.68	.0447	8.0000	-.02	+ .01636	+ .15	.0465	+3.052	1.167	11	11	0	-	3	1
2000 Hour Measurement																
.55	.583	.62	.0245	.30000	+ .02	+ .04600	+ .07	.0632	+8.364	2.302	10	9	0	-	4	1

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK16M104K

Parameter: Percent Dissipation Unit: DF x 100 . LIFE - 3
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: 100 V 85°C
 Upper Limit: 2.5 percent

Mln	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	My	Mu	N1	Nc	Nt
Initial Measurement																
.48	.675	1.13	.1672	-	-	-	-	-	-	-	13	-	0	-	1	1
168 Hour Measurement																
.53	.585	.65	.0435	.06747	-.49	-.09000	+.09	.1576	-13.333	2.059	13	13	0	-	1	1
500 Hour Measurement																
.56	.605	.68	.0407	.87830	-.01	+.02000	+.05	.0176	+3.419	4.096	13	13	0	-	1	1
1000 Hour Measurement																
.55	.643	.75	.0559	1.87951	-.02	+.03346	+.10	.0321	+6.357	4.321	13	13	0	-	2	0
2000 Hour Measurement																
.55	.676	.76	.0629	1.26602	-.07	+.01230	+.10	.1371	+5.023	.8495	13	13	0	-	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit Nope GROUPS: LIFE - 3
 Upper Limit: 2.5 percent 2.5 percent 100 V 85°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	Mo	My	Nu	N1	Nc	Nt
Initial Measurement																
1.43	1.686	2.36	.2638	-	-	-	-	-	-	-	14	-	0	-	1	0
168 Hour Measurement																
1.46	1.534	1.72	.0840	.10143	-.66	-.16461	+1.15	.2349	-9.763	2.526	13	13	0	-	2	0
500 Hour Measurement																
1.49	1.600	1.82	.0911	1.17563	+0.3	+0.06615	+1.10	.0244	+4.312	10.666	13	13	0	-	2	0
1000 Hour Measurement																
1.55	1.652	1.86	.0909	.99518	-.01	+0.05153	+1.13	.0362	+3.221	5.133	13	13	0	-	2	0
2000 Hour Measurement																
1.45	1.562	1.73	.0724	.63317	-.15	-.09000	-.03	.1315	-5.448	2.468	13	13	0	-	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 3
 Upper Limit: 2.5 percent 100 V 85°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	My	Nu	Nl	Nc	Nt
.48	.607	.72	.0780	-	-	-	-	-	-	-	14	-	0	-	1	0
Initial Measurement																
168 Hour Measurement																
.52	.575	.78	.0647	.68801	-.17	-.03142	+.10	.0774	-5.176	1.519	14	14	0	-	1	0
500 Hour Measurement																
.53	.582	.66	.0392	.36754	-.12	+.00642	+.05	.0429	+1.117	0.559	14	14	0	-	1	0
1000 Hour Measurement																
.53	.592	.65	.0362	.85064	-.06	+.01071	+.04	.0243	+1.840	1.650	14	14	0	-	1	0
2000 Hour Measurement																
.55	.621	.66	.0376	1.07633	.00	+.02857	+.05	.0500	+4.826	2.138	14	14	0	-	1	0

JPL TEST PROCEDURE NUMBER 152.20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter:	Percent Dissipation			Unit:	DF x 100											
Nominal Value:	Less than 2.5 percent			Lower Limit	None											
Upper Limit:	2.5 percent			GROUPS:												
							LIFE - 3									
							100 V 85°C									
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
1.43	1.773	2.18	.2842	-	-	-	-	-	-	-	13	-	0	-	2	0
Initial Measurement																
1.37	1.463	1.56	.0571	.04036	-.62	-.2210	-.02	.2203	-12.465	3.172	10	10	0	-	5	0
168 Hour Measurement																
1.39	1.483	1.55	.0558	.95398	-.04	+.02000	+.08	.0391	+1.367	1.617	10	10	0	-	5	0
500 Hour Measurement																
1.50	1.604	1.70	.0712	1.63002	+.05	+.12100	+.19	.0453	+8.159	8.451	10	10	0	-	5	0
1000 Hour Measurement																
1.55	1.621	1.67	.0560	.61735	-.03	+.01833	+.05	.1044	+1.143	.4301	6	6	0	-	9	0
2000 Hour Measurement																

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter: Percent Dissipation Unit: DF x 100
Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 3
Upper Limit: 2.5 percent 2.5 percent 100 V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt

Initial Measurement

.46	.583	.71	.0926	-	-	-	-	-	-	-	14	-	0	-	1	0

168 Hour Measurement

.50	.523	.54	.0117	.01633	-.19	-.06000	+.06	.0922	-10.292	2.435	14	14	0	-	1	0

500 Hour Measurement

.52	.543	.57	.0137	1.35714	+.01	+.02153	+.04	.0118	+.4.116	6.561	13	13	0	-	2	0

1000 Hour Measurement

.53	.564	.60	.0210	2.31578	-.01	+.02076	+.06	.0179	+.3.823	4.184	13	13	0	-	2	0

2000 Hour Measurement

.56	.595	.62	.0178	.70454	.00	+.02833	+.06	.0548	+.5.023	1.791	12	12	0	-	3	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30BX104K

Parameter:	Percent Dissipation	Unit:	DF x 100		GROUPS:	LIFE - 3										
Nominal Value:	Less than 3.0 percent	Lower Limit	None			100 V 85°C										
Upper Limit:	3.0 percent															
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Mc	Nt
1.35	1.644	2.08	.2106	-	-	-	-	-	-	-	15	-	0	-	0	0
Initial Measurement																
168 Hour Measurement																
1.23	1.443	1.80	.1664	.62457	-.53	-.19615	+.03	.1811	-11.931	3.905	13	13	0	-	2	0
500 Hour Measurement																
1.21	1.423	1.72	.1612	.93754	-.08	-.02000	+.05	.0401	-1.386	1.797	13	13	0	-	2	0
1000 Hour Measurement																
1.20	1.396	1.70	.1544	.91798	-.17	-.0279	+.14	.0778	-1.946	1.283	13	13	0	-	2	0
2000 Hour Measurement																
1.25	1.441	1.72	.1573	1.07969	-.03	+.04166	+.12	.1249	+2.984	1.155	12	12	0	-	3	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B758BX104K

Unit: DF x 100
 Lower Limit None
 LIFE - 3000
 100 V 85°C

GROUPS:

Parameter:	Percent Dissipation	Unit:	DF x 100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

Initial Measurement

.48	.744	1.29	.3254	-	-	-	-	-	-	-	7	-	0	-	8	0
168 Hour Measurement																
.54	.655	.95	.1511	.21556	-.44	-.08857	+.15	.2282	-11.905	1.027	7	7	0	-	8	0
500 Hour Measurement																
.57	.660	.77	.0757	.25109	-.18	+.00428	+.07	.0887	+.0.653	0.126	7	7	0	-	8	0
1000 Hour Measurement																
.54	.708	.82	.0868	1.31588	-.07	+.04857	+.15	.0760	+.7.359	1.690	7	7	0	-	8	0
2000 Hour Measurement																
.68	.737	.82	.0457	.27718	-.07	+.02857	+.14	.2124	+.4.035	.3559	7	7	0	-	8	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.0 percent Lower Limit None GROUPS: LIFE - 4
 Upper Limit: 2.0 percent 100 V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
.53	.794	1.12	.1459	-	-	-	-	-	-	-	15	-	0	-	0	0
168 Hour Measurement																
.71	.829	1.12	.1069	.53640	-.25	+.03533	+.21	.1425	+.4.450	0.960	15	15	0	-	0	0
500 Hour Measurement																
.76	.850	.96	.0712	.44395	-.24	+.02133	+.08	.0750	+.2.573	1.093	15	15	0	-	0	0
1000 Hour Measurement																
.83	1.014	1.15	.0912	1.63905	+.06	+.16333	+.21	.0407	+.19.215	15.526	15	15	0	-	0	0
2000 Hour Measurement																
1.05	1.254	1.45	.1252	1.88567	+.13	+.23571	+.30	.1565	+.23.246	5.636	14	14	0	-	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.0 percent Lower Limit None GROUPS: LIFE- 4
 Upper Limit: 2.0 percent 100 V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Np	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.44	.542	.61	.0598	-	-	-	-	-	-	-	13	-	0	-	2	0
168 Hour Measurement																
.51	.546	.57	.0170	.08100	-.06	+.00916	+.08	.0521	+1.690	0.609	12	12	0	-	2	1
500 Hour Measurement																
.50	.524	.53	.0089	.27580	-.04	-.02250	-.01	.0105	-4.121	7.431	12	12	0	-	2	1
1000 Hour Measurement																
.52	.572	.81	.0797	9.4999	+.02	+.05909	+.28	.0764	+11.277	2.564	11	10	0	-	4	0
2000 Hour Measurement																
.57	.632	.66	.0282	.12421	-.15	+.04600	+.11	.2328	+7.904	.6249	10	10	0	-	5	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK16M104K

DF x 100
None
LIFE - 4
100 V 125°C

GROUPS:

Unit:

Lower Limit

Percent Dissipation

Less than 2.5 percent

2.5 percent

Parameter:

Nominal Value:

Upper Limit:

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt:

Initial Measurement

.50	.620	.80	.2638	-	-	-	-	-	-	-	14	-	0	-	1	0

168 Hour Measurement

.57	.610	.66	.0245	.06396	-.17	-.01000	+.11	.0937	-1.613	0.399	14	14	0	-	1	0

500 Hour Measurement

.54	.563	.62	.0224	.83333	-.07	-.04642	-.02	.0148	-7.610	11.710	14	14	0	-	1	0

1000 Hour Measurement

.57	.601	.64	.0212	.90000	+.02	+.03785	+.06	.0118	+6.723	11.969	14	14	0	-	1	0

2000 Hour Measurement

.62	.687	.73	.0324	2.33333	+.05	+.08571	+.13	.0889	+14.261	3.607	14	14	0	-	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 4
 Upper Limit: 2.5 percent 100 V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Mc	Nt
Initial Measurement																
1.43	1.693	2.30	.2638	-	-	-	-	-	-	-	13	-	0	-	2	0
168 Hour Measurement																
1.40	1.590	2.36	.2541	.92801	-.66	-.08666	+.12	.2208	-5.119	1.359	12	12	0	-	3	0
500 Hour Measurement																
1.36	1.515	1.65	.0996	.15373	-1.00	-.07583	+.04	.2918	-4.769	0.900	12	12	0	-	3	0
1000 Hour Measurement																
1.40	1.590	1.72	.0992	.99093	+.01	+.06909	+.26	.0668	+4.560	3.431	11	11	0	-	4	0
2000 Hour Measurement																
1.35	1.491	1.60	.0854	.73983	-.13	-.11222	-.06	.1068	-7.058	3.152	9	9	0	-	6	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - CK80BW104K

Parameter:		Percent Dissipation		Unit:		DP x 100		GROUPS:		LIFE						
Nominal Value:		Less than 2.5 percent		Lower Limit		None				- 4						
Upper Limit:		2.5 percent								100 V 125°C						
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	NY	Nu	N1	Mc	Nt
Initial Measurement																
.51	.599	.76	.0766	-	-	-	-	-	-	-	14	-	0	-	1	0
168 Hour Measurement																
.48	.555	.61	.0333	.18941	-.19	-.04428	+.05	.0697	-7.392	2.379	14	14	0	-	1	0
500 Hour Measurement																
.48	.525	.55	.0202	.36936	-.07	-.03230	+.04	.0275	-5.820	4.252	13	13	0	-	2	0
1000 Hour Measurement																
.52	.563	.60	.0274	1.82926	+.02	+.03769	+.08	.0202	+7.179	6.711	13	13	0	-	2	0
2000 Hour Measurement																
.60	.648	.70	.0288	1.10666	+.04	+.08538	+.12	.0781	+15.165	3.942	13	13	0	-	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Unit: DF x 100

LIFE - 4

GROUPS:

None

100 V 125°C

Percent Dissipation

Less than 2.5 percent

2.5 percent

Parameter:

Nominal Value:

Upper Limit:

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	My	Nu	N1	Nc	Nt

Initial Measurement

1.45	1.900	2.68	.4173	-	-	-	-	-	-	-	13	-	2	-	2	0

168 Hour Measurement

1.47	1.531	1.60	.0416	.00993	-1.15	-.3744	-.02	.4322	-19.707	2.599	9	9	0	-	6	0

500 Hour Measurement

1.35	1.400	1.47	.0559	1.80924	-.15	-.13250	-.11	.0170	-8.654	15.561	4	4	0	-	11	0

1000 Hour Measurement

-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	15	0

2000 Hour Measurement

-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	15	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter:	Percent Dissipation	Unit:	DF x 100													
Nominal Value:	Less than 2.5 percent	Lower Limit	None													
Upper Limit:	2.5 percent															
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
168 Hour Measurement																
.47	.590	.92	.0976	-	-	-	-	-	-	-	12	-	0	-	3	0
500 Hour Measurement																
.50	.536	.61	.0315	.00010	-.38	-.05333	+.13	.1321	-9.039	1.399	12	12	0	-	3	0
1000 Hour Measurement																
.50	.526	.60	.0263	.69000	-.05	-.01000	+.01	.0164	-1.866	2.108	12	12	0	-	3	0
2000 Hour Measurement																
.52	.549	.58	.0219	.69565	-.03	-.02181	+.08	.0336	+4.146	2.152	11	11	0	-	4	0
2000 Hour Measurement																
.57	.669	1.12	.1598	3.20833	+.04	.12300	+.55	.4789	+22.404	.8122	10	10	0	-	5	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS -VL02BK103K V-4AM

Parameter:	Percent Dissipation	Unit:	DF x 100											
Nominal Value:	Less than 2.5 percent	Lower Limit	None											
Upper Limit:	2.5 percent													
		GROUPS:	LIFE - 4											
			100 V 125°C											
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1

Initial Measurement

1.33	1.527	2.68	.5508	-	-	-	-	-	-	-	14	-	1	-	1	0

168 Hour Measurement

1.36	1.423	1.89	.1424	.0680	-.79	-.21923	+0.4	.2417	-14.357	3.271	13	13	0	-	1	1

500 Hour Measurement

1.32	1.346	1.41	.0290	.04144	-.08	-.03750	+0.4	.0330	-2.635	3.935	12	12	0	-	2	1

1000 Hour Measurement

1.28	1.324	1.38	.0293	1.02380	-.10	-.02454	+0.3	.0410	-1.823	1.986	11	11	0	-	2	2

2000 Hour Measurement

1.30	1.319	1.38	.0247	.69767	-.08	-.00545	+0.6	.1140	-.4116	.1586	11	11	0	-	4	0

JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter:	Percent Dissipation	Unit:	DF x 100																	
Nominal Value:	Less than 3.0 percent		None	Lower Limit	Meand	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Mc	Nt					
Upper Limit:	3.0 percent																			
1.29	1.688	2.08	.2435	-	-	-	-	-	-	15	-	0	-	0	0					
Initial Measurement																				
1.35	1.548	1.92	.1629	.44740	-.35	+.40	.2306	-4.010	1.058	13	13	0	-	2	0					
168 Hour Measurement																				
1.20	1.333	1.54	.1060	.42367	-.72	-.20750	.1665	-13.404	4.317	12	12	0	-	3	0					
500 Hour Measurement																				
1.20	1.346	1.56	.1094	1.06405	-.05	+.01333	.0336	+1.000	1.373	12	12	0	-	3	0					
1000 Hour Measurement																				
1.17	1.326	1.45	.0829	.57441	-.11	+.08	.1517	-1.486	.4567	12	12	0	-	3	0					
2000 Hour Measurement																				

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B738BX104K

Parameter:	Percent Dissipation	Unit:	DF x 100
Nominal Value:	Less than 2.5 percent	Lower Limit	None
Upper Limit:	2.5 percent	GROUPS:	LIFE - 4 100 V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	Mo	Ny	Nu	Nl	Nc	Nt
.46	.606	.96	.1895	-	-	-	-	-	-	-	6	-	0	-	9	0
Initial Measurement																
168 Hour Measurement																
.62	.646	.72	.0392	.04289	-.34	+.04000	+.19	.1999	+6.601	0.490	6	6	0	-	9	0
500 Hour Measurement																
.61	.663	.77	.0656	2.79220	-.03	+.01666	+.15	.0674	+2.579	0.605	6	6	0	-	9	0
1000 Hour Measurement																
.63	.706	.75	.0427	.42325	-.07	+.04333	+.14	.0766	+6.535	1.386	6	6	0	-	9	0
2000 Hour Measurement																
.57	.620	.68	.0364	.72527	-.15	-.08666	.00	.1806	-12.275	1.175	6	6	0	-	9	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Parameter:	Percent Dissipation	Unit:	DF x 100	GROUPS:												
Nominal Value:	Less than 2.0 percent	Lower Limit	None	LIFE - 5												
Upper Limit:	2.0 percent			200 V 85°C												
Min	Mean	Max	Std	F	MinD	Meand	MaxD	Stdd	PC	t	No	Ny	Mu	Nl	Nc	Nt
Initial Measurement																
.52	.658	1.03	.1330	-	-	-	-	-	-	-	15	-	0	-	0	0
168 Hour Measurement																
.61	.682	.86	.0735	.30525	-.17	-.02800	+.13	.0829	-3.944	1.308	15	15	0	-	0	0
500 Hour Measurement																
.56	.715	.86	.0697	.90000	-.10	+.03266	+.14	.0593	+4.789	2.132	15	15	0	-	0	0
1000 Hour Measurement																
.80	.899	1.10	.0819	1.37860	+.05	+.18400	+.32	.0704	+25.734	10.119	15	15	0	-	0	0
2000 Hour Measurement																
.82	.926	1.12	.0879	1.15223	-.04	+.02733	+.07	.0964	+3.040	1.098	15	15	0	--	0	0

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:	Percent Dissipation	Unit:	DF x 100	GROUPS:												
Nominal Value:	Less than 2.0 percent	Lower Limit	None	LIFE - 5												
Upper Limit:	2.0 percent			200V 85°C												
Min	Mean	Max	Std	F	Mind	Meand	MaxD	Stdd	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
168 Hour Measurement																
.46	.551	.63	.0612	-	-	-	-	-	-	-	12	-	0	-	3	0
500 Hour Measurement																
.43	.470	.50	.0170	.07754	-.19	-.08166	+ .02	.0713	-14.820	3.969	12	12	0	-	2	1
1000 Hour Measurement																
.46	.476	.50	.0126	.55172	-.01	+ .00666	+ .03	.0161	+1.417	1.430	12	12	0.	-	2	1
2000 Hour Measurement																
.42	.544	.95	.2041	246.462	-.05	+ .07111	+ .47	.2026	+14.939	1.053	9	9	0	-	3	3
Initial Measurement																
168 Hour Measurement																
.48	.510	.53	.0207	.01008	-.42	+ .00375	+ .08	.5421	+ .6893	.0196	8	8	0	-	7	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK16M104K

DF x 100
None
LIFE - 5
200V 85°C

GROUPS:

Unit:

Lower Limit

Percent Dissipation
Less than 2.5 percent

2.5 percent

Parameter:

Nominal Value:

Upper Limit:

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt

Initial Measurement

.50	.658	1.16	.1944	-	-	-	-	-	-	-	14	-	0	-	1	0

168 Hour Measurement

.48	.512	.54	.0187	.00926	-.68	-.14642	+.02	.1988	-22.252	2.755	14	14	0	-	1	0

500 Hour Measurement

.48	.527	.56	.0205	1.20000	-.02	+.01500	+.04	.0158	+2.930	3.550	14	14	0	-	1	0

1000 Hour Measurement

.46	.542	.60	.0348	2.88095	-.03	+.01500	+.06	.0285	+2.846	1.972	14	14	0	-	1	0

2000 Hour Measurement

.55	.576	.60	.0214	.37190	-.01	+.02769	+.08	.0872	+5.109	1.145	13	13	0	-	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter:	Percent Dissipation	Unit:	DF x 100
Nominal Value:	Less than 2.5 percent	Lower Limit	None
Upper Limit:	2.5 Percent	GROUPS:	LIFE - 5
			200V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
1.47	1.938	2.58	.3986	-	-	-	-	-	-	-	15	-	0	-	0	0
168 Hour Measurement																
1.41	1.547	2.00	.1822	.02881	-1.07	-.45538	+18	.4389	-23.497	3.741	13	13	0	-	2	0
500 Hour Measurement																
1.42	1.630	2.08	.2275	1.56027	+0.01	+0.08750	+2.6	.0729	+5.656	4.156	12	12	0	-	3	0
1000 Hour Measurement																
1.38	1.513	1.72	.1221	.28819	-.36	-.07888	+0.05	.1225	-4.839	1.931	9	9	0	-	6	0
2000 Hour Measurement																
1.37	1.465	1.55	.0548	.20107	-.17	-.02500	+0.03	.2138	-1.652	.3307	8	8	0	-	7	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 5
 Upper Limit: 2.5 percent 200V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.49	.604	.68	.0652	-	-	-	-	-	-	-	15	-	0	-	0	0
168 Hour Measurement																
.47	.536	.62	.0381	.05094	-.15	-.07333	+.03	.0531	-12.141	5.348	15	15	0	-	0	0
500 Hour Measurement																
.48	.542	.62	.0416	1.19310	-.05	+.00666	+.05	.0241	+1.243	1.071	15	15	0	-	0	0
1000 Hour Measurement																
.46	.550	.66	.0557	1.79190	-.04	+.00800	+.17	.0522	+1.476	0.592	15	15	0	-	0	0
2000 Hour Measurement																
.53	.604	.68	.0463	.69032	-.01	+.05400	+.18	.0423	+9.818	4.943	15	15	0	-	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SCIONICS CAPACITORS - SCM30D104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 5
 Upper Limit: 2.5 percent 200V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
1.44	1.875	2.50	.3827	-	-	-	-	-	-	-	14	-	0	-	1	0
Initial Measurement																
168 Hour Measurement																
1.32	1.405	1.53	.0858	.05032	-.88	-.37666	+0.06	.3265	-20.089	3.460	9	9	0	-	.6	0
500 Hour Measurement																
1.32	1.398	1.55	.0811	.89280	-.18	-.02142	+0.02	.0717	-1.525	0.790	7	7	0	-	7	1
1000 Hour Measurement																
1.38	1.498	1.61	.0853	1.10486	+0.06	+0.0880	+0.18	.0536	+6.295	3.673	5	4	0	-	10	0
2000 Hour Measurement																
1.45	1.475	1.50	.0112	.17193	-.11	-.02000	+0.07	.4025	-1.335	.0703	2	2	0	-	13	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VLO2BK103K 0-LAM

Parameter:	Percent Dissipation	Unit:	DF x 100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														</

Initial Measurement

1.32	1.828	2.74	.5075	-	-	-	-	-	-	-	13	-	2	-	2	0

168 Hour Measurement

1.32	1.382	1.48	.0458	.00815	-1.37	-.44615	+0.04	.4930	-24.406	3.263	13	13	0	-	2	0

500 Hour Measurement

1.27	1.389	2.11	.2192	22.876	-.10	+0.00692	+0.67	.2009	+0.501	0.122	13	13	0	-	2	0

1000 Hour Measurement

1.18	1.288	1.42	.0671	.09367	-.11	-.04083	+0.10	.0594	-2.940	2.381	12	12	0	-	3	0

2000 Hour Measurement

1.26	1.330	1.35	.0309	.21111	-.08	+0.04250	+0.12	.2114	+3.300	.6964	12	12	0	-	3	0

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30BX104K

Parameter:	Percent Dissipation	Unit:	DF x 100
Nominal Value:	Less than 3.0 percent	Lower Limit	None
Upper Limit:	3.0 percent	GROUPS:	LIFE - 5
			200V 85°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	NY	Nu	N1	Mc	Nt
1.41	1.730	2.10	.1914	-	-	-	-	-	-	-	15	-	0	-	0	0
Initial Measurement																
1.17	1.462	1.93	.220	1.32150	-.57	-.26800	+.02	.1747	-15.491	5.940	15	15	0	-	0	0
168 Hour Measurement																
1.12	1.350	1.69	.1936	.77426	-.49	-.10000	+.10	.1366	-6.840	2.738	14	14	0	-	0	1
500 Hour Measurement																
1.05	1.270	1.50	.1713	.7823	-.17	-.05384	+.13	.0961	-3.988	2.019	13	13	0	-	1	1
1000 Hour Measurement																
1.14	1.334	1.57	.1561	.83054	-.18	+.06461	+.12	.2691	+5.087	.8657	13	13	0	-	2	0
2000 Hour Measurement																

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B758BX104K

Parameter:	Percent Dissipation	Unit:	DF x 100	GROUPS:	LIFE - 5											
Nominal Value:	Less than 2.5 percent	Lower Limit	None		200V 85°C											
Upper Limit:	2.5 percent															
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Mc	Nt
Initial Measurement																
168 Hour Measurement																
.46	.646	1.30	.3257	-	-	-	-	-	-	-	6	-	0	-	9	0
500 Hour Measurement																
.52	.705	1.18	.2466	.57295	-.12	+.05833	+.29	.1430	+9.029	0.999	6	6	0	-	9	0
1000 Hour Measurement																
.57	.720	.98	.1863	.57114	-.25	+.01500	+.15	.1647	+2.128	0.221	6	6	0	-	9	0
2000 Hour Measurement																
.65	.735	.92	.0942	.25547	-.21	+.01500	+.15	.1387	+2.083	0.265	6	6	0	-	9	0
2000 Hour Measurement																
.70	.776	.92	.0753	.63810	.00	+.04166	+.08	.0900	+5.668	1.134	6	6	0	-	9	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

AEROVOX CAPACITORS - MC605104RK

Unit: DF x 100

Parameter: Percent Dissipation

Nominal Value: Less than 2.0 percent

Lower Limit

None

GROUPS: LIFE - 6
200V 125°C

Upper Limit: 2.0 percent

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt

Initial Measurement

.48	.700	.92	.1293	-	-	-	-	-	-	-	15	-	0	-	0	0

168 Hour Measurement

.64	.800	.94	.0981	.57630	-.09	+.08714	+.38	.1298	+12.449	2.512	14	14	0	-	1	0

500 Hour Measurement

.55	.739	.94	.1196	1.48598	-.17	-.06071	+.02	.0562	-7.589	4.041	14	14	0	-	1	0

1000 Hour Measurement

.62	.873	1.27	.2331	3.79664	-.01	+.13428	+.43	.1469	+18.171	3.419	14	14	0	-	1	0

2000 Hour Measurement

.73	.913	1.12	.1268	.29596	-.23	+.04000	+.24	.4853	+4.582	0.308	14	14	0	-	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter:	Percent Dissipation	Unit:	DF	x 100	GROUPS:											
Nominal Value:	. Less than 2.0 percent	Lower Limit	None													
Upper Limit:	2.0 percent															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
.47	.542	.62	.0529	-	-	-	-	-	-	-	13	-	0	-	2	0
168 Hour Measurement																
.50	.535	.57	.0192	.13214	-.09	-.0050	+.07	.0607	-0.923	0.285	12	12	0	-	3	0
500 Hour Measurement																
.46	.490	.52	.0202	1.10810	-.08	-.04583	-.01	.0221	-8.566	7.172	12	12	0	-	3	0
1000 Hour Measurement																
.41	.440	.46	.0148	.53658	-.07	-.04727	-.03	.0148	-9.647	10.570	11	11	0	-	4	0
2000 Hour Measurement																
.51	.530	.56	.0170	1.27272	+.06	+.09090	+.11	.0678	+20.659	4.447	11	11	0	-	4	0

LIFE - 6
200 V 125°C

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CK16M104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 6
 Upper Limit: 2.5 percent 200V 125°C

Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt

Initial Measurement

.49	.643	.95	.1468	-	-	-	-	-	-	-	14	-	0	-	1	0
168 Hour Measurement																
.55	.622	.68	.0445	.09183	-.39	-.02769	+.16	.1737	-4.306	0.574	13	13	0	-	2	0
500 Hour Measurement																
.51	.579	.65	.0495	1.23737	-.07	-.04307	-.02	.0148	-6.924	10.470	13	13	0	-	2	0
1000 Hour Measurement																
.43	.593	.71	.1066	4.64081	-.08	+.01384	+.11	.0636	+2.390	0.785	13	13	0	-	2	0
2000 Hour Measurement																
.55	.602	.66	.0409	.14599	-.07	+.00923	+.12	.2412	+1.556	.1380	13	13	0	-	2	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

GULTON CAPACITORS - CN05M105K

Parameter: Percent Dissipation Unit: DF x 100 GROUPS: LIFE - 6
 Nominal Value: .Less than 2.5 percent Lower Limit None 200V 125°C
 Upper Limit: 2.5 percent

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
1.38	1.736	2.63	.4013	-	-	-	-	-	-	-	13	-	1	-	2	0
Initial Measurement																
168 Hour Measurement																
1.22	1.448	1.83	.1490	.13795	-.98	-.35090	.00	.3327	-20.213	3.498	11	11	0	-	4	0
500 Hour Measurement																
1.19	1.408	1.80	.1593	1.14227	-.07	-.03800	-.02	.0173	-2.624	6.938	10	10	0	-	5	0
1000 Hour Measurement																
1.00	1.216	1.46	.1372	.74182	-.34	-.20125	-.13	.0642	-14.293	8.868	8	8	0	-	7	0
2000 Hour Measurement																
1.05	1.241	1.40	.1123	.68225	+.03	+.06000	+.09	.0728	+4.934	2.181	7	7	0	-	8	0

UPL TEST PROCEDURE NUMBER 152.20-02

KING ELECTRIC CAPACITORS - CK80BW104K

Parameter:	Percent Dissipation			Unit:	DF x 100			GROUPS:			LIFE - 6					
Nominal Value:	Less than 2.5 percent			Lower Limit	None						200V 125°C					
Upper Limit:	2.5 percent															
Min	Mean	Max	Std	F	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
168 Hour Measurement																
.48	.605	.86	.1005	-	-	-	-	-	-	-	15	-	0	-	0	0
500 Hour Measurement																
.48	.568	.79	.0662	.43409	-.14	-.03733	+.09	.0726	-6.170	1.991	15	15	0	-	0	0
1000 Hour Measurement																
.46	.523	.57	.0316	.22831	-.05	-.02769	-.01	.0168	-4.875	5.966	13	13	0	-	1	1
2000 Hour Measurement																
.42	.483	.62	.0500	2.50000	-.06	-.04000	+.05	.0283	-7.648	5.099	13	13	0	-	1	1
5000 Hour Measurement																
.50	.560	.60	.0264	.27600	-.04	+.07500	+.12	.1338	+15.528	2.097	14	14	0	-	1	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

SGIONICS CAPACITORS - SCM30B104K

Parameter: Percent Dissipation Unit: DF x 100
 Nominal Value: Less than 2.5 percent Lower Limit None GROUPS: LIFE - 6
 Upper Limit: 2.5 percent 200V 125°C

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
1.47	1.860	2.58	.3437	-	-	-	-	-	-	-	13	-	1	-	2	0
Initial Measurement																
168 Hour Measurement																
1.63	1.784	1.90	.0811	.05560	-.75	-.07615	+.25	.2931	-4.094	0.936	13	13	0	-	2	0
500 Hour Measurement																
1.55	1.677	1.86	.1165	2.06697	-.23	-.10692	-.01	.0616	-5.993	6.254	13	13	0	-	2	0
1000 Hour Measurement																
1.75	1.882	2.88	.2782	5.69808	+0.01	+2.0461	+1.25	.3276	+12.201	2.252	13	13	1	-	2	0
2000 Hour Measurement																
1.70	1.792	2.27	.1479	.28276	-.53	-.09000	.00	.4548	-4.782	.7135	13	13	0	-	2	0

JPL TEST PROCEDURE NUMBER 152.20-02

EMC CAPACITORS - EK200R104K

Parameter:	Unit:	DF x 100
Percent Dissipation		
Nominal Value:	Lower Limit	None
Upper Limit:	Less than 2.5 percent 2.5 percent	LIFE - 6 200V 125°C

Min	Mean	Max	Std	F	Mind	Meand	MaxD	StdD -	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
.47	.555	.64	.0685	-	-	-	-	-	-	-	12	-	0	-	3	0
168 Hour Measurement																
.53	.552	.57	.0142	.04264	-.08	-.00166	+.09	.0637	-.0.299	0.089	12	12	0	-	3	0
500 Hour Measurement																
.52	.530	.56	.0105	.55000	-.05	-.02166	+.01	.0184	-3.924	4.069	12	12	0	-	3	0
1000 Hour Measurement																
.57	.605	.67	.0283	7.27272	+.03	+.07400	+.11	.0221	+13.962	10.571	10	10	0	-	3	2
2000 Hour Measurement																
.54	.558	.60	.0169	.35000	-.13	-.04700	.00	.1122	-7.769	1.325	10	10	0	-	5	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VL-2BK103K V-LAM

DF x 100
None
LIFE - 6
200V 125°C

GROUPS:

Unit:

Lower Limit

Percent Dissipation

Less than 2.5 percent

2.5 percent

Parameter:

Nominal Value:

Upper Limit:

Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt

Initial Measurement

1.31	1.617	2.38	.3875	-	-	-	-	-	-	-	11	-	0	-	4	0

168 Hour Measurement

1.37	1.444	1.62	.0722	.03477	-1.00	-.17272	+.09	.3816	-10.682	1.501	11	11	0	-	4	0

500 Hour Measurement

1.33	1.376	1.57	.0686	.90038	-.12	-.06818	-.02	.0375	-4.722	6.022	11	11	0	-	4	0

1000 Hour Measurement

1.30	1.398	1.60	.0884	1.66170	-.04	+.02100	+.13	.0530	+1.526	1.253	10	10	0	-	5	0

2000 Hour Measurement

1.32	1.386	1.55	.0682	.59411	-.08	-.01200	+.05	.1546	-.8584	.2455	10	10	0	-	5	0

- COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

VITRAMON CAPACITORS - VK30BX104K

Parameter: Percent Dissipation Unit: DF = 100
 Nominal Value: Less than 3.0 percent Lower Limit None GROUPS: LIFE - 6
 Upper Limit: 3.0 percent 200V 125°C

Min	Mean	Max	Std	r	MinD	MeanD	MaxD	StdD	PC	t	No	Ny	Nu	Nl	Nc	Nt
Initial Measurement																
1.45	1.656	2.20	.1914	-	-	-	-	-	-	-	15	-	0	-	0	0
168 Hour Measurement																
1.36	1.634	2.74	.3618	3.57400	-.40	-.02133	+1.17	.4085	-1.288	0.200	15	15	0	-	0	0
500 Hour Measurement																
1.31	1.470	1.84	.1585	.19200	-1.37	~~-.16400~~	.00	1.084	-10.037	1.854	15	15	0	-	0	0
1000 Hour Measurement																
1.37	1.524	1.71	.1493	.88698	-.12	+0.05400	+1.17	.0602	+3.673	3.476	15	15	0	-	0	0
2000 Hour Measurement																
1.34	1.458	1.72	.1201	.64782	-.32	-.06666	-.01	.2468	-4.374	1.046	15	15	0	-	0	0

COMPUTED STATISTIC SHEET

JPL TEST PROCEDURE NUMBER 152.20-02

WESTCAP CAPACITORS - B758EX104K

Parameter:	Percent Dissipation		Unit:	DF x 100		Lower Limit		None		GROUPS:		LIFE - 6				
Nominal Value:	Less than 2.5 percent											200V 125°C				
Upper Limit:	2.5 percent															
Min	Mean	Max	Std	F	MinD	Meand	MaxD	StdD	PC	t	No	Ny	Nu	N1	Nc	Nt
Initial Measurement																
.44	.795	1.76	.4659	-	-	-	-	-	-	-	7	-	0	-	8	0
168 Hour Measurement																
.53	.721	1.25	.2669	.16072	-.51	-.08000	+.15	.2607	-10.063	0.752	6	6	0	-	9	0
500 Hour Measurement																
.55	.600	.67	.0518	.03761	-.59	-.12166	+.02	.2321	-16.874	1.285	6	6	0	-	9	0
1000 Hour Measurement																
.68	.740	.81	.0506	.95522	+.02	+.14000	+.21	.0666	+23.333	5.146	6	6	0	-	9	0
2000 Hour Measurement																
.58	.618	.67	.0319	.39453	-.16	-.12166	-.05	.1285	-16.441	2.319	6	6	0	-	9	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
AEROVOX CAPACITORS - NC605104RK

Parameter: Insulation Leakage

Group: Life - 1
50V 85°C

Min. (K megohms)	No.	Nc
	Initial Measurement	
0.357	67	8
	168 Hour Measurement	
25.641	67	8
	500 Hour Measurement	
27.778	67	8
	1000 Hour Measurement	
23.810	67	8
	2000 Hour Measurement	
21.739	67	8

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Insulation Leakage

Group: Life - 1
50V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
1.904	70	5
	168 Hour Measurement	
111.111	68	7
	500 Hour Measurement	
37.037	67	7
	1000 Hour Measurement	
51.282	64	9
	2000 Hour Measurement	
95.238	57	15

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CK16M104K

Parameter: Insulation Leakage

Group: Life - 1
50V 85°C

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
0.192	68	7
	168 Hour Measurement	
62.500	63	12
	500 Hour Measurement	
45.455	63	12
	1000 Hour Measurement	
27.778	63	12
	2000 Hour Measurement	
33.333	63	12

Parameter: Insulation Leakage **Group:** Life - 1
50V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.011	67	6
	168 Hour Measurement	
0.500	61	14
	500 Hour Measurement	
5.263	61	14
	1000 Hour Measurement	
2.381	60	14
	2000 Hour Measurement	
2.564	58	17

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152-20-02
KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Insulation Leakage Group: Life - 1
50V 85°C

Min (K megohms)	No	Nc
	Initial Measurement	
0.556	73	2
	168 Hour Measurement	
28.169	72	2
	500 Hour Measurement	
26.316	73	2
	1000 Hour Measurement	
23.810	73	2
	2000 Hour Measurement	
11.905	72	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Insulation Leakage Group: Life-1
50V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.045	46	22
	168 Hour Measurement	
15.628	37	38
	500 Hour Measurement	
23.810	34	41
	1000 Hour Measurement	
10.638	34	41
	2000 Hour Measurement	
7.813	33	42

Parameter: Insulation Leakage Group: Life-1
50V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.455	61	14
	168 Hour Measurement	
10.526	61	14
	500 Hour Measurement	
1.818	61	14
	1000 Hour Measurement	
1.538	55	15
	2000 Hour Measurement	
5.000	55	20

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter: Insulation Leakage Group: Life-1
50V85°C

Min (K megohms)	N ₀	N _c
	Initial Measurement	
1.250	69	6
	168 Hour Measurement	
83.33	69	6
	500 Hour Measurement	
68.966	69	6
	1000 Hour Measurement	
86.957	57	6
	2000 Hour Measurement	
12.195	56	19

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter: Insulation Leakage

Group: Life-1
50V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.179	74	1
	168 Hour Measurement	
0.071	72	3
	500 Hour Measurement	
3.125	72	3
	1000 Hour Measurement	
1.563	70	5
	2000 Hour Measurement	
2.083	69	6

Parameter: Insulation Leakage Group: Life-1
50V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.014	63	12
	168 Hour Measurement	
0.227	60	15
	500 Hour Measurement	
0.153	60	15
	1000 Hour Measurement	
0.153	60	15
	2000 Hour Measurement	
1.071	59	16

Parameter:	Insulation Leakage	Group:	Life-2 50V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.455	14	1
	168 Hour Measurement	
35.714	14	1
	500 Hour Measurement	
27.778	14	1
	1000 Hour Measurement	
20.000	14	1
	2000 Hour Measurement	
22.727	14	1

Parameter: Insulation Leakage **Group:** Life-2
50V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.182	15	0
	168 Hour Measurement	
0.044	15	0
	500 Hour Measurement	
0.056	15	0
	1000 Hour Measurement	
200.000	13	0
	2000 Hour Measurement	
52.632	12	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
GULTON CAPACITORS - CK16M104K

Parameter: Insulation Leakage

Group: Life-2
 50V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.847	13	0
	168 Hour Measurement	
56.818	12	2
	500 Hour Measurement	
40.000	12	3
	1000 Hour Measurement	
32.895	12	3
	2000 Hour Measurement	
35.714	11	4

Parameter: Insulation Leakage **Group:** Life-2
50V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.333	14	1
	168 Hour Measurement	
0.179	12	3
	500 Hour Measurement	
0.357	11	4
	1000 Hour Measurement	
0.213	10	4
	2000 Hour Measurement	
1.250	10	5

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152-20.02
KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Insulation Leakage

Group: Life-2
 50V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
3.333	15	0
	168 Hour Measurement	
2.000	15	0
	500 Hour Measurement	
2.851	15	0
	1000 Hour Measurement	
3.846	15	0
	2000 Hour Measurement	
2.500	15	0

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
SCIONICS CAPACITORS - SCM30D104K

Parameter: Insulation Leakage

Group: Life-2
 50V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.172	13	2
	168 Hour Measurement	
0.071	13	2
	500 Hour Measurement	
0.385	10	5
	1000 Hour Measurement	
2.174	8	7
	2000 Hour Measurement	
18.519	2	13

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
EMC CAPACITORS - EK200R104K

Parameter: Insulation Leakage Group: Life-2
50V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
6.452	12	3
	168 Hour Measurement	
3.226	12	3
	500 Hour Measurement	
0.143	12	3
	1000 Hour Measurement	
0.049	11	3
	2000 Hour Measurement	
6.667	10	5

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter: Insulation Leakage Group: Life-2
50V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
17.857	14	1
	168 Hour Measurement	
333.333	13	1
	500 Hour Measurement	
370.370	13	2
	1000 Hour Measurement	
270.270	12	2
	2000 Hour Measurement	
185.185	12	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
VITRAMON CAPACITORS - VK30BX104K

Parameter: **Insulation Leakage**

Group: **Life - 2**
50V 125°C

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
10. 417	14	1
	168 Hour Measurement	
1. 563	14	1
	500 Hour Measurement	
0. 385	14	1
	1000 Hour Measurement	
0. 039	14	1
	2000 Hour Measurement	
8. 929	13	2

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
WESTCAP CAPACITORS - B758BX104K

Parameter: Insulation Leakage

Group: Life-2
50V 125°C

Min. (K megohms)	N ₀	N _c
	Initial Measurement	
0.042	10	5
	168 Hour Measurement	
6.250	10	5
	500 Hour Measurement	
4.167	10	5
	1000 Hour Measurement	
5.769	10	5
	2000 Hour Measurement	
6.250	10	5

Parameter:	Insulation Leakage	Group:	Life-3
			100V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
4.545	14	1
	168 Hour Measurement	
43.478	14	1
	500 Hour Measurement	
33.333	14	1
	1000 Hour Measurement	
45.455	14	1
	2000 Hour Measurement	
29.412	14	1

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Insulation Leakage

Group: Life-3
100V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0. 267	13	2
	168 Hour Measurement	
22. 727	13	2
	500 Hour Measurement	
0. 200	13	2
	1000 Hour Measurement	
8. 333	12	2
	2000 Hour Measurement	
9. 091	11	4

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
GULTON CAPACITORS - CK16M104K

Parameter: Insulation Leakage

Group: Life-3
100V 85°C

<u>Min. K(megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
0. 208	13	2
	168 Hour Measurement	
89. 286	13	2
	500 Hour Measurement	
58. 824	13	2
	1000 Hour Measurement	
67. 568	13	2
	2000 Hour Measurement	
5. 263	13	2

Parameter:	Insulation Leakage	Group:	Life - 3 100V 85°C

Min. K(megohms)	No	Nc
	Initial Measurement	
0.026	12	3
	168 Hour Measurement	
0.400	10	5
	500 Hour Measurement	
0.625	10	5
	1000 Hour Measurement	
2.381	9	6
	2000 Hour Measurement	
2.500	9	6

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Insulation Leakage

Group: Life-3
 100V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
2.632	15	0
	168 Hour Measurement	
47.619	15	0
	500 Hour Measurement	
86.957	15	0
	1000 Hour Measurement	
62.500	15	0
	2000 Hour Measurement	
33.333	15	0

Parameter:	Insulation Leakage	Group:	Life-3 100V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.056	13	2
	168 Hour Measurement	
0.031	11	4
	500 Hour Measurement	
0.100	11	4
	1000 Hour Measurement	
0.139	9	6
	2000 Hour Measurement	
0.357	6	9

Parameter: Insulation Leakage Group: Life-3
100V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.435	13	2
	168 Hour Measurement	
125.000	13	2
	500 Hour Measurement	
6.061	13	2
	1000 Hour Measurement	
2.353	12	2
	2000 Hour Measurement	
4.167	12	3

Parameter:	Insulation Leakage	Group:	Life-3
			100V 85°C

Min (K megohms)	No	Nc
	Initial Measurement	
2.000	12	3
	168 Hour Measurement	
500.000	12	3
	500 Hour Measurement	
166.667	12	3
	1000 Hour Measurement	
666.667	11	3
	2000 Hour Measurement	
19.231	11	4

Parameter: Insulation Leakage Group: Life-3
100V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.042	15	0
	168 Hour Measurement	
13.158	13	2
	500 Hour Measurement	
2.632	13	2
	1000 Hour Measurement	
8.621	13	2
	2000 Hour Measurement	
8.197	12	3

Parameter: Insulation Leakage Group: Life-3
100V 85°C

Min. (K megohms)	No.	Nc
	Initial Measurement	
15.306	10	5
	168 Hour Measurement	
0.020	9	6
	500 Hour Measurement	
1.531	9	6
	1000 Hour Measurement	
0.625	9	6
	2000 Hour Measurement	
2.083	9	6

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
AEROVOX CAPACITORS - NC605104RK

Parameter: Insulation Leakage

Group: Life-4
100V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
62.500	11	4
	168 Hour Measurement	
55.556	11	4
	500 Hour Measurement	
45.455	11	4
	1000 Hour Measurement	
66.667	11	4
	2000 Hour Measurement	
20.000	11	4

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Insulation Leakage Group: Life-4
100V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
10.526	13	2
	168 Hour Measurement	
125.000	12	2
	500 Hour Measurement	
55.556	12	3
	1000 Hour Measurement	
270.270	12	3
	2000 Hour Measurement	
200.000	10	5

COMPUTED STAISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
GULTON CAPACITORS - CK16M104K

Parameter: Insulation Leakage Group: Life-4
100V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
1.724	14	1
	168 Hour Measurement	
69.444	14	1
	500 Hour Measurement	
86.207	14	1
	1000 Hour Measurement	
17.857	14	1
	2000 Hour Measurement	
13.158	14	1

Parameter:	Insulation Leakage	Group:	Life-4
			100V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
1.111	12	3
	168 Hour Measurement	
0.067	11	4
	500 Hour Measurement	
0.017	11	4
	1000 Hour Measurement	
2.857	10	5
	2000 Hour Measurement	
3.333	10	5

Parameter: Insulation Leakage **Group:** Life-4
100V 125°C

Min. (Kmegohms)	No	Nc
	Initial Measurement	
1.031	15	0
	168 Hour Measurement	
13.514	15	0
	500 Hour Measurmenet	
10.101	14	1
	1000 Hour Measurement	
8.333	14	1
	2000 Hour Measurement	
4.167	13	2

Parameter:	Insulation Leakage	Group:	Life-4
			100V 125°C

Min. (megohms)	No	Nc
	Initial Measurement	
0.083	11	4
	168 Hour Measurement	
4.545	8	6
	500 Hour Measurement	
21.739	2	13
	1000 Hour Measurement	
	0	15
	2000 Hour Measurement	
	0	15

Parameter: Insulation Leakage **Group:** Life-4
100V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
1.818	11	4
	168 Hour Measurement	
166.667	11	4
	500 Hour Measurement	
133.333	11	4
	1000 Hour Measurement	
476.190	10	5
	2000 Hour Measurement	
142.857	10	5

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
VITRAMON CAPACITORS - VL02BK103K V-LAM

Parameter: Insulation Leakage

Group:

Life-4

100V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
153.846	14	1
	168 Hour Measurement	
454.545	13	1
	500 Hour Measurement	
277.778	13	1
	1000 Hour Measurement	
156.250	12	1
	2000 Hour Measurement	
17.857	12	3

[illegible]

Min. (K megohms)	No	Nc
	Initial Measurement	
0.333	15	0
	168 Hour Measurement	
5.882	13	2
	500 Hour Measurement	
2.273	12	2
	1000 Hour Measurement	
14.286	12	3
	2000 Hour Measurement	
9.804	12	3

Parameter: Insulation Leakage Group: Life-4
100V 125°C

Min. (Megohms)	No	Nc
	Initial Measurement	
0.031	13	1
	168 Hour Measurement	
9.375	13	2
	500 Hour Measurement	
8.721	13	2
	1000 Hour Measurement	
8.929	13	2
	2000 Hour Measurement	
8.333	13	2

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
AEROVOX CAPACITORS - NC605104RK

Parameter: Insulation Leakage Group: Life-5
200V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
14. 286	14	1
	168 Hour Measurement	
172. 414	14	1
	500 Hour Measurement	
185. 185	14	1
	1000 Hour Measurement	
89. 286	14	1
	2000 Hour Measurement	
73. 529	14	1

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
CHEM-ELECTRO RESEARCH CAPACITORS - CK2R104K

Parameter: Insulation Leakage Group: Life-5
200V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.444	13	2
	168 Hour Measurement	
1.818	13	2
	500 Hour Measurement	
1.818	13	2
	1000 Hour Measurement	
243.902	10	2
	2000 Hour Measurement	
370.370	9	6

Parameter: Insulation Leakage **Group:** Life-5
200V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.500	12	3
	168 Hour Measurement	
1.429	11	4
	500 Hour Measurement	
0.806	11	4
	1000 Hour Measurement	
0.056	11	4
	2000 Hour Measurement	
54.348	10	5

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152.20-02
GULTON CAPACITORS - CN05M105K

Parameter: Insulation Leakage Group: Life-5
200V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.042	14	1
	168 Hour Measurement	
0.909	11	3
	500 Hour Measurement	
0.033	10	4
	1000 Hour Measurement	
0.015	9	6
	2000 Hour Measurement	
0.233	8	7

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
KING ELECTRIC CAPACITORS - CK80BW104K

Parameter: Insulation Leakage Group: Life-5
200V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.244	15	0
	168 Hour Measurement	
0.250	15	0
	500 Hour Measurement	
0.556	15	0
	1000 Hour Measurement	
0.192	15	0
	2000 Hour Measurement	
1.786	15	0

Parameter: Insulation Leakage **Group:** Life-5
200V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.114	15	0
	168 Hour Measurement	
35.714	9	5
	500 Hour Measurement	
18.519	8	7
	1000 Hour Measurement	
18.519	5	10
	2000 Hour Measurement	
11.905	2	13

Parameter:	Insulation Leakage	Group:	Life-5
			500V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.211	15	0
	168 Hour Measurement	
181.818	14	1
	500 Hour Measurement	
111.111	14	1
	1000 Hour Measurement	
152.846	12	1
	2000 Hour Measurement	
142.857	12	3

Parameter: Insulation Leakage Group: Life-5
200 V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
52.632	14	1
	168 Hour Measurement	
333.333	14	1
	500 Hour Measurement	
400.000	14	1
	1000 Hour Measurement	
294.118	14	1
	2000 Hour Measurement	
185.185	14	1

Parameter: Insulation Leakage **Group:** Life-5
200V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
1.250	15	0
	168 Hour Measurement	
2.083	14	0
	500 Hour Measurement	
2.381	14	1
	1000 Hour Measurement	
23.809	13	2
	2000 Hour Measurement	
23.810	13	2

Parameter:	Insulation Leakage	Group:	Life-6 200V 85°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.030	15	0
	168 Hour Measurement	
3.261	15	0
	500 Hour Measurement	
2.778	14	1
	1000 Hour Measurement	
1.042	14	1
	2000 Hour Measurement	
1.074	12	3

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
AEROVOX CAPACITORS - NC605104RK

Parameter: **Insulation Leakage** **Group:** **Life-6**
200V 125°C

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
0.714	14	1
	168 Hour Measurement	
50.000	14	1
	500 Hour Measurement	
41.667	14	1
	1000 Hour Measurement	
41.667	14	1
	2000 Hour Measurement	
20.833	14	1

Parameter:	Insulation Leakage	Group:	Life-6
			200V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
20.833	13	2
	168 Hour Measurement	
100.000	12	3
	500 Hour Measurement	
153.846	12	3
	1000 Hour Measurement	
263.158	12	3
	2000 Hour Measurement	
250.000	12	3

Parameter: Insulation Leakage **Group:** Life-6
200V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.610	12	3
	168 Hour Measurement	
66.667	12	3
	500 Hour Measurement	
54.348	12	3
	1000 Hour Measurement	
41.667	12	3
	2000 Hour Measurement	
50.000	12	3

Parameter:	Insulation Leakage	Group:	Life-6 200V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
2.714	10	4
	168 Hour Measurement	
0.042	8	5
	500 Hour Measurement	
0.091	8	7
	1000 Hour Measurement	
1.316	5	10
	2000 Hour Measurement	
0.714	5	10

Parameter: Insulation Leakage **Group:** Life-6
200V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
1.754	15	0
	168 Hour Measurement	
100.000	14	0
	500 Hour Measurement	
95.238	14	1
	1000 Hour Measurement	
35.714	13	2
	2000 Hour Measurement	
10.417	13	2

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
SCIONICS CAPA CITORS - SCM30D104K

Parameter: Insulation Leakage

Group: Life-5
 200V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0. 125	13	1
	168 Hour Measurement	
20. 833	13	1
	500 Hour Measurement	
12. 281	13	2
	1000 Hour Measurement	
11, 905	13	2
	2000 Hour Measurement	
10. 000	13	2

COMPUTED STATISTIC SHEET
JPL TEST PROCEDURE NUMBER 152. 20-02
EMC CAPACITORS - EK200R104K

Parameter: **Insulation Leakage**

Group: **Life-6**
200V 125°C

<u>Min. (K megohms)</u>	<u>No</u>	<u>Nc</u>
	Initial Measurement	
11. 111	12	3
	168 Hour Measurement	
142. 857	12	3
	500 Hour Measurement	
114. 286	12	3
	1000 Hour Measurement	
270. 270	10	3
	2000 Hour Measurement	
200. 000	10	5

Parameter: Insulation Leakage **Group:** Life-6
200V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
60.606	11	4
	168 Hour Measurement	
227.273	11	4
	500 Hour Measurement	
120.482	11	4
	1000 Hour Measurement	
227.273	11	4
	2000 Hour Measurement	
208.333	11	4

[illegible]

Min. (K megohms)	No	Nc
	Initial Measurement	
11.111	15	0
	168 Hour Measurement	
7.813	15	0
	500 Hour Measurement	
8.197	15	0
	1000 Hour Measurement	
8.197	15	0
	2000 Hour Measurement	
6.250	15	0

Parameter: Insulation Leakage **Group:** Life-6
200V 125°C

Min. (K megohms)	No	Nc
	Initial Measurement	
0.054	14	1
	168 Hour Measurement	
1.136	13	2
	500 Hour Measurement	
1.923	12	3
	1000 Hour Measurement	
1.974	12	3
	2000 Hour Measurement	
4.545	12	3

APPENDIX IV

TABULATING CODES AND SERIAL NUMBER CROSS REFERENCE LIST

The reference information listed below is contained in the following pages:

Component Serial Number Cross Reference

Life Test Matrix Group Codes

Manufacturer's Codes

Measurement Number Codes

The cross reference listing is included to indicate the actual tag number used by PTS throughout the contract for individual component control. The corresponding JPL Item Number, together with the Group and Manufacturer Code, indicates the component identification contained in all punched data cards delivered under this contract.

The schedule of Group Codes contained in this Appendix are those which correspond to the Life Test Matrices.

Codes used to identify the manufacturers are identical with those contained in the punched data cards except the "0" code for Aerovox, which was changed to "010" in the punched cards.

Measurement Codes are shown as a two-digit number. The first digit designates the environmental series ("1") or the the life test series ("2"). The second digit designates the sequence of measurements within each series.

Item No.	Group No.	Mfg.	Serial No.
1	1	0	A 6 8 0 0 2
2	1	0	A 6 8 0 0 3
3	1	0	A 6 8 0 0 4
4	1	0	A 6 8 0 0 5
5	1	0	A 6 8 0 0 6
6	1	0	A 6 8 0 0 7
7	1	0	A 6 8 0 0 8
8	1	0	A 6 8 0 0 9
9	1	0	A 6 8 0 1 0
10	1	0	A 6 8 0 1 1
11	1	0	A 6 8 0 1 2
12	1	0	A 6 8 0 1 3
13	1	0	A 6 8 0 1 4
14	1	0	A 6 8 0 1 5
15	1	0	A 6 8 0 1 6
16	1	0	A 6 8 0 1 7
17	1	0	A 6 8 0 1 8
18	1	0	A 6 8 0 1 9
19	1	0	A 6 8 0 2 0
20	1	0	A 6 8 0 2 1
21	1	0	A 6 8 0 2 2
22	1	0	A 6 8 0 2 3
23	1	0	A 6 8 0 2 4
24	1	0	A 6 8 0 2 5
25	1	0	A 6 8 0 2 6
26	3	0	A 6 8 0 2 7
27	3	0	A 6 8 0 2 8
28	3	0	A 6 8 0 2 9
29	3	0	A 6 8 0 3 0
30	3	0	A 6 8 0 3 1
31	5	0	A 6 8 0 3 2
32	5	0	A 6 8 0 3 3
33	5	0	A 6 8 0 3 4
34	5	0	A 6 8 0 3 5
35	5	0	A 6 8 0 3 6
36	2	0	A 6 8 0 3 7
37	2	0	A 6 8 0 3 8
38	2	0	A 6 8 0 3 9
39	2	0	A 6 8 0 4 0
40	2	0	A 6 8 0 4 1
41	4	0	A 6 8 0 4 2
42	4	0	A 6 8 0 4 3
43	4	0	A 6 8 0 4 4
44	4	0	A 6 8 0 4 5
45	4	0	A 6 8 0 4 6
46	6	0	A 6 8 0 4 7
47	6	0	A 6 8 0 4 8
48	6	0	A 6 8 0 4 9

49	6	0	A 6 8 0 5 0
50	6	0	A 6 8 0 5 1
51	1	0	A 6 8 0 5 2
52	1	0	A 6 8 0 5 3
53	1	0	A 6 8 0 5 4
54	1	0	A 6 8 0 5 5
55	1	0	A 6 8 0 5 6
56	1	0	A 6 8 0 5 7
57	1	0	A 6 8 0 5 8
58	1	0	A 6 8 0 5 9
59	1	0	A 6 8 0 6 0
60	1	0	A 6 8 0 6 1
61	1	0	A 6 8 0 6 2
62	1	0	A 6 8 0 6 3
63	1	0	A 6 8 0 6 4
64	1	0	A 6 8 0 6 5
65	1	0	A 6 8 0 6 6
66	1	0	A 6 8 0 6 7
67	1	0	A 6 8 0 6 8
68	1	0	A 6 8 0 6 9
69	1	0	A 6 8 0 7 0
70	1	0	A 6 8 0 7 1
71	1	0	A 6 8 0 7 2
72	1	0	A 6 8 0 7 3
73	1	0	A 6 8 0 7 4
74	1	0	A 6 8 0 7 5
75	1	0	A 6 8 0 7 6
76	3	0	A 6 8 0 7 7
77	3	0	A 6 8 0 7 8
78	3	0	A 6 8 0 7 9
79	3	0	A 6 8 0 8 0
80	3	0	A 6 8 0 8 1
81	5	0	A 6 8 0 8 2
82	5	0	A 6 8 0 8 3
83	5	0	A 6 8 0 8 4
84	5	0	A 6 8 0 8 5
85	5	0	A 6 8 0 8 6
86	2	0	A 6 8 0 8 7
87	2	0	A 6 8 0 8 8
88	2	0	A 6 8 0 8 9
89	2	0	A 6 8 0 9 0
90	2	0	A 6 8 0 9 1
91	4	0	A 6 8 0 9 2
92	4	0	A 6 8 0 9 3
93	4	0	A 6 8 0 9 4
94	4	0	A 6 8 0 9 5
95	4	0	A 6 8 0 9 6
96	6	0	A 6 8 0 9 7
97	6	0	A 6 8 0 9 8
98	6	0	A 6 8 0 9 9
99	6	0	A 6 8 1 0 0
1 100	6	0	A 6 8 1 0 1
1 121	1	0	A 6 8 1 2 2
1 122	1	0	A 6 8 1 2 3
1 123	1	0	A 6 8 1 2 4
1 124	1	0	A 6 8 1 2 5
1 125	1	0	A 6 8 1 2 6
1 126	1	0	A 6 8 1 2 7

127	1	0	A68128
128	1	0	A68129
129	1	0	A68130
130	1	0	A68131
131	1	0	A68132
132	1	0	A68133
133	1	0	A68134
134	1	0	A68135
135	1	0	A68136
136	1	0	A68137
137	1	0	A68138
138	1	0	A68139
139	1	0	A68140
140	1	0	A68141
141	1	0	A68142
142	1	0	A68143
143	1	0	A68144
144	1	0	A68145
145	1	0	A68146
146	3	0	A68147
147	3	0	A68148
148	3	0	A68149
149	3	0	A68150
150	3	0	A68151
151	5	0	A68152
152	5	0	A68153
153	5	0	A68154
154	5	0	A68155
155	5	0	A68156
156	2	0	A68157
157	2	0	A68158
158	2	0	A68159
159	2	0	A68160
160	2	0	A68161
161	4	0	A68162
162	4	0	A68163
163	4	0	A68164
164	4	0	A68165
165	4	0	A68166
166	6	0	A68167
167	6	0	A68168
168	6	0	A68169
169	6	0	A68170
170	6	0	A68171
1	1	1	A68177
2	1	1	A68178
3	1	1	A68179
4	1	1	A68180
5	1	1	A68181
6	1	1	A68182
7	1	1	A68183
8	1	1	A68184
9	1	1	A68185
10	1	1	A68186
11	1	1	A68187
12	1	1	A68188
13	1	1	A68189
14	1	1	A68190

73	1	1	A 6 8 2 4 9
74	1	1	A 6 8 2 5 0
75	1	1	A 6 8 2 5 1
76	3	1	A 6 8 2 5 2
77	3	1	A 6 8 2 5 3
78	3	1	A 6 8 2 5 4
79	3	1	A 6 8 2 5 5
80	3	1	A 6 8 2 5 6
81	5	1	A 6 8 2 5 7
82	5	1	A 6 8 2 5 8
83	5	1	A 6 8 2 5 9
84	5	1	A 6 8 2 6 0
85	5	1	A 6 8 2 6 1
86	2	1	A 6 8 2 6 2
87	2	1	A 6 8 2 6 3
88	2	1	A 6 8 2 6 4
89	2	1	A 6 8 2 6 5
90	2	1	A 6 8 2 6 6
91	4	1	A 6 8 2 6 7
92	4	1	A 6 8 2 6 8
93	4	1	A 6 8 2 6 9
94	4	1	A 6 8 2 7 0
95	4	1	A 6 8 2 7 1
96	6	1	A 6 8 2 7 2
97	6	1	A 6 8 2 7 3
98	6	1	A 6 8 2 7 4
99	6	1	A 6 8 2 7 5
100	6	1	A 6 8 2 7 6
121	1	1	A 6 8 2 9 7
122	1	1	A 6 8 2 9 8
123	1	1	A 6 8 2 9 9
124	1	1	A 6 8 3 0 0
125	1	1	A 6 8 3 0 1
126	1	1	A 6 8 3 0 2
127	1	1	A 6 8 3 0 3
128	1	1	A 6 8 3 0 4
129	1	1	A 6 8 3 0 5
130	1	1	A 6 8 3 0 6
131	1	1	A 6 8 3 0 7
132	1	1	A 6 8 3 0 8
133	1	1	A 6 8 3 0 9
134	1	1	A 6 8 3 1 0
135	1	1	A 6 8 3 1 1
136	1	1	A 6 8 3 1 2
137	1	1	A 6 8 3 1 3
138	1	1	A 6 8 3 1 4
139	1	1	A 6 8 3 1 5
140	1	1	A 6 8 3 1 6
141	1	1	A 6 8 3 1 7
142	1	1	A 6 8 3 1 8
143	1	1	A 6 8 3 1 9
144	1	1	A 6 8 3 2 0
145	1	1	A 6 8 3 2 1
146	3	1	A 6 8 3 2 2
147	3	1	A 6 8 3 2 3
148	3	1	A 6 8 3 2 4
149	3	1	A 6 8 3 2 5
150	3	1	A 6 8 3 2 6

15	1	1	A 6 8 1 9 1
16	1	1	A 6 8 1 9 2
17	1	1	A 6 8 1 9 3
18	1	1	A 6 8 1 9 4
19	1	1	A 6 8 1 9 5
20	1	1	A 6 8 1 9 6
21	1	1	A 6 8 1 9 7
22	1	1	A 6 8 1 9 8
23	1	1	A 6 8 1 9 9
24	1	1	A 6 8 2 0 0
25	1	1	A 6 8 2 0 1
26	3	1	A 6 8 2 0 2
27	3	1	A 6 8 2 0 3
28	3	1	A 6 8 2 0 4
29	3	1	A 6 8 2 0 5
30	3	1	A 6 8 2 0 6
31	5	1	A 6 8 2 0 7
32	5	1	A 6 8 2 0 8
33	5	1	A 6 8 2 0 9
34	5	1	A 6 8 2 1 0
35	5	1	A 6 8 2 1 1
36	2	1	A 6 8 2 1 2
37	2	1	A 6 8 2 1 3
38	2	1	A 6 8 2 1 4
39	2	1	A 6 8 2 1 5
40	2	1	A 6 8 2 1 6
41	4	1	A 6 8 2 1 7
42	4	1	A 6 8 2 1 8
43	4	1	A 6 8 2 1 9
44	4	1	A 6 8 2 2 0
45	4	1	A 6 8 2 2 1
46	6	1	A 6 8 2 2 2
47	6	1	A 6 8 2 2 3
48	6	1	A 6 8 2 2 4
49	6	1	A 6 8 2 2 5
50	6	1	A 6 8 2 2 6
51	1	1	A 6 8 2 2 7
52	1	1	A 6 8 2 2 8
53	1	1	A 6 8 2 2 9
54	1	1	A 6 8 2 3 0
55	1	1	A 6 8 2 3 1
56	1	1	A 6 8 2 3 2
57	1	1	A 6 8 2 3 3
58	1	1	A 6 8 2 3 4
59	1	1	A 6 8 2 3 5
60	1	1	A 6 8 2 3 6
61	1	1	A 6 8 2 3 7
62	1	1	A 6 8 2 3 8
63	1	1	A 6 8 2 3 9
64	1	1	A 6 8 2 4 0
65	1	1	A 6 8 2 4 1
66	1	1	A 6 8 2 4 2
67	1	1	A 6 8 2 4 3
68	1	1	A 6 8 2 4 4
69	1	1	A 6 8 2 4 5
70	1	1	A 6 8 2 4 6
71	1	1	A 6 8 2 4 7
72	1	1	A 6 8 2 4 8

151	5	1	A68327
152	5	1	A68328
153	5	1	A68329
154	5	1	A68330
155	5	1	A68331
156	2	1	A68332
157	2	1	A68333
158	2	1	A68334
159	2	1	A68335
160	2	1	A68336
161	4	1	A68337
162	4	1	A68338
163	4	1	A68339
164	4	1	A68340
165	4	1	A68341
166	6	1	A68342
167	6	1	A68343
168	6	1	A68344
169	6	1	A68345
170	6	1	A68346
1	1	2	A68352
2	1	2	A68353
3	1	2	A68354
4	1	2	A68355
5	1	2	A68356
6	1	2	A68357
7	1	2	A68358
8	1	2	A68359
9	1	2	A68360
10	1	2	A68361
11	1	2	A68362
12	1	2	A68363
13	1	2	A68364
14	1	2	A68365
15	1	2	A68366
16	1	2	A68367
17	1	2	A68368
18	1	2	A68369
19	1	2	A68370
20	1	2	A68371
21	1	2	A68372
22	1	2	A68373
23	1	2	A68374
24	1	2	A68375
25	1	2	A68376
26	3	2	A68377
27	3	2	A68378
28	3	2	A68379
29	3	2	A68380
30	3	2	A68381
31	5	2	A68382
32	5	2	A68383
33	5	2	A68384
34	5	2	A68385
35	5	2	A68386
36	2	2	A68387
37	2	2	A68388
38	2	2	A68389

39	2	2	A 6 8 3 9 0
40	2	2	A 6 8 3 9 1
41	4	2	A 6 8 3 9 2
42	4	2	A 6 8 3 9 3
43	4	2	A 6 8 3 9 4
44	4	2	A 6 8 3 9 5
45	4	2	A 6 8 3 9 6
46	6	2	A 6 8 3 9 7
47	6	2	A 6 8 3 9 8
48	6	2	A 6 8 3 9 9
49	6	2	A 6 8 4 0 0
50	6	2	A 6 8 4 0 1
51	1	2	A 6 8 4 0 2
52	1	2	A 6 8 4 0 3
53	1	2	A 6 8 4 0 4
54	1	2	A 6 8 4 0 5
55	1	2	A 6 8 4 0 6
56	1	2	A 6 8 4 0 7
57	1	2	A 6 8 4 0 8
58	1	2	A 6 8 4 0 9
59	1	2	A 6 8 4 1 0
60	1	2	A 6 8 4 1 1
61	1	2	A 6 8 4 1 2
62	1	2	A 6 8 4 1 3
63	1	2	A 6 8 4 1 4
64	1	2	A 6 8 4 1 5
65	1	2	A 6 8 4 1 6
66	1	2	A 6 8 4 1 7
67	1	2	A 6 8 4 1 8
68	1	2	A 6 8 4 1 9
69	1	2	A 6 8 4 2 0
70	1	2	A 6 8 4 2 1
71	1	2	A 6 8 4 2 2
72	1	2	A 6 8 4 2 3
73	1	2	A 6 8 4 2 4
74	1	2	A 6 8 4 2 5
75	1	2	A 6 8 4 2 6
76	3	2	A 6 8 4 2 7
77	3	2	A 6 8 4 2 8
78	3	2	A 6 8 4 2 9
79	3	2	A 6 8 4 3 0
80	3	2	A 6 8 4 3 1
81	5	2	A 6 8 4 3 2
82	5	2	A 6 8 4 3 3
83	5	2	A 6 8 4 3 4
84	5	2	A 6 8 4 3 5
85	5	2	A 6 8 4 3 6
86	2	2	A 6 8 4 3 7
87	2	2	A 6 8 4 3 8
88	2	2	A 6 8 4 3 9
89	2	2	A 6 8 4 4 0
90	2	2	A 6 8 4 4 1
91	4	2	A 6 8 4 4 2
92	4	2	A 6 8 4 4 3
93	4	2	A 6 8 4 4 4
94	4	2	A 6 8 4 4 5
95	4	2	A 6 8 4 4 6
96	6	2	A 6 8 4 4 7

97	6	2	A 6 8 4 4 8
98	6	2	A 6 8 4 4 9
99	6	2	A 6 8 4 5 0
100	6	2	A 6 8 4 5 1
121	1	2	A 6 8 4 7 2
122	1	2	A 6 8 4 7 3
123	1	2	A 6 8 4 7 4
124	1	2	A 6 8 4 7 5
125	1	2	A 6 8 4 7 6
126	1	2	A 6 8 4 7 7
127	1	2	A 6 8 4 7 8
128	1	2	A 6 8 4 7 9
129	1	2	A 6 8 4 8 0
130	1	2	A 6 8 4 8 1
131	1	2	A 6 8 4 8 2
132	1	2	A 6 8 4 8 3
133	1	2	A 6 8 4 8 4
134	1	2	A 6 8 4 8 5
135	1	2	A 6 8 4 8 6
136	1	2	A 6 8 4 8 7
137	1	2	A 6 8 4 8 8
138	1	2	A 6 8 4 8 9
139	1	2	A 6 8 4 9 0
140	1	2	A 6 8 4 9 1
141	1	2	A 6 8 4 9 2
142	1	2	A 6 8 4 9 3
143	1	2	A 6 8 4 9 4
144	1	2	A 6 8 4 9 5
145	1	2	A 6 8 4 9 6
146	3	2	A 6 8 4 9 7
147	3	2	A 6 8 4 9 8
148	3	2	A 6 8 4 9 9
149	3	2	A 6 8 5 0 0
150	3	2	A 6 8 5 0 1
151	5	2	A 6 8 5 0 2
152	5	2	A 6 8 5 0 3
153	5	2	A 6 8 5 0 4
154	5	2	A 6 8 5 0 5
155	5	2	A 6 8 5 0 6
156	2	2	A 6 8 5 0 7
157	2	2	A 6 8 5 0 8
158	2	2	A 6 8 5 0 9
159	2	2	A 6 8 5 1 0
160	2	2	A 6 8 5 1 1
161	4	2	A 6 8 5 1 2
162	4	2	A 6 8 5 1 3
163	4	2	A 6 8 5 1 4
164	4	2	A 6 8 5 1 5
165	4	2	A 6 8 5 1 6
166	6	2	A 6 8 5 1 7
167	6	2	A 6 8 5 1 8
168	6	2	A 6 8 5 1 9
169	6	2	A 6 8 5 2 0
170	6	2	A 6 8 5 2 1
1	1	3	A 6 8 5 2 7
2	1	3	A 6 8 5 2 8
3	1	3	A 6 8 5 2 9
4	1	3	A 6 8 5 3 0

5	1	3	A 6 8 5 3 1
6	1	3	A 6 8 5 3 2
7	1	3	A 6 8 5 3 3
8	1	3	A 6 8 5 3 4
9	1	3	A 6 8 5 3 5
10	1	3	A 6 8 5 3 6
11	1	3	A 6 8 5 3 7
12	1	3	A 6 8 5 3 8
13	1	3	A 6 8 5 3 9
14	1	3	A 6 8 5 4 0
15	1	3	A 6 8 5 4 1
16	1	3	A 6 8 5 4 2
17	1	3	A 6 8 5 4 3
18	1	3	A 6 8 5 4 4
19	1	3	A 6 8 5 4 5
20	1	3	A 6 8 5 4 6
21	1	3	A 6 8 5 4 7
22	1	3	A 6 8 5 4 8
23	1	3	A 6 8 5 4 9
24	1	3	A 6 8 5 5 0
25	1	3	A 6 8 5 5 1
26	3	3	A 6 8 5 5 2
27	3	3	A 6 8 5 5 3
28	3	3	A 6 8 5 5 4
29	3	3	A 6 8 5 5 5
30	3	3	A 6 8 5 5 6
31	5	3	A 6 8 5 5 7
32	5	3	A 6 8 5 5 8
33	5	3	A 6 8 5 5 9
34	5	3	A 6 8 5 6 0
35	5	3	A 6 8 5 6 1
36	2	3	A 6 8 5 6 2
37	2	3	A 6 8 5 6 3
38	2	3	A 6 8 5 6 4
39	2	3	A 6 8 5 6 5
40	2	3	A 6 8 5 6 6
41	4	3	A 6 8 5 6 7
42	4	3	A 6 8 5 6 8
43	4	3	A 6 8 5 6 9
44	4	3	A 6 8 5 7 0
45	4	3	A 6 8 5 7 1
46	6	3	A 6 8 5 7 2
47	6	3	A 6 8 5 7 3
48	6	3	A 6 8 5 7 4
49	6	3	A 6 8 5 7 5
50	6	3	A 6 8 5 7 6
51	1	3	A 6 8 5 7 7
52	1	3	A 6 8 5 7 8
53	1	3	A 6 8 5 7 9
54	1	3	A 6 8 5 8 0
55	1	3	A 6 8 5 8 1
56	1	3	A 6 8 5 8 2
57	1	3	A 6 8 5 8 3
58	1	3	A 6 8 5 8 4
59	1	3	A 6 8 5 8 5
60	1	3	A 6 8 5 8 6
61	1	3	A 6 8 5 8 7
62	1	3	A 6 8 5 8 8

63	1	3	A 68589
64	1	3	A 68590
65	1	3	A 68591
66	1	3	A 68592
67	1	3	A 68593
68	1	3	A 68594
69	1	3	A 68595
70	1	3	A 68596
71	1	3	A 68597
72	1	3	A 68598
73	1	3	A 68599
74	1	3	A 68600
75	1	3	A 68601
76	3	3	A 68602
77	3	3	A 68603
78	3	3	A 68604
79	3	3	A 68605
80	3	3	A 68606
81	5	3	A 68607
82	5	3	A 68608
83	5	3	A 68609
84	5	3	A 68610
85	5	3	A 68611
86	2	3	A 68612
87	2	3	A 68613
88	2	3	A 68614
89	2	3	A 68615
90	2	3	A 68616
91	4	3	A 68617
92	4	3	A 68618
93	4	3	A 68619
94	4	3	A 68620
95	4	3	A 68621
96	6	3	A 68622
97	6	3	A 68623
98	6	3	A 68624
99	6	3	A 68625
100	6	3	A 68626
121	1	3	A 68647
122	1	3	A 68648
123	1	3	A 68649
124	1	3	A 68650
125	1	3	A 68651
126	1	3	A 68652
127	1	3	A 68653
128	1	3	A 68654
129	1	3	A 68655
130	1	3	A 68656
131	1	3	A 68657
132	1	3	A 68658
133	1	3	A 68659
134	1	3	A 68660
135	1	3	A 68661
136	1	3	A 68662
137	1	3	A 68663
138	1	3	A 68664
139	1	3	A 68665
140	1	3	A 68666

141	1	3	A68667
142	1	3	A68668
143	1	3	A68669
144	1	3	A68670
145	1	3	A68671
146	3	3	A68672
147	3	3	A68673
148	3	3	A68674
149	3	3	A68675
150	3	3	A68676
151	5	3	A68677
152	5	3	A68678
153	5	3	A68679
154	5	3	A68680
155	5	3	A68681
156	2	3	A68682
157	2	3	A68683
158	2	3	A68684
159	2	3	A68685
160	2	3	A68686
161	4	3	A68687
162	4	3	A68688
163	4	3	A68689
164	4	3	A68690
165	4	3	A68691
166	6	3	A68692
167	6	3	A68693
168	6	3	A68694
169	6	3	A68695
170	6	3	A68696
51	1	4	A68702
52	1	4	A68703
53	1	4	A68704
54	1	4	A68705
55	1	4	A68706
56	1	4	A68707
57	1	4	A68708
58	1	4	A68709
59	1	4	A68710
60	1	4	A68711
61	1	4	A68712
62	1	4	A68713
63	1	4	A68714
64	1	4	A68715
65	1	4	A68716
66	1	4	A68717
67	1	4	A68718
68	1	4	A68719
69	1	4	A68720
70	1	4	A68721
71	1	4	A68722
72	1	4	A68723
73	1	4	A68724
74	1	4	A68725
75	1	4	A68726
26	3	4	A68727
27	3	4	A68728
28	3	4	A68729

29	3	4	A 6 8 7 3 0
30	3	4	A 6 8 7 3 1
31	5	4	A 6 8 7 3 2
32	5	4	A 6 8 7 3 3
33	5	4	A 6 8 7 3 4
34	5	4	A 6 8 7 3 5
35	5	4	A 6 8 7 3 6
36	2	4	A 6 8 7 3 7
37	2	4	A 6 8 7 3 8
38	2	4	A 6 8 7 3 9
39	2	4	A 6 8 7 4 0
40	2	4	A 6 8 7 4 1
41	4	4	A 6 8 7 4 2
42	4	4	A 6 8 7 4 3
43	4	4	A 6 8 7 4 4
44	4	4	A 6 8 7 4 5
45	4	4	A 6 8 7 4 6
46	6	4	A 6 8 7 4 7
47	6	4	A 6 8 7 4 8
48	6	4	A 6 8 7 4 9
49	6	4	A 6 8 7 5 0
50	6	4	A 6 8 7 5 1
1	1	4	A 6 8 7 5 2
2	1	4	A 6 8 7 5 3
3	1	4	A 6 8 7 5 4
4	1	4	A 6 8 7 5 5
5	1	4	A 6 8 7 5 6
6	1	4	A 6 8 7 5 7
7	1	4	A 6 8 7 5 8
8	1	4	A 6 8 7 5 9
9	1	4	A 6 8 7 6 0
10	1	4	A 6 8 7 6 1
11	1	4	A 6 8 7 6 2
12	1	4	A 6 8 7 6 3
13	1	4	A 6 8 7 6 4
14	1	4	A 6 8 7 6 5
15	1	4	A 6 8 7 6 6
16	1	4	A 6 8 7 6 7
17	1	4	A 6 8 7 6 8
18	1	4	A 6 8 7 6 9
19	1	4	A 6 8 7 7 0
20	1	4	A 6 8 7 7 1
21	1	4	A 6 8 7 7 2
22	1	4	A 6 8 7 7 3
23	1	4	A 6 8 7 7 4
24	1	4	A 6 8 7 7 5
25	1	4	A 6 8 7 7 6
76	3	4	A 6 8 7 7 7
77	3	4	A 6 8 7 7 8
78	3	4	A 6 8 7 7 9
79	3	4	A 6 8 7 8 0
80	3	4	A 6 8 7 8 1
81	5	4	A 6 8 7 8 2
82	5	4	A 6 8 7 8 3
83	5	4	A 6 8 7 8 4
84	5	4	A 6 8 7 8 5
85	5	4	A 6 8 7 8 6
86	2	4	A 6 8 7 8 7

87	2	4	A 6 8 7 8 8
88	2	4	A 6 8 7 8 9
89	2	4	A 6 8 7 9 0
90	2	4	A 6 8 7 9 1
91	4	4	A 6 8 7 9 2
92	4	4	A 6 8 7 9 3
93	4	4	A 6 8 7 9 4
94	4	4	A 6 8 7 9 5
95	4	4	A 6 8 7 9 6
96	6	4	A 6 8 7 9 7
97	6	4	A 6 8 7 9 8
98	6	4	A 6 8 7 9 9
99	6	4	A 6 8 8 0 0
1 00	6	4	A 6 8 8 0 1
1 21	1	4	A 6 8 8 2 2
1 22	1	4	A 6 8 8 2 3
1 23	1	4	A 6 8 8 2 4
1 24	1	4	A 6 8 8 2 5
1 25	1	4	A 6 8 8 2 6
1 26	1	4	A 6 8 8 2 7
1 27	1	4	A 6 8 8 2 8
1 28	1	4	A 6 8 8 2 9
1 29	1	4	A 6 8 8 3 0
1 30	1	4	A 6 8 8 3 1
1 31	1	4	A 6 8 8 3 2
1 32	1	4	A 6 8 8 3 3
1 33	1	4	A 6 8 8 3 4
1 34	1	4	A 6 8 8 3 5
1 35	1	4	A 6 8 8 3 6
1 36	1	4	A 6 8 8 3 7
1 37	1	4	A 6 8 8 3 8
1 38	1	4	A 6 8 8 3 9
1 39	1	4	A 6 8 8 4 0
1 40	1	4	A 6 8 8 4 1
1 41	1	4	A 6 8 8 4 2
1 42	1	4	A 6 8 8 4 3
1 43	1	4	A 6 8 8 4 4
1 44	1	4	A 6 8 8 4 5
1 45	1	4	A 6 8 8 4 6
1 46	3	4	A 6 8 8 4 7
1 47	3	4	A 6 8 8 4 8
1 48	3	4	A 6 8 8 4 9
1 49	3	4	A 6 8 8 5 0
1 50	3	4	A 6 8 8 5 1
1 51	5	4	A 6 8 8 5 2
1 52	5	4	A 6 8 8 5 3
1 53	5	4	A 6 8 8 5 4
1 54	5	4	A 6 8 8 5 5
1 55	5	4	A 6 8 8 5 6
1 56	2	4	A 6 8 8 5 7
1 57	2	4	A 6 8 8 5 8
1 58	2	4	A 6 8 8 5 9
1 59	2	4	A 6 8 8 6 0
1 60	2	4	A 6 8 8 6 1
1 61	4	4	A 6 8 8 6 2
1 62	4	4	A 6 8 8 6 3
1 63	4	4	A 6 8 8 6 4
1 64	4	4	A 6 8 8 6 5

165	4	4	A68866
166	6	4	A68867
167	6	4	A68868
168	6	4	A68869
169	6	4	A68870
170	6	4	A68871
1	1	5	A68877
2	1	5	A68878
3	1	5	A68879
4	1	5	A68880
5	1	5	A68881
6	1	5	A68882
7	1	5	A68883
8	1	5	A68884
9	1	5	A68885
10	1	5	A68886
11	1	5	A68887
12	1	5	A68888
13	1	5	A68889
14	1	5	A68890
15	1	5	A68891
16	1	5	A68892
17	1	5	A68893
18	1	5	A68894
19	1	5	A68895
20	1	5	A68896
21	1	5	A68897
22	1	5	A68898
23	1	5	A68899
24	1	5	A68900
25	1	5	A68901
26	3	5	A68902
27	3	5	A68903
28	3	5	A68904
29	3	5	A68905
30	3	5	A68906
31	5	5	A68907
32	5	5	A68908
33	5	5	A68909
34	5	5	A68910
35	5	5	A68911
36	2	5	A68912
37	2	5	A68913
38	2	5	A68914
39	2	5	A68915
40	2	5	A68916
41	4	5	A68917
42	4	5	A68918
43	4	5	A68919
44	4	5	A68920
45	4	5	A68921
46	6	5	A68922
47	6	5	A68923
48	6	5	A68924
49	6	5	A68925
50	6	5	A68926
51	1	5	A68927
52	1	5	A68928

53	1	5	A 6 8 9 2 9
54	1	5	A 6 8 9 3 0
55	1	5	A 6 8 9 3 1
56	1	5	A 6 8 9 3 2
57	1	5	A 6 8 9 3 3
58	1	5	A 6 8 9 3 4
59	1	5	A 6 8 9 3 5
60	1	5	A 6 8 9 3 6
61	1	5	A 6 8 9 3 7
62	1	5	A 6 8 9 3 8
63	1	5	A 6 8 9 3 9
64	1	5	A 6 8 9 4 0
65	1	5	A 6 8 9 4 1
66	1	5	A 6 8 9 4 2
67	1	5	A 6 8 9 4 3
68	1	5	A 6 8 9 4 4
69	1	5	A 6 8 9 4 5
70	1	5	A 6 8 9 4 6
71	1	5	A 6 8 9 4 7
72	1	5	A 6 8 9 4 8
73	1	5	A 6 8 9 4 9
74	1	5	A 6 8 9 5 0
75	1	5	A 6 8 9 5 1
76	3	5	A 6 8 9 5 2
77	3	5	A 6 8 9 5 3
78	3	5	A 6 8 9 5 4
79	3	5	A 6 8 9 5 5
80	3	5	A 6 8 9 5 6
81	5	5	A 6 8 9 5 7
82	5	5	A 6 8 9 5 8
83	5	5	A 6 8 9 5 9
84	5	5	A 6 8 9 6 0
85	5	5	A 6 8 9 6 1
86	2	5	A 6 8 9 6 2
87	2	5	A 6 8 9 6 3
88	2	5	A 6 8 9 6 4
89	2	5	A 6 8 9 6 5
90	2	5	A 6 8 9 6 6
91	4	5	A 6 8 9 6 7
92	4	5	A 6 8 9 6 8
93	4	5	A 6 8 9 6 9
94	4	5	A 6 8 9 7 0
95	4	5	A 6 8 9 7 1
96	6	5	A 6 8 9 7 2
97	6	5	A 6 8 9 7 3
98	6	5	A 6 8 9 7 4
99	6	5	A 6 8 9 7 5
100	6	5	A 6 8 9 7 6
121	1	5	A 6 8 9 9 7
122	1	5	A 6 8 9 9 8
123	1	5	A 6 8 9 9 9
124	1	5	A 6 9 0 0 0
125	1	5	A 6 9 0 0 1
126	1	5	A 6 9 0 0 2
127	1	5	A 6 9 0 0 3
128	1	5	A 6 9 0 0 4
129	1	5	A 6 9 0 0 5
130	1	5	A 6 9 0 0 6

131	1	5	A69007
132	1	5	A69008
133	1	5	A69009
134	1	5	A69010
135	1	5	A69011
136	1	5	A69012
137	1	5	A69013
138	1	5	A69014
139	1	5	A69015
140	1	5	A69016
141	1	5	A69017
142	1	5	A69018
143	1	5	A69019
144	1	5	A69020
145	1	5	A69021
146	3	5	A69022
147	3	5	A69023
148	3	5	A69024
149	3	5	A69025
150	3	5	A69026
151	5	5	A69027
152	5	5	A69028
153	5	5	A69029
154	5	5	A69030
155	5	5	A69031
156	2	5	A69032
157	2	5	A69033
158	2	5	A69034
159	2	5	A69035
160	2	5	A69036
161	4	5	A69037
162	4	5	A69038
163	4	5	A69039
164	4	5	A69040
165	4	5	A69041
166	6	5	A69042
167	6	5	A69043
168	6	5	A69044
169	6	5	A69045
170	6	5	A69046
1	1	6	A69052
2	1	6	A69053
3	1	6	A69054
4	1	6	A69055
5	1	6	A69056
6	1	6	A69057
7	1	6	A69058
8	1	6	A69059
9	1	6	A69060
10	1	6	A69061
11	1	6	A69062
12	1	6	A69063
13	1	6	A69064
14	1	6	A69065
15	1	6	A69066
16	1	6	A69067
17	1	6	A69068
18	1	6	A69069

19	1	6	A 6 9 0 7 0
20	1	6	A 6 9 0 7 1
21	1	6	A 6 9 0 7 2
22	1	6	A 6 9 0 7 3
23	1	6	A 6 9 0 7 4
24	1	6	A 6 9 0 7 5
25	1	6	A 6 9 0 7 6
26	3	6	A 6 9 0 7 7
27	3	6	A 6 9 0 7 8
28	3	6	A 6 9 0 7 9
29	3	6	A 6 9 0 8 0
30	3	6	A 6 9 0 8 1
31	5	6	A 6 9 0 8 2
32	5	6	A 6 9 0 8 3
33	5	6	A 6 9 0 8 4
34	5	6	A 6 9 0 8 5
35	5	6	A 6 9 0 8 6
36	2	6	A 6 9 0 8 7
37	2	6	A 6 9 0 8 8
38	2	6	A 6 9 0 8 9
39	2	6	A 6 9 0 9 0
40	2	6	A 6 9 0 9 1
41	4	6	A 6 9 0 9 2
42	4	6	A 6 9 0 9 3
43	4	6	A 6 9 0 9 4
44	4	6	A 6 9 0 9 5
45	4	6	A 6 9 0 9 6
46	6	6	A 6 9 0 9 7
47	6	6	A 6 9 0 9 8
48	6	6	A 6 9 0 9 9
49	6	6	A 6 9 1 0 0
50	6	6	A 6 9 1 0 1
51	1	6	A 6 9 1 0 2
52	1	6	A 6 9 1 0 3
53	1	6	A 6 9 1 0 4
54	1	6	A 6 9 1 0 5
55	1	6	A 6 9 1 0 6
56	1	6	A 6 9 1 0 7
57	1	6	A 6 9 1 0 8
58	1	6	A 6 9 1 0 9
59	1	6	A 6 9 1 1 0
60	1	6	A 6 9 1 1 1
61	1	6	A 6 9 1 1 2
62	1	6	A 6 9 1 1 3
63	1	6	A 6 9 1 1 4
64	1	6	A 6 9 1 1 5
65	1	6	A 6 9 1 1 6
66	1	6	A 6 9 1 1 7
67	1	6	A 6 9 1 1 8
68	1	6	A 6 9 1 1 9
69	1	6	A 6 9 1 2 0
70	1	6	A 6 9 1 2 1
71	1	6	A 6 9 1 2 2
72	1	6	A 6 9 1 2 3
73	1	6	A 6 9 1 2 4
74	1	6	A 6 9 1 2 5
75	1	6	A 6 9 1 2 6
76	3	6	A 6 9 1 2 7

155	5	6	A69206
156	2	6	A69207
157	2	6	A69208
158	2	6	A69209
159	2	6	A69210
160	2	6	A69211
161	4	6	A69212
162	4	6	A69213
163	4	6	A69214
164	4	6	A69215
165	4	6	A69216
166	6	6	A69217
167	6	6	A69218
168	6	6	A69219
169	6	6	A69220
170	6	6	A69221
1	1	7	A69227
2	1	7	A69228
3	1	7	A69229
4	1	7	A69230
5	1	7	A69231
6	1	7	A69232
7	1	7	A69233
8	1	7	A69234
9	1	7	A69235
10	1	7	A69236
11	1	7	A69237
12	1	7	A69238
13	1	7	A69239
14	1	7	A69240
15	1	7	A69241
16	1	7	A69242
17	1	7	A69243
18	1	7	A69244
19	1	7	A69245
20	1	7	A69246
21	1	7	A69247
22	1	7	A69248
23	1	7	A69249
24	1	7	A69250
25	1	7	A69251
26	3	7	A69252
27	3	7	A69253
28	3	7	A69254
29	3	7	A69255
30	3	7	A69256
31	5	7	A69257
32	5	7	A69258
33	5	7	A69259
34	5	7	A69260
35	5	7	A69261
36	2	7	A69262
37	2	7	A69263
38	2	7	A69264
39	2	7	A69265
40	2	7	A69266
41	4	7	A69267
42	4	7	A69268

77	3	6	A 6 9 1 2 8
78	3	6	A 6 9 1 2 9
79	3	6	A 6 9 1 3 0
80	3	6	A 6 9 1 3 1
81	5	6	A 6 9 1 3 2
82	5	6	A 6 9 1 3 3
83	5	6	A 6 9 1 3 4
84	5	6	A 6 9 1 3 5
85	5	6	A 6 9 1 3 6
86	2	6	A 6 9 1 3 7
87	2	6	A 6 9 1 3 8
88	2	6	A 6 9 1 3 9
89	2	6	A 6 9 1 4 0
90	2	6	A 6 9 1 4 1
91	4	6	A 6 9 1 4 2
92	4	6	A 6 9 1 4 3
93	4	6	A 6 9 1 4 4
94	4	6	A 6 9 1 4 5
95	4	6	A 6 9 1 4 6
96	6	6	A 6 9 1 4 7
97	6	6	A 6 9 1 4 8
98	6	6	A 6 9 1 4 9
99	6	6	A 6 9 1 5 0
1 00	6	6	A 6 9 1 5 1
1 21	1	6	A 6 9 1 7 2
1 22	1	6	A 6 9 1 7 3
1 23	1	6	A 6 9 1 7 4
1 24	1	6	A 6 9 1 7 5
1 25	1	6	A 6 9 1 7 6
1 26	1	6	A 6 9 1 7 7
1 27	1	6	A 6 9 1 7 8
1 28	1	6	A 6 9 1 7 9
1 29	1	6	A 6 9 1 8 0
1 30	1	6	A 6 9 1 8 1
1 31	1	6	A 6 9 1 8 2
1 32	1	6	A 6 9 1 8 3
1 33	1	6	A 6 9 1 8 4
1 34	1	6	A 6 9 1 8 5
1 35	1	6	A 6 9 1 8 6
1 36	1	6	A 6 9 1 8 7
1 37	1	6	A 6 9 1 8 8
1 38	1	6	A 6 9 1 8 9
1 39	1	6	A 6 9 1 9 0
1 40	1	6	A 6 9 1 9 1
1 41	1	6	A 6 9 1 9 2
1 42	1	6	A 6 9 1 9 3
1 43	1	6	A 6 9 1 9 4
1 44	1	6	A 6 9 1 9 5
1 45	1	6	A 6 9 1 9 6
1 46	3	6	A 6 9 1 9 7
1 47	3	6	A 6 9 1 9 8
1 48	3	6	A 6 9 1 9 9
1 49	3	6	A 6 9 2 0 0
1 50	3	6	A 6 9 2 0 1
1 51	5	6	A 6 9 2 0 2
1 52	5	6	A 6 9 2 0 3
1 53	5	6	A 6 9 2 0 4
1 54	5	6	A 6 9 2 0 5

43	4	7	A69269
44	4	7	A69270
45	4	7	A69271
46	6	7	A69272
47	6	7	A69273
48	6	7	A69274
49	6	7	A69275
50	6	7	A69276
51	1	7	A69277
52	1	7	A69278
53	1	7	A69279
54	1	7	A69280
55	1	7	A69281
56	1	7	A69282
57	1	7	A69283
58	1	7	A69284
59	1	7	A69285
60	1	7	A69286
61	1	7	A69287
62	1	7	A69288
63	1	7	A69289
64	1	7	A69290
65	1	7	A69291
66	1	7	A69292
67	1	7	A69293
68	1	7	A69294
69	1	7	A69295
70	1	7	A69296
71	1	7	A69297
72	1	7	A69298
73	1	7	A69299
74	1	7	A69300
75	1	7	A69301
76	3	7	A69302
77	3	7	A69303
78	3	7	A69304
79	3	7	A69305
80	3	7	A69306
81	5	7	A69307
82	5	7	A69308
83	5	7	A69309
84	5	7	A69310
85	5	7	A69311
86	2	7	A69312
87	2	7	A69313
88	2	7	A69314
89	2	7	A69315
90	2	7	A69316
91	4	7	A69317
92	4	7	A69318
93	4	7	A69319
94	4	7	A69320
95	4	7	A69321
96	6	7	A69322
97	6	7	A69323
98	6	7	A69324
99	6	7	A69325
100	6	7	A69326

121	1	7	A69347
122	1	7	A69348
123	1	7	A69349
124	1	7	A69350
125	1	7	A69351
126	1	7	A69352
127	1	7	A69353
128	1	7	A69354
129	1	7	A69355
130	1	7	A69356
131	1	7	A69357
132	1	7	A69358
133	1	7	A69359
134	1	7	A69360
135	1	7	A69361
136	1	7	A69362
137	1	7	A69363
138	1	7	A69364
139	1	7	A69365
140	1	7	A69366
141	1	7	A69367
142	1	7	A69368
143	1	7	A69369
144	1	7	A69370
145	1	7	A69371
146	3	7	A69372
147	3	7	A69373
148	3	7	A69374
149	3	7	A69375
150	3	7	A69376
151	5	7	A69377
152	5	7	A69378
153	5	7	A69379
154	5	7	A69380
155	5	7	A69381
156	2	7	A69382
157	2	7	A69383
158	2	7	A69384
159	2	7	A69385
160	2	7	A69386
161	4	7	A69387
162	4	7	A69388
163	4	7	A69389
164	4	7	A69390
165	4	7	A69391
166	6	7	A69392
167	6	7	A69393
168	6	7	A69394
169	6	7	A69395
170	6	7	A69396
1	1	8	A69402
2	1	8	A69403
3	1	8	A69404
4	1	8	A69405
5	1	8	A69406
6	1	8	A69407
7	1	8	A69408
8	1	8	A69409

9	1	8	A 6 9 4 1 0
10	1	8	A 6 9 4 1 1
11	1	8	A 6 9 4 1 2
12	1	8	A 6 9 4 1 3
13	1	8	A 6 9 4 1 4
14	1	8	A 6 9 4 1 5
15	1	8	A 6 9 4 1 6
16	1	8	A 6 9 4 1 7
17	1	8	A 6 9 4 1 8
18	1	8	A 6 9 4 1 9
19	1	8	A 6 9 4 2 0
20	1	8	A 6 9 4 2 1
21	1	8	A 6 9 4 2 2
22	1	8	A 6 9 4 2 3
23	1	8	A 6 9 4 2 4
24	1	8	A 6 9 4 2 5
25	1	8	A 6 9 4 2 6
26	3	8	A 6 9 4 2 7
27	3	8	A 6 9 4 2 8
28	3	8	A 6 9 4 2 9
29	3	8	A 6 9 4 3 0
30	3	8	A 6 9 4 3 1
31	5	8	A 6 9 4 3 2
32	5	8	A 6 9 4 3 3
33	5	8	A 6 9 4 3 4
34	5	8	A 6 9 4 3 5
35	5	8	A 6 9 4 3 6
36	2	8	A 6 9 4 3 7
37	2	8	A 6 9 4 3 8
38	2	8	A 6 9 4 3 9
39	2	8	A 6 9 4 4 0
40	2	8	A 6 9 4 4 1
41	4	8	A 6 9 4 4 2
42	4	8	A 6 9 4 4 3
43	4	8	A 6 9 4 4 4
44	4	8	A 6 9 4 4 5
45	4	8	A 6 9 4 4 6
46	6	8	A 6 9 4 4 7
47	6	8	A 6 9 4 4 8
48	6	8	A 6 9 4 4 9
49	6	8	A 6 9 4 5 0
50	6	8	A 6 9 4 5 1
51	1	8	A 6 9 4 5 2
52	1	8	A 6 9 4 5 3
53	1	8	A 6 9 4 5 4
54	1	8	A 6 9 4 5 5
55	1	8	A 6 9 4 5 6
56	1	8	A 6 9 4 5 7
57	1	8	A 6 9 4 5 8
58	1	8	A 6 9 4 5 9
59	1	8	A 6 9 4 6 0
60	1	8	A 6 9 4 6 1
61	1	8	A 6 9 4 6 2
62	1	8	A 6 9 4 6 3
63	1	8	A 6 9 4 6 4
64	1	8	A 6 9 4 6 5
65	1	8	A 6 9 4 6 6
66	1	8	A 6 9 4 6 7

67	1	8	A 69468
68	1	8	A 69469
69	1	8	A 69470
70	1	8	A 69471
71	1	8	A 69472
72	1	8	A 69473
73	1	8	A 69474
74	1	8	A 69475
75	1	8	A 69476
76	3	8	A 69477
77	3	8	A 69478
78	3	8	A 69479
79	3	8	A 69480
80	3	8	A 69481
81	5	8	A 69482
82	5	8	A 69483
83	5	8	A 69484
84	5	8	A 69485
85	5	8	A 69486
86	2	8	A 69487
87	2	8	A 69488
88	2	8	A 69489
89	2	8	A 69490
90	2	8	A 69491
91	4	8	A 69492
92	4	8	A 69493
93	4	8	A 69494
94	4	8	A 69495
95	4	8	A 69496
96	6	8	A 69497
97	6	8	A 69498
98	6	8	A 69499
99	6	8	A 69500
100	6	8	A 69501
121	1	8	A 69522
122	1	8	A 69523
123	1	8	A 69524
124	1	8	A 69525
125	1	8	A 69526
126	1	8	A 69527
127	1	8	A 69528
128	1	8	A 69529
129	1	8	A 69530
130	1	8	A 69531
131	1	8	A 69532
132	1	8	A 69533
133	1	8	A 69534
134	1	8	A 69535
135	1	8	A 69536
136	1	8	A 69537
137	1	8	A 69538
138	1	8	A 69539
139	1	8	A 69540
140	1	8	A 69541
141	1	8	A 69542
142	1	8	A 69543
143	1	8	A 69544
144	1	8	A 69545

145	1	8	A69546
146	3	8	A69547
147	3	8	A69548
148	3	8	A69549
149	3	8	A69550
150	3	8	A69551
151	5	8	A69552
152	5	8	A69553
153	5	8	A69554
154	5	8	A69555
155	5	8	A69556
156	2	8	A69557
157	2	8	A69558
158	2	8	A69559
159	2	8	A69560
160	2	8	A69561
161	4	8	A69562
162	4	8	A69563
163	4	8	A69564
164	4	8	A69565
165	4	8	A69566
166	6	8	A69567
167	6	8	A69568
168	6	8	A69569
169	6	8	A69570
170	6	8	A69571
1	1	9	A69577
2	1	9	A69578
3	1	9	A69579
4	1	9	A69580
5	1	9	A69581
6	1	9	A69582
7	1	9	A69583
8	1	9	A69584
9	1	9	A69585
10	1	9	A69586
11	1	9	A69587
12	1	9	A69588
13	1	9	A69589
14	1	9	A69590
15	1	9	A69591
16	1	9	A69592
17	1	9	A69593
18	1	9	A69594
19	1	9	A69595
20	1	9	A69596
21	1	9	A69597
22	1	9	A69598
23	1	9	A69599
24	1	9	A69600
25	1	9	A69601
26	3	9	A69602
27	3	9	A69603
28	3	9	A69604
29	3	9	A69605
30	3	9	A69606
31	5	9	A69607
32	5	9	A69608

33	5	9	A 6 9 6 0 9
34	5	9	A 6 9 6 1 0
35	5	9	A 6 9 6 1 1
36	2	9	A 6 9 6 1 2
37	2	9	A 6 9 6 1 3
38	2	9	A 6 9 6 1 4
39	2	9	A 6 9 6 1 5
40	2	9	A 6 9 6 1 6
41	4	9	A 6 9 6 1 7
42	4	9	A 6 9 6 1 8
43	4	9	A 6 9 6 1 9
44	4	9	A 6 9 6 2 0
45	4	9	A 6 9 6 2 1
46	6	9	A 6 9 6 2 2
47	6	9	A 6 9 6 2 3
48	6	9	A 6 9 6 2 4
49	6	9	A 6 9 6 2 5
50	6	9	A 6 9 6 2 6
51	1	9	A 6 9 6 2 7
52	1	9	A 6 9 6 2 8
53	1	9	A 6 9 6 2 9
54	1	9	A 6 9 6 3 0
55	1	9	A 6 9 6 3 1
56	1	9	A 6 9 6 3 2
57	1	9	A 6 9 6 3 3
58	1	9	A 6 9 6 3 4
59	1	9	A 6 9 6 3 5
60	1	9	A 6 9 6 3 6
61	1	9	A 6 9 6 3 7
62	1	9	A 6 9 6 3 8
63	1	9	A 6 9 6 3 9
64	1	9	A 6 9 6 4 0
65	1	9	A 6 9 6 4 1
66	1	9	A 6 9 6 4 2
67	1	9	A 6 9 6 4 3
68	1	9	A 6 9 6 4 4
69	1	9	A 6 9 6 4 5
70	1	9	A 6 9 6 4 6
71	1	9	A 6 9 6 4 7
72	1	9	A 6 9 6 4 8
73	1	9	A 6 9 6 4 9
74	1	9	A 6 9 6 5 0
75	1	9	A 6 9 6 5 1
76	3	9	A 6 9 6 5 2
77	3	9	A 6 9 6 5 3
78	3	9	A 6 9 6 5 4
79	3	9	A 6 9 6 5 5
80	3	9	A 6 9 6 5 6
81	5	9	A 6 9 6 5 7
82	5	9	A 6 9 6 5 8
83	5	9	A 6 9 6 5 9
84	5	9	A 6 9 6 6 0
85	5	9	A 6 9 6 6 1
86	2	9	A 6 9 6 6 2
87	2	9	A 6 9 6 6 3
88	2	9	A 6 9 6 6 4
89	2	9	A 6 9 6 6 5
90	2	9	A 6 9 6 6 6

91	4	9	A 6 9 6 6 7
92	4	9	A 6 9 6 6 8
93	4	9	A 6 9 6 6 9
94	4	9	A 6 9 6 7 0
95	4	9	A 6 9 6 7 1
96	6	9	A 6 9 6 7 2
97	6	9	A 6 9 6 7 3
98	6	9	A 6 9 6 7 4
99	6	9	A 6 9 6 7 5
1 00	6	9	A 6 9 6 7 6
1 21	1	9	A 6 9 6 9 7
1 22	1	9	A 6 9 6 9 8
1 23	1	9	A 6 9 6 9 9
1 24	1	9	A 6 9 7 0 0
1 25	1	9	A 6 9 7 0 1
1 26	1	9	A 6 9 7 0 2
1 27	1	9	A 6 9 7 0 3
1 28	1	9	A 6 9 7 0 4
1 29	1	9	A 6 9 7 0 5
1 30	1	9	A 6 9 7 0 6
1 31	1	9	A 6 9 7 0 7
1 32	1	9	A 6 9 7 0 8
1 33	1	9	A 6 9 7 0 9
1 34	1	9	A 6 9 7 1 0
1 35	1	9	A 6 9 7 1 1
1 36	1	9	A 6 9 7 1 2
1 37	1	9	A 6 9 7 1 3
1 38	1	9	A 6 9 7 1 4
1 39	1	9	A 6 9 7 1 5
1 40	1	9	A 6 9 7 1 6
1 41	1	9	A 6 9 7 1 7
1 42	1	9	A 6 9 7 1 8
1 43	1	9	A 6 9 7 1 9
1 44	1	9	A 6 9 7 2 0
1 45	1	9	A 6 9 7 2 1
1 46	3	9	A 6 9 7 2 2
1 47	3	9	A 6 9 7 2 3
1 48	3	9	A 6 9 7 2 4
1 49	3	9	A 6 9 7 2 5
1 50	3	9	A 6 9 7 2 6
1 51	5	9	A 6 9 7 2 7
1 52	5	9	A 6 9 7 2 8
1 53	5	9	A 6 9 7 2 9
1 54	5	9	A 6 9 7 3 0
1 55	5	9	A 6 9 7 3 1
1 56	2	9	A 6 9 7 3 2
1 57	2	9	A 6 9 7 3 3
1 58	2	9	A 6 9 7 3 4
1 59	2	9	A 6 9 7 3 5
1 60	2	9	A 6 9 7 3 6
1 61	4	9	A 6 9 7 3 7
1 62	4	9	A 6 9 7 3 8
1 63	4	9	A 6 9 7 3 9
1 64	4	9	A 6 9 7 4 0
1 65	4	9	A 6 9 7 4 1
1 66	6	9	A 6 9 7 4 2
1 67	6	9	A 6 9 7 4 3
1 68	6	9	A 6 9 7 4 4

169
170

6
6

9
9

A69745
A69746

LIFE TEST MATRIX GROUP CODES

<u>Code Number</u>	<u>Voltage</u>	<u>Temperature °C</u>
1	50	85
2	50	125
3	100	85
4	100	125
5	200	85
6	200	125

MANUFACTURER'S CODES

<u>Code Number</u>	<u>Manufacturer</u>	<u>Part Number</u>
0	Aerovox	MC605140RK
1	Chem-Electro Research	CK2R104K
2	Gulton	CK16M104K
3	Gulton	CN05M105K
4	King Electronics	KC80BW104K
5	Scionics	SCM30D104K
6	EMC	EK200R104K
7	Vitramon	VL02BK103K V-LAM
8	Vitramon	VK30BX104K
9	Westcap	B758BX104K

MEASUREMENT CODES

<u>Code Number</u>	<u>Measurement</u>
11	Initial
12	Post Burn-in
13	Post Vibration
14	Post Mechanical Shock
15	Post Thermal Shock
16	Post Moisture Resistance Test
21	168 Hour Life Test
22	500 Hour Life Test
23	1000 Hour Life Test
24	2000 Hour Life Test