Bendix

Aerospace Systems Division

Parts Application Analysis
LSPE - ALSEP Array E

NO.	REV. NO.
ATM 975	

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DATE 23 July 1971

The purpose of this ATM is to document the results of the Parts Application Analysis study conducted on the LSP Experiment. This study has included the LSPE central electronics and the Explosive Package Assembly parts and is comprised of the Bendix analysis, Geotech, and Bulova subcontractor inputs.

The stress levels shown were determined on the basis of EEE parts operation at nominal values of resistance, capacitance, voltage and current levels. The failure rates were derived using a conservative temperature level of 60°C for the electronics.

As shown in Table I, all piece parts are well within the ALSEP and Bendix established derating criteria except for three IC loads. The note below Table I explains the acceptability of these three loads.

From this analysis it is concluded that the LSPE is designed in a manner to assure a reliable operational life.

Prepared by J. T. Staats
J. T. Staats
ALSEP Reliability Dept.

8-23-71

Approved by S. J. Ellison
S. J. Ellison, Manager
ALSEP Reliability

TABLE I

A. Summary of LSPE Discrete Parts Stress Levels

Status	Quantity
0-12%	124
13-25	15
26-35	6
36-50	8
51-60	10

B. Summary of LSPE Integrated Circuit Load Levels

Load Level	Quantity
0-10%	155
11-20	42
21-30	6
31-40	13
41-50	8
51-60	9
61-70	1
*71-80	3

*The design goal for integrated circuit loading, as defined in ATM 605A, is 75% of the maximum loading level of each device. An exception to this criteria allows loading to 80% only when the addition of this extra load precludes the addition of another gate to the circuit. Reliability trade-off studies have shown that this additional loading makes the circuit more reliable than the addition of another gate.

Table of Appendix

Appendix A: Teledyne Geotech Parts Application Analysis for the SDS Amplifier and Geophones

Appendix B: Bulova Watch Company failure rate tabulation based on mechanical hardware stress

Appendix C: BxA Parts Application Analysis worksheets for BxA built electronics

NOTE: The Parts Application Analysis for the 16 channel mux-A/D Converter is documented in ATM 911.

PARTS APPLICATION ANALYSIS SUMMARY

ATM 975

PROJECT: ALSEP
DATE: 23 July 1971
ASSEMBLY: LSPE SUB ASSEMBLY: Transmitter SCHEMATIC NO: 2347820

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE	COMMENTS
CAPACITORS	28	280×10^{-6}	
RESISTORS	19	.003944	
DIODES			
SEMICONDUCTORS	10	.0385	
CRYSTAL	1	.002	
TRANSFORMERS			
CONNECTORS			
COILS & CHOKES	13	.0026	

TOTAL ASSEMBLY FAILURE RATE .047 %/1000 HOURS

MEAN-TIME-TO-FAILURE _____ HOURS

MISSION SUCCESS PROBABILITY .99991

PARTS APPLICATION ANALYSIS SUMMARY

ATM 975

PROJECT: ALSEP DATE: 23 July 1971

ASSEMBLY: LSPE SUB ASSEMBLY: DC/DC Converte SCHEMATIC NO: 2347209

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE %/1000 hrs.	COMMENTS
CAPACITORS	18	$.95027 \times 10^{-3}$	
RESISTORS	19	$.635 \times 10^{-3}$	
DIODES	15	.02421	
TRANSISTORS	4	.0408	
MICROCIRCUITS	1	.0036	
TRANSFORMERS	2	.004	
CONNECTORS			
COILS & CHOKES	5	.001	

TOTAL ASSEMBLY FAILURE RATE .0762 %/1000 HOURS

MEAN-TIME-TO-FAILURE _____ HOURS

MISSION SUCCESS PROBABILITY .99984

PARTS APPLICATION ANALYSIS SUMMARY

ATM 975

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Bd. #1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE	COMMENTS
CAPACITORS	5	25×10^{-6}	
RESISTORS	2	44×10^{-6}	
DIODES			
TRANSISTORS			
MICROCIRCUITS	47	84.2×10^{-3}	
TRANSFORMERS			
CONNECTORS			
COILS & CHOKES			

TOTAL ASSEMBLY FAILURE RATE .084269 %/1000 HOURS

MEAN-TIME-TO-FAILURE _____ HOURS

MISSION SUCCESS PROBABILITY .9998315

PARTS APPLICATION ANALYSIS SUMMARY

ATM 975

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor BD #2
DATE: 23 July 1971
SCHEMATIC NO: 2347826

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE %/1 K hr.	COMMENTS
CAPACITORS	10	156.72×10^{-6}	
RESISTORS		198.00×10^{-6}	
DIODES	1	.00385	
TRANSISTORS	2	.00510	
MICROCIRCUITS	72	.144	
TRANSFORMERS			
CONNECTORS			
COILS & CHOKES			

TOTAL ASSEMBLY FAILURE RATE .15329 %/1000 HOURS

MEAN-TIME-TO-FAILURE _____ HOURS

MISSION SUCCESS PROBABILITY .9865688

PARTS APPLICATION ANALYSIS SUMMARY

ATM 975

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Bd. #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE	COMMENTS
CAPACITORS	2	10×10^{-6}	
RESISTORS	1	22×10^{-6}	
DIODES			
TRANSISTORS			
MICROCIRCUITS	53	.0986	
TRANSFORMERS			
CONNECTORS			
COILS & CHOKES			

TOTAL ASSEMBLY FAILURE RATE .098632 %/1000 HOURS

MEAN-TIME-TO-FAILURE _____ HOURS

MISSION SUCCESS PROBABILITY .9998027

DIGITAL PROCESSOR TOTAL = .99933

PARTS APPLICATION ANALYSIS SUMMARY

ATM 975

PROJECT: ALSEP
DATE: 23 July 1971
ASSEMBLY: LSPE
SUB ASSEMBLY: Signal Processor
SCHEMATIC NO: 2348356

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE %/1 K hr.	COMMENTS
CAPACITORS	3	15×10^{-6}	
RESISTORS	24	532×10^{-6}	
DIODES	3	.00725	
TRANSISTORS	3	.00765	
MICROCIRCUITS	7	.0169	
TRANSFORMERS			
CONNECTORS			
COILS & CHOKES			

TOTAL ASSEMBLY FAILURE RATE .0323 %/1000 HOURS

MEAN-TIME-TO-FAILURE _____ HOURS

MISSION SUCCESS PROBABILITY .99999

PARTS APPLICATION ANALYSIS SUMMARY

PROJECT: ALSEP — Firing Pulse — ATM 975
ASSEMBLY: LSPE — SUB ASSEMBLY: Generator — DATE: 23 July 1971
SCHEMATIC NO: 2348360

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE	COMMENTS
CAPACITORS	4	236×10^{-6}	
RESISTORS	4	645×10^{-6}	
DIODES			
SEMICONDUCTORS	4	.01849	
RELAYS			
TRANSFORMERS			
CONNECTORS			
COILS & CHOKES			

TOTAL ASSEMBLY FAILURE RATE .01937 %/1000 HOURS

MEAN-TIME-TO-FAILURE _____ HOURS

MISSION SUCCESS PROBABILITY .99999

PARTS APPLICATION ANALYSIS SUMMARY

ATM 975

PROJECT: ALSEP
DATE: 23 July 1971
ASSEMBLY: LSPE SUB ASSEMBLY: Receiver SCHEMATIC NO: 2348351

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE	COMMENTS
CAPACITORS	18	154×10^{-6}	
RESISTORS	12	23.45×10^{-4}	
DIODES	1	.0017	
TRANSISTORS	1	.00255	
MICROCIRCUITS	4	.0144	
TRANSFORMERS			
MISC	2	.002195	
COILS & CHOKES	8	16×10^{-4}	

TOTAL ASSEMBLY FAILURE RATE .0249 %/1000 HOURS

MEAN-TIME-TO-FAILURE _____ HOURS

MISSION SUCCESS PROBABILITY .99999

APPENDIX A

ATM 975
APPENDIX A

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: 975
ASSEMBLY: 605 AMPLIFIER
SUB ASSEMBLY: DUAL REGULATOR
DATE: 20 JANUARY 1971
SCHEMATIC NO: 340[illegible]21-01

(Resistors)

1 CIR. DESIGN.	2 PART NUMBER MIL-R-10509	3 MANUFACTURER	4 RESISTANCE VALUE OHMS	5 TOLERANCE %	6 POWER RATING WATTS	7 MIL-R-10509 POWER RATING WATTS	8 POWER RATIO OPERATING/RATED	9 MIL-R-10509 STYLE	10 APPLICATION	11 MIL-R-10509 CHAR.	12 QUALITY LEVEL	13 ENVIRONMENT	14 FAILURE RATE (%/1000 hr)	15 QUALITY FACTOR	16 FAILURE RATE
R501	RNR50-H-1000FS	MEPCO	100Ω	1	.05	.004	<.1	1	Isolates OP Amp Power		A		ATM605A	1		1	.177
R502	RNR50-H-1801FS	MEPCO	1.8K	1	.05	.009	<.1	1	Bias Q501 Base		A		ATM605A	1		1	.177
R503	RNR50-H-2001FS	MEPCO	2K	1	.05	.005	<.1	1	Zener Current Limiter		A		ATM605A	1		1	.177
R504	RNR50-H-2802FS	MEPCO	28K	1	.05	NEG	<.1	1	Sets Current of CR504		A		ATM605A	1		1	.177
R505	34734-01-01	KELVIN	*	.05	.05	NEG	<.1	1	Reg + Feedback Res		A		ATM605A	1		1	1.375
R506	RNR FS	MEPCO	*	1	.05	NEG	<.1	1	Reg + Feedback Res		A		ATM605A	1		1	.177
R507	RNR FS	MEPCO	*	1	.05	NEG	<.1	1	Reg + Feedback Res		A		ATM605A	1		1	.177
R508	34734-01-05	KELVIN	6.83K	.05	.05	.006	.13	1	Reg + Feedback Res		A		ATM605A	1		1	1.375
R509	34734-01-07	KELVIN	10K	.05	.05	.010	.20	1	Reg Feedback Ref Res		A		ATM605A	1		1	1.525
R510	34734-01-07	KELVIN	10K	.05	.05	.010	.20	1	Reg Feedback Ref Res		A		ATM605A	1		1	1.525
R511	RNR50-H-2001FS	MEPCO	2K	1	.05	.005	<.1	1	Zener Current Limiter		A		ATM605A	1		1	.177
R512	RNR50-H-1801FS	MEPCO	1.8K	1	.05	.003	<.1	1	Bias Q502 Base		A		ATM605A	1		1	.177
R513	RNR50-H-1000FS	MEPCO	100Ω	1	.05	.004	<.1	1	Isolates OP Amp Power		A		ATM605A	1		1	.177

19 * = SELECTED VALUE
FAILURE RATE SOURCE (FOR COLUMN #16)
A ATM605A B
C D

20 CALCULATED MTBF NA HRS

21 TOTAL FAILURE RATE 7.353 ($/10^6$ h)

ATM 475
APPENDIX A

PARTS APPLICATION ANALYSIS

CAPACITORS

(Capacitors)

PROJECT: SDS
ASSEMBLY: SDS AMPLIFIER
SUBASSEMBLY: DUAL REGULATOR
DATE: 20 JANUARY 1971
SCHEMATIC NO: 34686-21-10

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or MFR) AND CONSTRUCTION	3 MANUFACTURER	4 CAPACITANCE VALUE μfd	5 TOLERANCE %	6 MANUFACTURER'S RATED VOLTAGE	7 OPERATING VOLTAGE DC	7 OPERATING VOLTAGE PEAK AC	8 VOLTAGE RATIO: OPERATING/RATED	9 MAXIMUM DUTY CYCLE	10 BULK AIR TEMPERATURE (°C)	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (λb) (Failures/10⁶ h)	13 FOR USE OF RELIABILITY DEPT.	14 SPECIAL ENVIRONMENT (SWITCHES)	15 FAILURE RATE MULTIPLIER	16 FINAL FAILURE RATE	17 TOTAL CAPACITOR COUNT PER TYPE	18 TOTAL FAILURE RATE (/10⁶ h)
C501	CSR13G-475KS	KEMET	4.7	10%	50	9		.18	1		AC Coupling to Q501	See 18 A		ATM605	1		1	.0107
C502	CSR13G-475KS	KEMET	4.7	10%	50	12		.24	1		OP Amp Power Filter	A		ATM605	1		1	.0107
C503	CSR13G-475KS	KEMET	4.7	10%	50	12		.24	1		OP Amp Power Filter	A		ATM605	1		1	.0107
C504	CSR13G-475KS	KEMET	4.7	10%	50	9		.18	1		AC Coupling to Q602	A		ATM605	1		1	.0107
C505	34661-01-04	U.S.C.C.	.0001	10%	100	NEGI		<.20	1		OP Amp Compensation	A		ATM605	1		1	.0107
C506	34661-01-04	U.S.C.C.	.0001	10%	100	NEGI		<.20	1		OP Amp Compensation	A		ATM605	1		1	.0107
C507	34661-01-04	U.S.C.C.	.0001	10%	100	NEGI		<.20	1		OP Amp Compensation	A		ATM605	1		1	.0107
C508	34661-01-04	U.S.C.C.	.0001	10%	100	NEGI		<.20	1		OP Amp Compensation	A		ATM605	1		1	.0107
C509	CSR13G-475KS	KEMET	4.7	10%	50	9.5		.19	1		−9.5V Filter	A		ATM605	1		1	.0107
C510	CSR13G-475KS	KEMET	4.7	10%	50	9.5		.19	1		+9.5V Filter	A		ATM605	1		1	.0107

20 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM605A B
C D

21 CALCULATED MTBF NA HRS

22 TOTAL FAILURE RATE .2642 (/10⁶ h)

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ATM 975
APPENDIX A

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: SDS
ASSEMBLY: SDS AMPLIFIER
SUB ASSEMBLY: DUAL REGULATOR
DATE: 20 JANUARY 1971
SCHEMATIC NO: 34686-21-01

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT T_A ACTUAL	MAX. TEMP °C: AMBIENT T_A RATED	MAX. TEMP °C: JUNCTION T_J ACTUAL	MAX. TEMP °C: CASE HOT SPOT T_C ACTUAL	AVG PWR DISSIPATION (mw): RATED AT 25°C: AMBIENT	AVG PWR DISSIPATION (mw): RATED AT 25°C: CASE	AVG PWR DISSIPATION (mw): ACTUAL AMBIENT T_A	AVG PWR DISSIPATION (mw): ACTUAL CASE T_C	AVG PWR DISSIPATION (mw): ACTUAL	POWER RATIO: ACTUAL PWR DISSIP / RATED PWR DISSIP (Amb or case)	POWER RATIO: ACTUAL T_A or T_C / RATED T_A or T_C	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CEO} RATED V	MAXIMUM VOLTAGES: V_{CE} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION or APPLICATION	PART SPECIAL ENVIRONMENT (Define)	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE (See below)	MULTIPLIER	FINAL FAIL RATE (%/1000 HRS)	TOTAL FAIL COUNT PER TYPE	TOTAL FAILURE RATE (/10^9 h)
Q501	SI NPN S2N2219A	TI	85	175			800		480		100	.12	.21	60	2	30	2.5			+Reg Pass Trans	ATM 605A		A	1		1	2.300
Q502	SI PNP JANTX2N2905A	TI	85	200			600		394		100	.16	.21	60	2	40	2.5			–Reg Pass Trans	ATM 605A		A	1		1	6.580
CR501	ZENER SI JANTX1N752A	TI	85	150			400		288		22	.06	.08					5.6	5.6	Voltage Offset	ATM 605A		A	1		1	3.200
CR502	DIODE GP-SI SM1N914A	TI	85	175			250		148		NEG	<.01	.01					7.5	3.6	Starting Diode	ATM 605A		A	1		1	.885
CR503	ZENER SI JANTX1N752A	TI	85	150			400		288		22	.06	.08					5.6	5.6	Voltage Offset	ATM 605A		A	1		1	3.200
CR504	REF DIODE SI PCI – 104 FCT – 1121	FSC	85	175			250		148		0.7	<.01	.01					6.7	6.7	Ref Diode	ATM 605A		A	1		1	2.425

FAILURE RATE SOURCE (See Column 23)
A ATM605A C
B D

NOTE: It is assumed the transient and peak power does not exceed the safe limit.

TOTAL FAILURE RATE 18.590 (/10^9 h)

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ATM 975
APPENDIX A

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: SDS
ASSEMBLY: SDS AMPLIFIER
SUB ASSEMBLY: DUAL REGULATOR
DATE: 20 JANUARY 1971
SCHEMATIC NO: 2466621-01

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: SEC ACTUAL	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (V, 1000 HRS)	FOR RELIABILITY USE ONLY: LEVEL	FOR RELIABILITY USE ONLY: FAILURE RATE SOURCE	FOR RELIABILITY USE ONLY: NO. OF PIECES PER SYSTEM	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE $\lambda/10^6$ HR
Z501	OP AMP LM108A	NSC	IC	85	125		±18	±9.5	±7							Error Signal Amplifier		A	1	1	2.660
Z502	OP AMP LM108A	NSC	IC	85	125		±18	±9.5	±7							Error Signal Amplifier		A	1	1	2.660

FAILURE RATE SOURCE (See Column 19)
A ATM605A
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE = 7.198 $(10^{-6}$ hr)

8xA 679

(Microcircuits)

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: SDS DATE: 20 JANUARY 1971

ASSEMBLY: SDS AMPLIFIER SUB ASSEMBLY: CAL-AMP-FIL/LOG COMP SCHEMATIC NO: 34687-21-01

(Resistors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or MFR) AND CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	7 MAXIMUM OPERATING POWER (WATTS)	8 POWER RATIO (OPERATING/RATED)	9 CALCULATED HOT SPOT (°C)	10 BULK AIR TEMPERATURE (°C)	11 CIRCUIT FUNCTION OR APPLICATION	12 MIL-R FAILURE RATE LEVEL (A, B, C, D, S, R, P, M)	13 FOR USE OF RELIABILITY ENGINEERING ONLY	14 SPECIAL SCREENING REQUIRED	15 FAILURE RATE SOURCE	16 TRIAL FAILURE RATE ($/10^6$ h)	17 TOTAL RESISTOR COUNT PER TYPE	18 TOTAL FAILURE RATE ($/10^6$ h)
R1	RNR60-H-1503FS	MEPCO	150K	±1%	.12W	NEG	<.1	.01		Cal Voltage Divider	A		ATM605A	1	.177	4	.708
R2	RNR50-H-2802FS	MEPCO	28K	±1%	.05	NEG	<.1	.01		Limit Q1 Base Current	A		ATM605A	1	.177	4	.708
R3	RNR50-H-1821FS	MEPCO	1.82K	±1%	.05	NEG	<.1	.01		Voltage Divider	A		ATM605A	1	.177	4	.708
R4	RNR50-H-2802FS	MEPCO	28K	±1%	.05	NEG	<.1	.01		Q1 Collector Load	A		ATM605A	1	.177	4	.708
R5	RNR60-H-1503FS	MEPCO	150K	±1%	.12	NEG	<.1	.01		Limits Cal Current	A		ATM605A	1	.177	4	.708
R6	RNR-60-H-1373FS	MEPCO	137K	±1%	.12	NEG	<.1	.01		Limits Cal Current	A		ATM605A	1	.177	4	.708
R7	RNR50-H-1302FS	MEPCO	13K	±1%	.05	NEG	<.1	1		Z1 Input Resistor	A		ATM605A	1	.177	4	.708
R8	RNR50-H-1302FS	MEPCO	13K	±1%	.05	NEG	<.1	1		Z1 Input Resistor	A		ATM605A	1	.177	4	.708
R9	Deleted																
R10	RNR50-H-6042FS	MEPCO	60.4K	±1%	.05	NEG	<.1	1		Z1 Bias Balance	A		ATM605A	1	.177	4	.708
R11	RNR50-H-5902FS	MEPCO	59K	±1%	.05	NEG	<.1	1		Z1 Feedback Res	A		ATM605A	1	.177	4	.708
R12	RNR60-H-1503FS	MEPCO	150K	±1%	.12	NEG	<.1	1		Q3 Drain Load	A		ATM605A	1	.177	4	.708
R13	RNR50-H-2001FS	MEPCO	2K	±1%	.05	NEG	<.1	1		Z1 Feedback Loop	A		ATM605A	1	.177	4	.708
R14	RNR50-H-1502FS	MEPCO	15K	±1%	.05	NEG	<.1	1		Z1 Feedback Loop	A		ATM605A	1	.177	4	.708
R15	RNR50-H-3011FS	MEPCO	3.01K	±1%	.05	NEG	<.1	1		Z1 Feedback Loop	A		ATM605A	1	.177	4	.708
R16	RNR50-H-4220FS	MEPCO	422Ω	±1%	.05	NEG	<.1	1		Isolates Q2 ΔR_{DS}	A		ATM605A	1	.177	4	.708
R17	RNR65-H-1004FS	MEPCO	1.0M	±1%	.25	NEG	<.1	1		Part of Z2 Input Res	A		ATM605A	1	.177	4	.708
R18	RNR65-H-1004FS	MEPCO	1.0M	±1%	.25	NEG	<.1	1		Part of Z2 Feedback Loop	A		ATM605A	1	.177	4	.708

19 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM605A B _____

C _____ D _____

20 CALCULATED MTBF NA HRS

21 TOTAL FAILURE RATE 12.036 ($/10^6$ h)

BS-321A

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: SDS

ASSEMBLY: SDS AMPLIFIER

SUB ASSEMBLY: CAL-AMP-FIL/LOG COMP

DATE: 30 JANUARY 1973

SCHEMATIC NO: 2650220-101

(Resistors)

1 CIRCUIT SYMBOL DESIGN.	2 TYPE DESIGNATION (MIL-R-NUMBER AND CONSTRUCTION)	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	7 TEMPERATURE COEFFICIENT (PARTS PER MILLION)	8 POWER RATIO OPERATED/RATED	9 NUMBER OF RESISTORS	10 VOLTAGE TRANSIENTS (V)	11 CIRCUIT FUNCTION OF APPLICATION	12 FAILURE RATE SOURCE	13 QUALITY FACTOR	14 BASE FAILURE RATE (λ_b)	15 ENVIRONMENTAL FACTOR	16 CORRECTED FAILURE RATE (λ_p)
R19	RNR60-H-4993FS	MEPCO	499K	1%	.12W	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R20	RNR60-H-1783FS	MEPCO	178K	1%	.12	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R21	RNR60-H-3093FS	MEPCO	309K	1%	.12	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R22	RNR65-H-1004FS	MEPCO	1.0M	1%	.25	NEG	<.1	1		Z2 Bias Resistor	A	1	.177	4	.708
R23	RNR50-H-6812FS	MEPCO	68.1K	1%	.05	NEG	<.1	1		Part of Z2 Feedback	A	1	.177	4	.708
R24	RNR50-H-1002FS	MEPCO	10K	1%	.05	NEG	<.1	1		Part of Z2 Feedback	A	1	.177	4	.708
R25	RNR60-H-1373FS	MEPCO	137K	1%	.12	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R26	RNR60-H-1373FS	MEPCO	137K	1%	.12	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R27	RNR60-H-1373FS	MEPCO	137K	1%	.12	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R28	RNR65-H-1004FS	MEPCO	1.0M	1%	.25	NEG	<.1	1		Z3 Input Res	A	1	.177	4	.708
R29	RNR65-H-7323FS	MEPCO	732K	1%	.25	NEG	<.1	1		Z3 Feedback Res	A	1	.177	4	.708
R30	RNR60-H-1373FS	MEPCO	137K	1%	.12	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R31	RNR60-H-1373FS	MEPCO	137K	1%	.12	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R32	RNR60-H-1373FS	MEPCO	137K	1%	.12	NEG	<.1	1		Part of Filter Network	A	1	.177	4	.708
R33	RNR65-H-1004FS	MEPCO	1.0M	1%	.25	NEG	<.1	1		Z4 Input Res	A	1	.177	4	.708
R34	RNR65-H-7323FS	MEPCO	732K	1%	.25	NEG	<.1	1		Z4 Feedback Res	A	1	.177	4	.708
R35	RNR50-H-4992FS	MEPCO	49.9K	1%	.05	NEG	<.1	1		Z5 Input Res	A	1	.177	4	.708
R36	RNR50-H-4992FS	MEPCO	49.9K	1%	.05	NEG	<.1	1		Z5 Input Res	A	1	.177	4	.708

19 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM605A B

C D

20 CALCULATED MTBF NA HRS

21 TOTAL FAILURE RATE 12.774 $/10^6$ hr

BS-321A

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: SDS

ASSEMBLY: SDS AMPLIFIER

SUB ASSEMBLY: CAL-AMP-FIL/LOG COMP

DATE: 20 JANUARY 1971

SCHEMATIC NO: 34734-01-01

(Resistors)

1 CIRCUIT DESIGNATION	2 TYPE DESIGNATION (MIL or MFG) AND CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	7 TEMPERATURE COEFFICIENT (PPM/°C)	8 POWER RATIO (OPERATING/RATED)	9 VOLTAGE RATIO (OPERATING/RATED)	10 RELIABILITY FACTOR (πR)	11 CIRCUIT FUNCTION OF APPLICATION	12 PART FAILURE RATE (%/1000 HRS)	13 PART FAILURE RATE SOURCE (FOR COLUMN 12)	14 QUANTITY OF EQUIVALENT PARTS	15 PART FAILURE RATE (%/1000 HRS)	16 PART FAILURE RATE (%/1000 HRS)	17 PART FAILURE RATE (%/1000 HRS)
R37	RNR50-H4992FS	MEPCO	49.9K	1%	.05	NEG	<.1	1		Z7 Input Res		A	ATM605A	1	.177	4	.708
R38	RNR50-H8061FS	MEPCO	8.06K	1%	.05	NEG	<.1	1		Z5 Output Limiter		A	ATM605A	1	.177	4	.708
R39	RNR50-H4751FS	MEPCO	4.75K	1%	.05	NEG	<.1	1		Z8 Output Limiter		A	ATM605A	1	.177	4	.708
R40	RNR50-H4751FS	MEPCO	4.75K	1%	.05	NEG	<.1	1		Z7 Output Limiter		A	ATM605A	1	.177	4	.708
R41	34734-01-00	KELVIN	10K	.05%	.05	NEG	<.1	1		Z8 Input Resistor		A	ATM605A	1	1.375	4	5.500
R42	34734-01-00	KELVIN	10K	.05%	.05	NEG	<.1	1		Z8 Feedback Res		A	ATM605A	1	1.375	4	5.500
R43	34734-01-00	KELVIN	10K	.05%	.05	NEG	<.1	1		Z8 Feedback Res		A	ATM605A	1	1.375	4	5.500
R44	MIL-R-55182	MEPCO	*	1%	.05	NEG	<.1	1		Sets Z7 Level		A	ATM605A	1	.177	4	.708
R45	MIL-R-55182	MEPCO	*	1%	.05	NEG	<.1	1		Sets Z7 Level		A	ATM605A	1	.177	4	.708
R46	34734-01-00	KELVIN	*	.05%	.05	NEG	<.1	1		Sets Z7 Level		A	ATM605A	1	1.375	4	5.500
R47	34734-01-08	KELVIN	10.25K	.05%	.05	NEG	<.1	1		Z9 Feedback Res		A	ATM605A	1	1.375	4	5.500
R48	MIL-R-55182	MEPCO	*	1%	.05	NEG	<.1	1		Z9 Feedback Res		A	ATM605A	1	.177	4	.708
R49	MIL-R-39007	DALE	*	1%	.05	NEG	<.1	1		Z9 Feedback Res		A	ATM605A	1	.064	4	.256
R50	34734-01-08	KELVIN	10.25K	.05%	.05	NEG	<.1	1		Z10 Feedback Res		A	ATM605A	1	1.375	4	5.500
R51	MIL-R-55182	MEPCO	*	1%	.05	NEG	<.1	1		Z10 Feedback Res		A	ATM605A	1	.177	4	.708
R52	MIL-R-39007	DALE	*	1%	.05	NEG	<.1	1		Z10 Feedback Res		A	ATM605A	1	.064	4	.256
R53	34734-01-00	KELVIN	*	.05%	.05	NEG	<.1	1		Sets Z10 Level		A	ATM605A	1	1.375	4	5.500
R54	MIL-R-55182	MEPCO	*	1%	.05	NEG	<.1	1		Sets Z10 Level		A	ATM605A	1	.177	4	.708

18 * = SELECTED VALUE

FAILURE RATE SOURCES (FOR COLUMN #13)

A ATM605A B _____

C _____ D _____

20 CALCULATED MTBF NA HRS

21 TOTAL FAILURE RATE 43.384 (/10^9 h)

BS-321A

ATM 975
APPENDIX A

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: SDS

ASSEMBLY: SDS AMPLIFIER

SUB ASSEMBLY: CAL-AMP-FIL/LOG COMP

DATE: 20 JANUARY 1971

SCHEMATIC NO: 34687-21-01

1 CIRCUIT DESIG.	2 PART NO.	3 MANUFACTURER	4 RESISTANCE	5 TOLERANCE	6 WATTAGE	7 POWER RATING CHARACTERISTIC	8 POWER RATIO OPERATING/RATED	9 STRESS ANALYSIS FACTOR	10 BULK AMBIENT TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (/10⁶ h)	13 QUALITY FACTOR	14 SPECIAL ENVIRONMENT	15 NO. OF PARTS	16 FAILURE RATE PER PART (/10⁶ h)	17 TOTAL FAILURE RATE (/10⁶ h)	18 TOTAL RESISTOR COUNT PER TYPE	19 TOTAL FAILURE RATE (/10⁶ h)
R55	MIL-R-55182	MEPCO		1%	.05	NEG	<.1	1		Sets Z10 Level		A	ATM605A	1	.177	4	.708	
R56	34734-01-06	KELVIN	4K	.05%	.05	NEG	<.1	1		Part of Summing Junction		A	ATM605A	1	1.375	4	5.500	
R57	34734-01-06	KELVIN	4K	.05%	.05	NEG	<.1	1		Part of Summing Junction		A	ATM605A	1	1.375	4	5.500	
R58	34734-01-09	KELVIN	16.2K	.05%	.05	NEG	<.1	1		Sets DC Output Level		A	ATM605A	1	1.375	4	5.500	
R59	RNR50-H-1221FS	MEPCO	1.22K	1%	.05	NEG	<.1	1		Z11 Bias Balance		A	ATM605A	1	.177	4	.708	
R60	34734-01-06	KELVIN	4K	.05%	.05	NEG	<.1	1		Z11 Feedback Res		A	ATM605A	1	1.375	4	5.500	
R61	RNR50-H-2200FS	MEPCO	220Ω	1%	.05	NEG	<.1	1		Limits Z11 Output		A	ATM605A	1	.177	4	.708	
R62	MIL-R-55182	MEPCO		1%	.05	NEG	<.1	.01		Nulls Cal-Offset		A	ATM605A	1	.177	4	.708	
R63	MIL-R-55182	MEPCO		1%	.05	NEG	<.1	.01		Nulls Cal-Offset		A	ATM605A	1	.177	4	.708	
R64	RNR50-H-6042FS	MEPCO	60.4K	1%	.05	NEG	<.1	.01		Part of Voltage Divider		A	ATM605A	1	.177	4	.708	
R65	RNR50-H-2802FS	MEPCO	28K	1%	.05	NEG	<.1	1		Q1 Bias Resistor		A	ATM605A	1	.177	4	.708	
R66	RNR50-H-1001FS	MEPCO	1K	1%	.05	NEG	<.1	.1		Q1 Emitter Resistor		A	ATM605A	1	.177	4	.708	
RT1	34689-01-01	TEL LAB	1K	1%	2.5	NEG	<.1	1		Temp Compensator		B	ATM605A	1	3.000	4	12.000	
RT2	34689-01-01	TEL LAB	1K	1%	2.5	NEG	<.1	1		Temp Compensator		B	ATM605A	1	3.000	4	12.000	
RT3	34689-01-01	TEL LAB	1K	1%	2.5	NEG	<.1	1		Temp Compensator		B	ATM605A	1	3.000	4	12.000	
RT4	34689-01-01	TEL LAB	1K	1%	2.5	NEG	<.1	1		Temp Compensator		B	ATM605A	1	3.000	4	12.000	

FOR USE OF RELIABILITY DEPT

18 * SELECTED VALUE

FAILURE RATE SOURCE (FOR COLUMN #12)

A ATM605A B MIL-217A

C D

20 CALCULATED MTBF NA HRS

21 TOTAL FAILURE RATE 75.664 (/10⁸ h)

Resistors

BS-3614

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: SDS DATE: 20 JANUARY 1971

ASSEMBLY: SDS AMPLIFIER SUBASSEMBLY: CAL-AMP-FIL/LOG COMP SCHEMATIC NO: 34687-21-01

(Capacitors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or EIA) CONSTRUCTION	3 MANUFACTURER	4 CAPACITANCE VALUE mfd	5 TOLERANCE %	6 MANUFACTURER'S RATED VOLTAGE	7 OPERATING VOLTAGE DC	7 OPERATING VOLTAGE PEAK AC	8 VOLTAGE RATIO: OPERATING/RATED	9 MAXIMUM DUTY CYCLE	10 BULK AIR TEMPERATURE (°C)	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (%/1000 hrs @ 25°C) SOURCE	12 BASIC FAILURE RATE (%/1000 hrs @ 25°C) DESIGNATION	13 SPECIAL ENVIRONMENT (DEFINED)	14 FAILURE RATE MULTIPLIER	15 FINAL FAILURE RATE	16 TOTAL CAPACITOR COUNT PER TYPE	17 TOTAL FAILURE RATE (/10⁶ h)
C1	Deleted																	
C2	34661-01-03	U.S.C.C.	.000033	10	100	<10		<.1	1		Compensates Z1		A	ATM605	1	.050	4	.200
C3	34661-01-04	U.S.C.C.	.000100	10	100	<10		<.1	1		Compensates Z1		A	ATM605	1	.050	4	.200
C4	34661-01-08	U.S.C.C.	.12	5	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C5	34661-01-07	U.S.C.C.	.068	5	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C6	34661-01-03	U.S.C.C.	.000033	10	100	<10		<.1	1		Compensates Z2		A	ATM605	1	.050	4	.200
C7	34661-01-07	U.S.C.C.	.068	5	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C8	34661-01-06	U.S.C.C.	.039	5	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C9	34661-01-05	U.S.C.C.	.022	5	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C10	34661-01-03	U.S.C.C.	.000033	10	100	<10		<.1	1		Compensates Z3		A	ATM605	1	.050	4	.200
C11	34661-01-07	U.S.C.C.	.068	5	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C12	34661-01-06	U.S.C.C.	.039	5	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C13	34661-01-05	U.S.C.C.	.022	5	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C14	34661-01-03	U.S.C.C.	.000033	10	100	<10		<.1	1		Part of Filter Network		A	ATM605	1	.050	4	.200
C15	CSRI3-E-156KS	KEMET	15	10	50	<10	2	<.1	1		Coupling to Z5		A	ATM605	1	.008	4	.032
C16	CSR13-E-156KS	KEMET	15	10	50	<10	2	<.1	1		Coupling to Z5		A	ATM605	1	.008	4	.032
C17	34661-01-01	U.S.C.C.	.000010	10	100	<10		<.1	1		Part of Z5 Feedback		A	ATM605	1	.050	4	.200
C18	34661-01-02	U.S.C.C.	.000022	10	100	<10		<.1	1		Compensates Z5		A	ATM605	1	.050	4	.200
C19	34661-01-04	U.S.C.C.	.000100	10	100	<10		<.1	1		Compensates Z5		A	ATM605	1	.050	4	.200

FOR USE OF RELIABILITY DEPT

20 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM605A B

C D

21 CALCULATED MTBF NA HRS

22 TOTAL FAILURE RATE 3.264 (/10⁶ h)

BS-321A

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: SDS

ASSEMBLY: SDS AMPLIFIER

SUBASSEMBLY: CAL-AMP-FIL/LOG COMP

DATE: 20 JANUARY 1971

SCHEMATIC NO: 34687-21-01

(Capacitors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL SPEC AND STYLE) AND CONSTRUCTION	3 MANUFACTURER	4 CAPACITANCE VALUE (mfd)	5 TOLERANCE (%)	6 MANUFACTURER'S RATED VOLTAGE	7 OPERATING VOLTAGE AC	8 OPERATING VOLTAGE DC	9 VOLTAGE DERATING (OPERATING/RATED)	10 MAXIMUM DUTY CYCLE	11 BULK AIR TEMPERATURE (°C)	12 CIRCUIT FUNCTION OR APPLICATION	13 BASIC FAILURE RATE (λ_b / 10⁶ h)	14 SPECIAL INVESTIGATION (DETAIL)	15 FAILURE RATE MULTIPLIER	16 FINAL FAILURE RATE	17 TOTAL CAPACITOR COUNT PER TYPE	18 TOTAL FAILURE RATE (/10⁶ h)
C20	34661-01-04	U.S.C.C.	.000100	10	100	<10	<.1	1			Part of Z6 Feedback	A	ATM605	1	.050	4	.200
C21	34661-01-02	U.S.C.C.	.000022	10	100	<10	<.1	1			Compensates Z6	A	ATM605	1	.050	4	.200
C22	34661-01-04	U.S.C.C.	.000100	10	100	<10	<.1	1			Compensates Z6	A	ATM605	1	.050	4	.200
C23	34661-01-04	U.S.C.C.	.000100	10	100	<10	<.1	1			Part of Z7 Feedback	A	ATM605	1	.050	4	.200
C24	34661-01-02	U.S.C.C.	.000022	10	100	<10	<.1	1			Compensates Z7	A	ATM605	1	.050	4	.200
C25	34661-01-04	U.S.C.C.	.000100	10	100	<10	<.1	1			Compensates Z7	A	ATM605	1	.050	4	.200
C26	34661-01-01	U.S.C.C.	.000010	10	100	<10	<.1	1			Compensates Z8	A	ATM605	1	.050	4	.200
C27	34661-01-01	U.S.C.C.	.000010	10	100	<10	<.1	1			Compensates Z8	A	ATM605	1	.050	4	.200
C28	34661-01-01	U.S.C.C.	.000010	10	100	<10	<.1	1			Compensates Z7	A	ATM605	1	.050	4	.200
C29	34661-01-02	U.S.C.C.	.000022	10	100	<10	<.1	1			Compensates Z7	A	ATM605	1	.050	4	.200
C30	34661-01-01	U.S.C.C.	.000010	10	100	<10	<.1	1			Compensates Z10	A	ATM605	1	.050	4	.200
C31	34661-01-02	U.S.C.C.	.000022	10	100	<10	<.1	1			Compensates Z10	A	ATM605	1	.050	4	.200
C32	34661-01-04	U.S.C.C.	.000100	10	100	<10	<.1	1			Part of Z11 Feedback	A	ATM605	1	.050	4	.200

FOR USE OF RELIABILITY TEST

20 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM605A B

C D

21 CALCULATED MTBF NA HRS

22 TOTAL FAILURE RATE 2.600 (/10⁸ h)

BS-321A

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: SDS **DATE:** 20 JANUARY 1971

ASSEMBLY: SDS AMPLIFIER **SUB ASSEMBLY:** CAL-AMP-FIL/LOG COMP **SCHEMATIC NO:** 34687-21-01

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT ACTUAL T_A	MAX. TEMP °C: JUNCTION RATED T_J	MAX. TEMP °C: CASE ACTUAL HOT SPOT T_C	AVG PWR DISSIPATION (mw): RATED AT 25°C AMBIENT	AVG PWR DISSIPATION (mw): RATED AT 25°C CASE	AVG PWR DISSIPATION (mw): ACTUAL AMBIENT T_A	AVG PWR DISSIPATION (mw): ACTUAL CASE T_C	AVG PWR DISSIPATION (mw): ACTUAL	POWER RATIO: ACTUAL/RATED 25°C (Amb. or case)	POWER RATIO: ACTUAL T_A or T_C / RATED T_A or T_C	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CEO} RATED V	MAXIMUM VOLTAGES: V_{CE} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION or APPLICATION	PART SPECIAL ENVIRONMENT (Define)	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS) / ($/10^6$ h)	SOURCE (See below)	FAIL. RATE	MULTIPLIER	FINAL RATE	TOTAL PER TYPE	COUNT	TOTAL FAILURE RATE ($/10^6$ h)
Q1	SM2N2222A SI – NPN	TI	85	175		500		200		<1	<.01	<.01	60	11	30	12			Cal Sig Amp	ATM 605		A	1	1.77	4		7.100
Q2	2N4445 N – FET	CRY	85	200		400		262		<1	<.01	<.01	25	9.5	25	<1			Gain Change Switch	ATM 605		A	1	3.8	4		15.200
Q3	JAN2N2609 P – FET	SIL	85	175		300		180		<1	<.01	<.01	30	9	30	9.5			Gain Change Driver	ATM 605		A	1	1.77	4		7.100
Q4	JANTX2N2920 DUAL NPN	NSC	85	200		600		498		<10	<.05	.05	60	10	60	10			Log Element	ATM 605		A	1	1.77	4		7.100
Q5	JAN2N3811 DUAL PNP	MOT	85	200		360		326		<10	<.05	<.05	60	10	60	10			Log Element	ATM 605		A	1	3.8	4		15.200
Q6	SM2N2907A SI – PNP	TI	85	200		500		368		<10	<.05	<.05	60	12	60	12			Cal Relay Driver	ATM 605		A	1	3.8	4		15.200
CR1	DIODE SI GEN PURPOSE SM1N914A	TI	85	175		250		148		<1	<.01	<.01					75	12	Relay Trans Suppres	ATM 605		A	1	.885	4		3.540
CR2	DIODE SI GEN PURPOSE SM1N914A	TI	85	175		250		148		<1	<.01	<.01					75	8	+Sig Splitter	ATM 605		A	1	.885	4		3.540

(29) FAILURE RATE SOURCE (See Column 23)
A ATM605 C
B D

(30) NOTE: It is assumed the transient and peak power does not exceed the safe limit.

(31) TOTAL FAILURE RATE 73.98 ($/10^8$ h)

BS-321A

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: SDS

DATE: 20 JANUARY 1971

ASSEMBLY: SDS AMPLIFIER

SUB ASSEMBLY: CAL-AMP-FIL-LOG COMP

SCHEMATIC NO: 34687-21-01

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT T_A ACTUAL	MAX. TEMP °C: JUNCTION T_J RATED	MAX. TEMP °C: CASE ACTUAL HOT SPOT T_C	AVG POWER DISSIPATION (mw): RATED AT 25°C: AMBIENT	AVG POWER DISSIPATION (mw): RATED AT 25°C: CASE	AVG POWER DISSIPATION (mw): ACTUAL: AMBIENT T_A	AVG POWER DISSIPATION (mw): ACTUAL: CASE T_C	AVG POWER DISSIPATION (mw): ACTUAL	POWER RATIO: ACTUAL/RATED 25°C Amb. or case	POWER RATIO: ACTUAL/RATED T_A or T_C	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CEO} RATED V	MAXIMUM VOLTAGES: V_{CE} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION or APPLICATION	PART SPECIAL ENVIRONMENT (Define)	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE (See below)	FAILURE RATE	MULTIPLIER	FINAL FAILURE RATE (%/1000 HRS)	TOTAL PER TYPE	COUNT	TOTAL FAILURE RATE ($/10^6$ h)
CR3	DIODE SI GEN PURPOSE SM1N914	TI	85	175		250		148		<1	<.01	<.01					75	8	-SIG CLAMP	ATM 605	.885	A	1		4		3.540
CR4	DIODE SI GEN PURPOSE SM1N914	TI	85	175		250		148		<1	<.01	<.01					75	8	+SIG CLAMP	ATM 605	.885	A	1		4		3.540
CR5	DIODE SI GEN PURPOSE SM1N914	TI	85	175		250		148		<1	<.01	<.01					75	8	-SIG CLAMP	ATM 605	.885	A	1		4		3.540
CR6	DIODE SI GEN PURPOSE SM1N914	TI	85	175		250		148		<1	<.01	<.01					75	8	-SIG CLAMP	ATM 605	.885	A	1		4		3.540
CR7	DIODE SI GEN PURPOSE SM1N914	TI	85	175		250		148		<1	<.01	<.01					75	8	+SIG CLAMP	ATM 605	.885	A	1		4		3.540

FAILURE RATE SOURCE (See Column 23)
A ATM605
B
C
D

NOTE: It is assumed the transient and peak power does not exceed the safe limit.

TOTAL FAILURE RATE 17.700 ($/10^6$ h)

BS-321A

PARTS APPLICATION ANALYSIS

(RELAYS)

PROJECT: SDS DATE: 20 JANUARY 1971

ASSEMBLY: SDS AMPLIFIER SUB ASSEMBLY: CAL-AMP-FIL/LOG COMP SCHEMATIC NO: 34687-21-01

(Relays)

CIRCUIT REFERENCE DESIGNATION 1	TYPE DESIGNATION (CSC, MIL OR MFR) AND CONSTRUCTION 2	MANUFACTURER 3	CONTACT LOAD: RATED VOLTAGE V 4	CONTACT LOAD: RATED CURRENT A 5	CONTACT LOAD: ACTUAL VOLTAGE TRANSIENTS V 6	CONTACT LOAD: ACTUAL VOLTAGE PEAK V 7	CONTACT LOAD: ACTUAL CURRENT TRANSIENTS A 8	CONTACT LOAD: ACTUAL CURRENT SURGE A 9	TYPE OF LOAD 10	NUMBER OF POLES: TOTAL 11	NUMBER OF POLES: ACTIVE 12	RELAY COIL: POWER MAX. RATED 13	RELAY COIL: POWER ACTUAL 14	RELAY COIL: VOLTAGE MAX. PULL IN 15	RELAY COIL: VOLTAGE MIN. OPER 16	RATE OF OPERATIONS PER HOUR OR SECOND 17	RQ'D LIFE OPERATIONS 18	MISCELLANEOUS REMARKS 19	DETAIL SPEC 20	FAILURE RATE SOURCE 21	QUALITY LEVEL 22	ENVIRONMENTAL MODIFIER 23	TOTAL FAILURE RATE (/10^8 h) 24
K1	D.P.D.T. SEALED SUB-MIN. 34655-01-01 (430-7090)	Teledyne	28	1.0	<.01	<.01	<.01	<.01	R	2	2	.5 W	.15 W	20	10	NEG	<50		.2	A	5	1.000

DEVICE AVERAGE AMBIENT TEMPERATURE °C: 0 AND 70 (24)

FAILURE RATE SOURCES (FOR COLUMN NO. 21) (25): A MIL-217A B C D

CALCULATED MTBF: NA HOURS (26)

TOTAL FAILURE RATE: 1.0 (/10^8 h) (27)

BS-321 A

ATM 975
APPENDIX A

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: SDS
ASSEMBLY: SDS AMPLIFIER
SUB ASSEMBLY: CAL-AMP-FIL/LOG COMP
DATE: 20 JANUARY 1971
SCHEMATIC NO: 34687-21-01

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: AMBIENT ACTUAL	MAX TEMP °C: AMBIENT RATED	MAX TEMP °C: JUNCTION ACTUAL	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: ACTUAL	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (/10^6 h)	QUALITY	FAILURE RATE	TOTAL FAILURE RATE (/10^6 h)
Z1	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							Pre-Amp	3.550	A	1	14.200
Z2	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							Filter Stage 1	3.550	A	1	14.200
Z3	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							Filter Stage 2	3.550	A	1	14.200
Z4	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							Filter Stage 3	3.550	A	1	14.200
Z5	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							Log Amp	3.550	A	1	14.200
Z6	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							− Ref Amp	3.550	A	1	14.200
Z7	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							+ Ref Amp	3.550	A	1	14.200
Z8	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							Polarity Splitter	3.550	A	1	14.200
Z9	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7							+ Summing Amp	3.550	A	1	14.200

FAILURE RATE SOURCE (See Column 19)
A ATM-9-9A
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY
$V_{MAX} = V_{HIGH} + .5\,(V_{RATED\ MAX} - V_{HIGH})$
$V_{MIN} = V_{HIGH} - .5\,(V_{HIGH} - V_{RATED\ MIN})$

TOTAL FAILURE RATE 127.800 (/10^6 h)

8xA 6-70

APPENDIX A

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: SDS

ASSEMBLY: SDS AMPLIFIER

SUB ASSEMBLY: CAL-AMP FIL/LOG COMP

DATE: 20 JANUARY 1971

SCHEMATIC NO: 34687-21-01

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: AMBIENT ACTUAL	MAX TEMP °C: AMBIENT RATED	MAX TEMP °C: JUNCTION ACTUAL	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: SEC ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (/10⁸ h)	SOURCE	FAILURE RATE	TOTAL	TOTAL FAILURE RATE (/10⁸ h)
Z10	OP AMP LM108A	NSC	IC	85	150		±18	±9.5	±7.0							Summing Amp	3.550	A	1	4	14.200
Z11	OP AMP LM741	NSC	IC	89	150		±17	±9.5	±9.0							Output Amp	3.550	A	1	4	14.200

FAILURE RATE SOURCE (See Column 19)

A ATM605A C

B D

NOTE DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6(V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE 28.400 (/10⁸ h)

BxA 679

APPENDIX B

PART NO.	NOMENCLATURE — DESCRIPTION	QTY. PER UNIT	Failure Rate
D87207	Base Mounting Assy	1	4.2×10^{-4}
F87203	Control Assy	1	5.3×10^{-5}
D87205	Timer Assy	1	3.3×10^{-5}
MS51959-13	Screw-Flat Head (#4-40 x 1/4 lg., CRES)	4	4×10^{-6}
MS51959-12	Screw-Flat Head (#4-40 x 3/16 lg., CRES)	2	2×10^{-6}
MS35275-13	Screw-Filister Head (#4-40 x 1/4 lg., CRES)	1	1×10^{-6}
B87146-02	Pull Pin Assy	1	2×10^{-6}
B87146-03	Pull Pin Assy	1	2×10^{-6}
Loctite "C"	Sealing Compound	A/R	Zero
B87230	Shim-Winding Hub	A/R	Zero
B87256	Spacer, Shaft	1	1×10^{-6}
A87187	Low Friction Plating	1	Zero
--	System Friction	-	1.3×10^{-3}
	TOTAL Failure Rate	-	1.8×10^{-3}

TITLE

TIMER, THERMAL BATTERY, LSPE ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87200

ATM 975
APPENDIX B
SHEET 2 OF 14

PART NO.	NOMENCLATURE — DESCRIPTION	QTY. PER UNIT	Failure Rate
D87175	Base Mounting	1	Zero
			-
B87171	Body-Firing Pin	1	1×10^{-6}
B87172	Tip-Firing Pin	1	1×10^{-6}
D87174	Lock-Firing Pin	1	1×10^{-6}
Esna 79-022-099-0187	Pin-Roll	1	1×10^{-6}
A87186	Switch (SCD)	2	2×10^{-4}
B87219	Screw, Modif.	4	4×10^{-6}
Loctite "C"	Sealing Compound	A/R	Zero
B87201	Spring	1	2×10^{-4}
B87241	Bushing-Firing Pin	1	1×10^{-6}
B87231	Latch	1	1×10^{-6}
	Pin Dowel 3/32 Dia. x 5/16 lg.	1	1×10^{-6}
B87255	Tip, Actuator	1	1×10^{-6}
1/32 Dia. x 3/16	Spirol Pin (Stainless Steel Type 302)	1	1×10^{-6}
C87259-01	Actuator, Switch	1	1×10^{-6}
C87259-02	Actuator, Switch	1	1×10^{-6}
1/16 Dia. x 1/2 lg.	Spirol Pin (Stainl. Stl. Type 302)	1	1×10^{-6}
	TOTAL 87207	-	4.2×10^{-4}

TITLE

TIMER, THERMAL BATTERY LSPE ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87200

ATM 975
APPENDIX B
SHEET 3 OF 14

PART	NOMENCLATURE — DESCRIP	QTY. PER UNIT	Failure Rate
S35650-314	Nut-Hex (#0-80)	1	$1\frac{2}{3} \times 10^{-6}$
87204	Watch Movement Assy	1	1.13×10^{-5}
87157	Cover-Housing	1	12×10^{-76}
S51959-13	Screw-Flat Head, 82° (#4-40 x 1/4 lg., CRES)	4	48×10^{-76}
87158	Housing-Control	1	12×10^{-76}
87143	Pawl	1	12×10^{-76}
87140	Cover-Control Arm	1	12×10^{-76}
S51959-2	Screw-Flat Head, 82° (#0-80 x 1/8 lg., CRES)	2	24×10^{-76}
87141	Cap-Housing-Seal	1	12×10^{-76}
87131	Bushing-Control	1	12×10^{-76}
87148	Spacer-Control Shaft	1	12×10^{-76}
87132	Shaft-Control	1	12×10^{-76}
87133	Arm-Control	1	12×10^{-76}
	Dowel Pin (.062 x 3/8 CRES)	1	12×10^{-76}
87136	Ring-Movement Retaining	1	12×10^{-76}
87138	Adapter-Stem Seal	1	12×10^{-76}
87190-01	"O" Ring (SCD)	1	1×10^{-6}
87182	Stem-Control	1	12×10^{-76}
87142	Retainer-Pull Pin	1	12×10^{-76}
87137	Adapter, Locating	1	12×10^{-76}
87258	Wave Washer	1	12×10^{-76}
S 51023-1	Screw, Set, Cup Pt. (#0-80 x 1.8 lg., CRES)	1	12×10^{-76}

TITLE

TIMER, THERMAL BATTERY LSPE ASSEMBLY

DATE ~~4-22-71~~ 8-6-71 ISSUE A

NX F87200

P. O.	NOMENCLATURE — DESCRIPTION	QTY. PER UNIT	Failure Rate
MS51038-2	Set Screw Cone Pt (#2-56 x 3/16 lg., CRES)	1	1×10^{-6}
A87190-02	"O" Ring (SCD)	2	2×10^{-6}
MS51023-1	Set Screw, Cup Pt. (#0-80 x 1/8 lg., CRES)	1	1×10^{-6}
A87190-03	"O" Ring (SCD)	1	1×10^{-6}
A87189-02	Ball Bearing (SCD)	1	1×10^{-6}
B87191	Nut (Adapter)	1	1×10^{-6}
B87212	Window	1	1×10^{-6}
Loctite "C"	Sealant	A/R	Zero
A87262	Epoxy (Stycast 2741) (SCD)	A/R	Zero
B87223	Coupling Drive	1	1×10^{-6}
B87222	Pin Drive	1	1×10^{-6}
B87224	Sleeve Spring	1	1×10^{-6}
B87225	Bushing	1	1×10^{-6}
C87226	Link	1	1×10^{-6}
	Grease, High Vacuum (Krytox, DuPont)		
B87221	Bushing, Drive	1	1×10^{-6}
B87248	Actuator, Clock	1	1×10^{-6}
B87252	Release Pull Pin	1	1×10^{-6}
B87260	Housing, Detent (Replace 87142)		1×10^{-6}
B87263	Detent Spring (Replace 87142)		1×10^{-6}
	TOTAL	-	53×10^{-5}

TITLE

TIMER, THERMAL BATTERY LSPE ASSEMBLY

DATE 8-6-71

ISSUE A

NX F87200

ATM 975
APPENDIX B
SHEET 5 OF 14

NO.	NOMENCLATURE — DESCRIPTION	PER UNIT	Failure Ra
C87218	Control Drum	1	1×10^{-6}
C87123	Gear-Timing	1	1×10^{-6}
C87188	Mainspring-Timer	1	1×10^{-6}
B87109	Pin-Spring Retaining	1	1×10^{-6}
D87156	Frame-Support	1	1×10^{-6}
B87150	Bushing	1	1×10^{-6}
B87183	Screw-Modified	4	8×10^{-8}
B87243	Pin-Spring Anchor	1	1×10^{-6}
B87247	Washer	1	1×10^{-6}
MS35233-1	Screw, Pan Hd. (#2-56 x 1/8 lg., CRES)	3	3×10^{-6}
B87215	Flange Mounting	1	1×10^{-6}
	Screw (#0-80 x 1/8 lg.) Pan Head	3	3×10^{-6}
B87230	Shim-Spring Winding (Hub)	3	3×10^{-6}
B87214	Mainspring Winding Shaft	1	1×10^{-6}
B87237	Bushing (Fir. Pin Pull Pin)	1	1×10^{-6}
B87216	Bearing Plate	1	1×10^{-6}
B87254	Bearing Flanged (SCD)	2	2×10^{-6}
B87239	Plate, Drum Locating	1	1×10^{-6}
B87245	Clip, Spring	1	1×10^{-6}
B87256	Shaft, Spacer	1	1×10^{-6}
B87257	Shaft, Spacer	1	1×10^{-6}
	Screw, Pan Hd. (#0-80 x 3/32 lg., CRES)	2	2×10^{-6}
	Screw, Flat Hd., 100° (#2-56 x 3/16 lg., CRES)	1	1×10^{-6}
B87264	Spacer, Shaft	1	1×10^{-6}
A87261	Flanged Bearing	2	2×10^{-6}
	TOTAL 87205	-	3.3×10^{-5}

TITLE

TIMER, THERMAL BATTERY LSPE ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87200

ATM 975
APPENDIX B
SHEET 6 OF 4

PART NO.	NOMENCLATURE — DESCRIPTION	QTY PER UNIT	Failure Ra
[illegible]7151	Pin-Pull	1	1×10^{-6}
[illegible]7153	Sleeve-Pull Pin	1	1×10^{-6}
	#24 Awg. Buss Wire Per QQ-W-343 1/2" lg.	A/R	2×10^{-6}
	TOTAL 87146-02		4×10^{-6}

TITLE

TIMER, THERMAL BATTERY, LSPE ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87200

ATM 975
APPENDIX B
SHEET 7 OF 14

PART NO.	NOMENCLATURE — DESCRIPTION	QTY. PER UNIT	Failure Rate
[illegible]7152	Pin-Pull (Firing Pin)	1	1×10^{-6}
B37153	Sleeve-Pull Pin	1	1×10^{-6}
	#24 Awg. Buss Wire Per QQ-W-343 1/2" lg.	A/R	2×10^{-6}
	TOTAL 87146-03		4×10^{-6}

TITLE	DATE 8-6-71	ISSUE A
TIMER, THERMAL BATTERY, LSPE ASSEMBLY	NX F07200	ATM 975 APPENDIX B SHEET 8 OF 14

P/N	NOMENCLATURE — DESCRIPTION	QTY. PER UNIT	Failure Rate
[illegible]7248	Base Mounting Assy	1	1.8×10^{-5}
D87185	Control Assy	1	5.3×10^{-5}
[illegible]	Timer Assy	1	3.3×10^{-5}
[illegible]-91	Pull Pin Assy	1	4×10^{-6}
MS35275-13	Screw-Fil. Hd. (#4-40 x 1/4 lg. CRES)	1	1×10^{-6}
MS51957-12	Screw-Pan Hd. (#4-40 x 3/16 lg. CRES)	2	1×10^{-6}
Item "C"	Sealant	A/R	Zero
	Screw, Pan Hd. (2-56 x 3/16, CRES)	4	4×10^{-6}
[illegible]7235	Post	1	1×10^{-6}
[illegible]7236	Post	1	1×10^{-6}
	Dowel Pin (1/16 Dia. x 3/32 lg., CRES)	2	2×10^{-6}
[illegible]7230	Shim-Winding Hub	A/R	Zero
[illegible]7256	Shaft, Spacer	1	1×10^{-6}
MS-35275-11	Screw, Fil. Hd. (#4-40 x 1/8 lg., CRES)	1	1×10^{-6}
MS-35233-13	Screw, Pan Hd. (#4-40 x 1/4 lg., CRES)	1	1×10^{-6}
[illegible]7257	Low Friction Plating	A/R	Zero
[illegible]7247	Block Jack (Slider Reset)	1	1×10^{-6}
B87266	Screw Jack (Slider Reset)	1	1×10^{-6}
-----	System Friction	-	1.3×10^{-3}
	TOTAL Failure Rate	-	1.4×10^{-3}

TITLE

S/A SLIDER TIMER ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87100

ATM 975
APPENDIX B
SHEET 9 OF 14

NO.	NOMENCLATURE — DESCRIPTION	PER UNIT	Failure Rate
[illegible]	Base-Mounting	1	Zero
[illegible]	Shaft-Lock	1	1×10^{-6}
[illegible]	Retainer	1	1×10^{-6}
MS51959-3	Screw-Flat Head, 82°, (#2-56 x 1/4 lg., CRES)	1	1×10^{-6}
[illegible]	Spacer	1	1×10^{-6}
[illegible]	Spacer	1	1×10^{-6}
[illegible]	Pin-Arming & Safing	2	2×10^{-6}
[illegible]	Spring-Compression	2	2×10^{-6}
[illegible]	Lock-Arming Pin	1	1×10^{-6}
[illegible]	Lock-Safing Pin	1	1×10^{-6}
[illegible]	Lever-Arm Lock	1	1×10^{-6}
MS51922-112	Pin-Spring (1/32 Dia. x 3/16 lg., CRES)	2	2×10^{-6}
Loctite "C"	Sealing Compound	A/R	Zero
[illegible]	Latch	2	2×10^{-6}
MS 51056-2	Screw, Set (#2-56 x 3/16 lg., CRES)	2	2×10^{-6}
	TOTAL 87208		1.8×10^{-5}

TITLE

S/A SLIDER TIMER ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87100

ATM 975
APPENDIX B
SHEET 10 OF 14

PART NO.	NOMENCLATURE — DESCRIPTION	PER UNIT	Failure Rate
MS35650-314	Nut-Hex (# 0 - 80)	1	1×10^{-6}
D87204	Watch Movement Assy	1	1.13×10^{-5}
B87130	Cover-Housing	1	1×10^{-6}
MS51959-13	Screw-Flat Head, 82° (#4-40 x 1/4 lg., CRES)	4	4×10^{-6}
B87129	Housing-Control	1	1×10^{-6}
C87143	Pawl	1	1×10^{-6}
B87139	Cover-Control Arm	1	1×10^{-6}
MS51959-2	Screw-Flat Head, 82° (#0-80 x 1/8 lg., CRES)	4	4×10^{-6}
C87141	Cap-Housing Seal	1	1×10^{-6}
B87131	Bushing-Control	1	1×10^{-6}
B87148	Spacer-Control Shaft	1	1×10^{-6}
B87132	Shaft-Control	1	1×10^{-6}
B87133	Arm-Control	1	1×10^{-6}
	Dowel Pin (.062 Dia. x 1/2 lg., CRES)	1	1×10^{-6}
B87136	Ring-Movement Retaining	1	1×10^{-6}
B87138	Adapter-Stem Seal	1	1×10^{-6}
A87190-01	"O" Ring (SCD)	1	1×10^{-6}
B87181	Stem-Control	1	1×10^{-6}
D87142	Retainer-Pull Pin (Spring Clip)	1	1×10^{-6}
B87137	Adapter, Locating	1	1×10^{-6}
B87258	Wave Washer	1	1×10^{-6}
MS 51023-1	Screw, Set, Cup Pt. (#0-80 x 1/8 lg., CRES)	1	1×10^{-6}

TITLE

S/A SLIDER TIMER ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87100

NO.	NOMENCLATURE — DESCRIPTION	QTY. PER UNIT	Failure Ra
[illegible]	Set Screw Cone Pt. (#2-56 x 3/16 lg., CRES)	1	1×10^{-6}
[illegible]-03	"O" Ring (SCD)	1	1×10^{-6}
	Set Screw, Cup Pt. (#0-80 x 1/8 lg., CRES)	1	1×10^{-6}
[illegible]-02	"O" Ring (SCD)	2	1×10^{-6}
[illegible]-02	Ball-Bearing (SCD)	1	1×10^{-6}
[illegible]	Nut (Adapter)	1	1×10^{-6}
[illegible]	Window	1	1×10^{-6}
[illegible] "C"	Sealant	A/R	Zero
[illegible]	Sealant-Epoxy (Stycast 2741) SCD	A/R	Zero
[illegible]7223	Coupling Drive	1	1×10^{-6}
B87222	Pin Drive	1	1×10^{-6}
[illegible]7224	Sleeve-Spring	1	1×10^{-6}
[illegible]7225	Bushing	1	1×10^{-6}
[illegible]7226	Link	1	1×10^{-6}
	Grease, High Vacuum (Krytox, DuPont)	A/R	Zero
[illegible]7221	Bushing, Drive	1	1×10^{-6}
[illegible]7248	Actuator, Clock	1	1×10^{-6}
[illegible]7252	Release, Pull Pin	1	1×10^{-6}
C87260	Housing, Detent (Replace 87263)	1	1×10^{-6}
B87263	Detent Spring (Replace 87263)	1	1×10^{-6}
	TOTAL 87185	-	5.3×10^{-5}

TITLE

S/A SLIDER TIMER ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87100

ATM 975
APPENDIX B
SHEET 12 OF 14

PART	NOMENCLATURE — DESCRIPTION	PER UNIT	Failure Rate
[illegible]217	Control Drum	1	1×10^{-6}
[illegible]123	Gear-Timing	1	1×10^{-6}
[illegible]128	Mainspring-Timer	1	1×10^{-6}
[illegible]129	Pin-Spring Retaining	1	1×10^{-6}
[illegible]131	Frame-Support	1	1×10^{-6}
[illegible]135	Bushing	1	1×10^{-6}
[illegible]3	Screw-Modified	4	4×10^{-6}
[illegible]213	Plate, Drum Locating	1	1×10^{-6}
[illegible]247	Washer	3	3×10^{-6}
	Screw, Pan Hd. (#0-80 x 3/32 lg., CRES)	2	2×10^{-6}
[illegible]te "C"	Sealing Compound	A/R	Zero
87215	Flange Mounting	1	1×10^{-6}
	Screw (#0-80 x 1/8 lg.) Pan Head	3	3×10^{-6}
[illegible]236	Shim-Spring Winding-Hub	3	3×10^{-6}
[illegible]214	Mainspring Winding Shaft	1	1×10^{-6}
[illegible]243	Pin-Spring Anchor	1	1×10^{-6}
[illegible]216	Bearing-Plate	1	1×10^{-6}
[illegible]254	Bearing, Flanged (SCD)	2	2×10^{-6}
[illegible]256	Spacer, Shaft	1	1×10^{-6}
[illegible]257	Spacer, Shaft	1	1×10^{-6}
[illegible]264	Spacer, Shaft	1	1×10^{-6}
[illegible]261	Flanged Bearing	2	2×10^{-6}
	TOTAL 87199	-	3.3×10^{-5}

TITLE

S/A SLIDER TIMER ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87100

ATM 975
APPENDIX B
SHEET 13 OF 14

NO.	NOMENCLATURE — DESCRIPTION	QTY. PER UNIT	Failure Rate
[illegible]	Sleeve-Pull Pin	1	1×10^{-6}
[illegible]145	Pin Pull	1	1×10^{-6}
	#24 Awg. Buss wire per QQ-W-343 1/2" lg.	1	2×10^{-6}
	TOTAL 87146-01		4×10^{-6}

TITLE

S/A SLIDER TIMER ASSEMBLY

DATE 8-6-71 ISSUE A

NX F87100

ATM 975
APPENDIX B
SHEET 14 OF 14

APPENDIX C

ATM 475
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: _____ SUB ASSEMBLY: RECEIVER
DATE: 7-20-71
SCHEMATIC NO: 2348351

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE (See Column 19)	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
AR1	2346296-1		Lin.				+18	+13.75			50% V		≈15%				.0086	A	1		.0036
AR2	2346296-1		Lin.				+18	+13.75			50% V		≈ 8%				.0036	A	1		.0036
AR3	SM107G-1		Lin.				±22	+13.75			50% V		≈ 1%				.0036	A	1		.0036
AR4	SM10FG-1		Lin.				±22	+13.75			50% V		≈ 1%				.0036	A	1		.0036

22 FAILURE RATE SOURCE (See Column 19)
A ATM605
B _____ C _____ D _____

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0144 %/1000 HRS

BxA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: ALSEP DATE: 7-20-71

ASSEMBLY: SUB ASSEMBLY: RECEIVER SCHEMATIC NO: 2348351

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT T_A ACTUAL	MAX. TEMP °C: AMBIENT T_A RATED	MAX. TEMP °C: JUNCTION T_J ACTUAL	MAX. TEMP °C: CASE HOT SPOT T_C ACTUAL	AVG PWR DISSIPATION (mw): RATED AT 25°C: AMBIENT T_A	AVG PWR DISSIPATION (mw): RATED AT 25°C: CASE T_C	AVG PWR DISSIPATION (mw): ACTUAL AMBIENT T_A	AVG PWR DISSIPATION (mw): ACTUAL CASE T_C	AVG PWR DISSIPATION (mw): ACTUAL	POWER RATIO: ACTUAL % RATED (Ambient case)	POWER RATIO: ACTUAL % RATED T_C	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION OR APPLICATION	PART SPECIAL DIVISION DESIGNATION (Define)	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FAIL. RATE SOURCE (See below)	FAIL. RATE MULTIPLIER	FINAL FAIL. RATE (%/1000 HRS)	TOTAL FAIL. PER TYPE	PART COUNT	TOTAL FAILURE RATE (%/1000 HRS)
Q1	(2N4416A) 2340366-1	T1					300				36mw	16.3%		VDG -25	-13.75	VDS -25	-13.75			Amp.		.00255	A	1				.00255
CR1	SMIN914																	75	6	Det.		.0017	A	1				.0017

22 FAILURE RATE SOURCE (See Column 23)
A ATM605 C
B D

23 NOTE: It is assumed the transient and peak power does not exceed the safe limit.

24 TOTAL FAILURE RATE .00425 %/1000 HRS.

Form BS-321A

PARTS APPLICATION ANALYSIS

(INDUCTORS & TRANSFORMERS)

PROJECT: ALSEP
ASSEMBLY:
SUB ASSEMBLY: RECEIVER
DATE: 7-20-71
SCHEMATIC NO: 2348351

(Inductors & Transformers)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or REPR) AND CONSTRUCTION	3 MANUFACTURER	CONSTRUCTION 4 TYPE OF CASE (SEE BELOW)	5 WIRE SIZE, PRIMARY	6 WIRE SIZE, SECONDARY	7 INSULATION CLASS	8 RESISTANCE	9 INDUCTANCE AT RATED CUR.	10 SPECIFIED FREQ	11 MISCELLANEOUS	TEMPERATURE (°C) 12 OPERATING AMBIENT (NOT TEST SURFACE)	13 RISE (AS METHOD)	14 EST. ACTUAL RISE	15 OPERATING TEMP RISE	16 PRIMARY CURRENT ACTUAL	17 RATED	18 PRIMARY VOLTAGE	19 SECONDARY NO. WINDINGS	20 WINDING NO.	21 VOLTAGE	22 WINDINGS	23 HIPOT READING VOLTS	24 BASIC FAILURE RATE (1/1000 HRS) – λ_b	25 SOURCE (SEE BELOW)	26 TOTAL FAILURE RATE (1/1000 HRS)
																								REL. DEPT USE ONLY	
L-1	2340319-14						.30	1.8							0	640							00.02	A	2×10^{-4}
L-2	2340319- 9						.60	.68							0	450							00.02	A	2×10^{-4}
L-3	2340319-23						3.7	10.							30	180							00.02	A	2×10^{-4}
L-4	2340319-23						3.7	10.							0	180							00.02	A	2×10^{-4}
L-5	2340319-23						3.7	10.							30	180							00.02	A	2×10^{-4}
L-6	2340319-12						.18	1.2							0	550							00.02	A	2×10^{-4}
L-7	2340319-23						3.7	10.							6	180							00.02	A	2×10^{-4}
L-8	2340319-13						.22	1.5							0	745							00.02	A	2×10^{-4}

28 TYPE OF CASE
A. HER. SEAL
B. VAC. IMP.
C. ENCAP.
D. OPEN

29 FAILURE RATE SOURCES (FOR COLUMN #26)
A. MIL-HDBK-217A B.
C. D.

30 CALCULATED MTBF _____ HRS

31 TOTAL FAILURE RATE 16×10^{-4} %/1000 HRS

DD FORM 3248

BS-321A

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: ALSEP **DATE:** 7-20-71

ASSEMBLY: _____ **SUBASSEMBLY:** RECEIVER **SCHEMATIC NO:** -2348351

(Capacitors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION STYLE OR MFR. AND CONSTRUCTION	3 MANUFACTURER	4 CAPACITANCE VALUE	5 TOLERANCE	6 MANUFACTURER'S RATED VOLTAGE	7 OPERATING VOLTAGE DC	7 OPERATING VOLTAGE AC PEAK	8 VOLTAGE RATIO OPERATING/RATED	9 MAXIMUM RPM CYCLE	10 RATED AIR TEMPERATURE (°C)	11 CIRCUIT FUNCTION OR APPLICATION	12 BASE FAILURE RATE (% PER 1000 HRS)	12 TABLE	13 SPECIAL ENVIRONMENT CONTROL	14 FAILURE RATE ADJUSTMENT	15 TOTAL FAILURE RATE	16 TOTAL CAPACITORS COUNT PER TYPE	16 TOTAL FAILURE RATE (% PER 1000 HRS)
C1	2346230-6		27 pf	+10%	200	0	0				Coupling	.005	A		.001			5×10^{-6}
C2	2346231-12		.01		200	0	0				by-pass	.005	A		.001			5×10^{-6}
C3	2346231-12		.01		200	13.75	7%				decouple	.005	A		.001			5×10^{-6}
C4	2346283-10		8-10pf			13.75					tuning	.005			.001			5×10^{-6}
C5	ECY102R2C5		2.2 pf		500	6	1.1%				coupling	.005	A		.001			5×10^{-6}
C6	2346231-12		.01		200	13.75	7%				decouple - agc	.005	A		.001			5×10^{-6}
C7	2346231-12		.01		200	6	3%	3%			by-pass	.005	A		.001			5×10^{-6}
C8	2346231-12		.01		200	13.75		7%			by-pass	.005	A		.001			5×10^{-6}
C9	2346230-1		10 pf	±10%	200	6	3%	3%			coupling	.005	A		.001			5×10^{-6}
C10	2346231-12		.01		200	13.75					decouple - agc	.005	A		.001			5×10^{-6}
C11	ECY105R6J5		5.6pf	± 5%	500	6v	1.1%					.005	A		.001			5×10^{-6}
C12	2346283-10		8-10pf								tuning	.005			.001			5×10^{-6}
C13	2346231-12		.01		200	6	3%	3%			by-pass	.005	A		.001			5×10^{-6}
C14	2346231-12		.01		200	13.75		7%			by-pass	.037			.001			37×10^{-6}
C15	2346231-12		.01		200	13.75		7%			by-pass	.037			.001			37×10^{-6}
C16	2346230-24		820pf	±10%	200	0		0			coupling	.005	A		.001			5×10^{-6}
C17	2346231-24		.1mt		100	6		6%			filter	.005	A		.001			5×10^{-6}
C18	2346231-36		1mt		50v	13.7v		27.4%			coupling	.005	A		.001			5×10^{-6}

FOR USE OF THIS FORM, SEE AD-P PROCUREMENT INSTRUCTIONS

20 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM605 B _____
C _____ D _____

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE 154×10^{-6} / 1000 HRS

BS-321A

PARTS APPLICATION ANALYSIS

RESISTORS

(Resistors)

PROJECT: ALSEP DATE: 7-20-71

ASSEMBLY: SUB ASSEMBLY: RECEIVER SCHEMATIC NO: 2348351

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or LEITR) AND CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	7 MAXIMUM OPERATING POWER (WATTS)	8 POWER RATIO (OPERATING/RATED)	9 MAXIMUM DUTY CYCLE	10 RELIABILITY TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (%/1000 HRS)	13 FROM TABLE (SEE BELOW)	14 SPECIAL ENVIRONMENTS (DEFINED)	15 FAILURE RATE MULTIPLIER	16 FINAL FAILURE RATE (%/1000 HRS)	17 TOTAL RESISTOR CIRCUIT FAIL TYPE	18 TOTAL FAILURE RATE (%/1000 HRS)
R1	RNR55E1000FS		1.00	1%	1/10		-			current limit-bias	.195	A		.001			195 x10^{-6}
R2	RNR55E5111FS		5.11K	1%	1/10	5mw	.05			AGC current limit	.195	A		.001			195x10^{-6}
R3	RNR55E4750FS		475	1%	1/10	7.6mw	.76			Load		A					
R4	RNR55E1002FS		10K	1%	1/10	3.6mw	036			AGC current limit	.195	A		.001			195x10^{-6}
R5	RNR55E1211FS		1.21K	1%	1/10	0	0			bias	.195			.001			195x10^{-6}
R6	RNR55E1001FS		1K	1%	1/10	3.6mw	.36			load-dumping	.251			.001			251x10^{-6}
R7	RNR55E2211FS		2.21K	1%	1/10	18mw	.18			Voltage divider	.214			.001			124x10^{-6}
R8	RNR55E1001FS		1K	1%	1/10	0	0			Load	.195			.001			195x10^{-6}
R9	RNR55E3012FS		30.1K	1%	1/10	0	0			bias	.195			.001			195x10^{-6}
R10	RNR55E3571FS		3.57K	1%	1/10	16mw	.16			Voltage divider	.214			.001			214x10^{-6}
R11	RNR65		SAT	1%	1/10					Feedback	.266			.001			266x10^{-6}
R12	RNR55E3321FS		3.32K	1%	1/10	30mw	.3			Filter	.233			.001			233x10^{-6}

NOT USE TO DETERMINE FAILURE RATE

19 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM605 B
C D

20 CALCULATED MTBF HRS

21 TOTAL FAILURE RATE 2.378x10^{-3} %/1000 HRS

BS-321A

APPENDIX C

PARTS APPLICATION ANALYSIS

(MISC. PARTS)

PROJECT: ALSEP
ASSEMBLY:
SUB ASSEMBLY: RECEIVER
DATE: 7-20-71
SCHEMATIC NO: 2348351

(Misc. Parts)

CIRCUIT SYMBOL NUMBER (1)	TYPE DESIGNATION (CEC, MIL OR MFR) and CONSTRUCTION (2)	MANUFACTURER (3)	TEMPERATURE RANGE MAX (4)	TEMPERATURE RANGE MIN (5)	ELECTRICAL STRESS RATED (6)	ELECTRICAL STRESS USE (7)	PERCENT DUTY CYCLE (8)	MAJOR CHARACTERISTICS and APPLICATION (9)	FOR RELIABILITY USE ONLY: BASIC FAILURE RATE (%/1000 HOURS) at ___°C (10)	FOR RELIABILITY USE ONLY: SOURCE (SEE BELOW) (11)	FOR RELIABILITY USE ONLY: PART SPECIAL ENVIRONMENT (DEFINE) (12)	FOR RELIABILITY USE ONLY: FAILURE RATE MULTIPLIER (13)	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HOURS) (14)
Y1	2346256-1							X-tol filter	.002				.002
RT1	2335661-2							Thermistor	.195	A		.021	195×10^{-6}

15 FAILURE RATE SOURCES (FOR COLUMN 11)
A. ATM605 B.
C. D. Mil Std 217 Chart XXIV

16 CALCULATED MTBF ____ HOURS

17 TOTAL FAILURE RATE .002195 %/1000 HOURS

DD Form 9258

BS-321A

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: AISEP

ASSEMBLY: _____ SUBASSEMBLY: Signal Processor

DATE: 7-20-71

SCHEMATIC NO: 2348356

(Capacitors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL-C-39 AND CONSTRUCTION)	3 MANUFACTURER	4 CAPACITANCE VALUE mfd	5 TOLERANCE %	6 DIELECTRIC RATED VOLTAGE	7 OPERATING VOLTAGE DC	7 OPERATING VOLTAGE PEAK AC	8 VOLTAGE DERATING (OPERATING/RATED)	9 MAXIMUM DUTY CYCLE	10 RELATIVE TEMPERATURE (°C)	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (λb) FROM TABLE	13 NOTE: USE OF RELIABILITY FACTOR	14 SPECIAL ENVIRONMENT (REFER)	15 FAILURE RATE SOURCE	16 FINAL FAILURE RATE	17 TOTAL CAPACITOR COUNT PER TYPE	18 TOTAL FAILURE RATE (1/1000 HRS)
C1	2346231-4		.0022	#0%	200	5.76		.687			Feedback	.005	A	.001	5x10⁻⁶			5 x 10⁻⁶
C2	2346231-24		.1	±10%	100	5.9		.055			Timing	.005	A	.001	5x10⁻⁶			5 x 10⁻⁶
C3	2346231-32		.47	±10%	50	1.58		.11			Timing	.005	A	.001	5x10⁻⁶			5 x 10⁻⁶

20 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 6.05 B _____

C _____ D _____

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE 15x10⁻⁶ 1/1000 HRS

BS-321A

APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: _____ SUB ASSEMBLY: Signal Processor

DATE: 7-20-71

SCHEMATIC NO: 2348356

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY				
				ACTUAL AMBIENT	RATED JUNCTION	ACTUAL JUNCTION	DERATED MAXIMUM	ACTUAL	DERATED MINIMUM	FAN IN %	% OF MAX I OR V	FAN OUT %	LOADING %	% OF MAX	MIN / ACTUAL %		RATE (%/ 1000 HRS)	SOURCE (See Column 19)	FAILURE RATE MULTIPLIER	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
AR1	SM107G-1		LIN				19.2	13.75	10.8			15 ma	1.57 ma	70.4%			.0036	A			.0036
AR2	SM107G-1		LIN				19.2	13.75	10.8			15 ma	7.5 ma	50%			.0036	A			.0036
U1	2346201-11		DIG				5.3	5.5	4.7			10%					.0025	A			.0025
U2	2346201-11		DIG				5.3	5.5	4.7			20% 20%					.0025	A			.0025
U3	2346207-3	T1	DIG				5.3	5.5	4.7				30% 12.1%				.0025	A			.0025
U4	2347207-18	T1	DIG				5.3	5.5	4.7				30%				.0025	A			.0025
U5	2346207-18	T1	DIG				5.3	5.5	4.7				40%				.0025	A			.0025

23 FAILURE RATE SOURCE (See Column 19)

A ATM-605 C _____

B _____ D _____

24 NOTE. DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0197 %/1000 HRS

BxA 679

ATTACHMENT C

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: ALSEP

ASSEMBLY:

SUB ASSEMBLY: Signal Processor

DATE: 7/20-71

SCHEMATIC NO: 2348356

(Resistors) ✓

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or ASTM) AND CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	7 MAXIMUM OPERATING POWER (WATTS)	8 POWER RATIO (OPERATING/RATED)	9 MAXIMUM DUTY CYCLE	10 RMS AIR TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (%/1000 HRS)	13 FAILURE RATE SOURCE (SEE BELOW)	14 SPECIAL ENVIRONMENTS (DUTIES)	15 FAILURE RATE MULTIPLIERS	16 FINAL FAILURE RATE (%/1000 HRS)	17 TOTAL RESISTOR COUNT PER TYPE	18 TOTAL FAILURE RATE (%/1000 HRS)
R1	RNR55E3012FS		30.1 K	1	1/10	.4mw	.004 ✓			Feedback-Scaling	.195	A		.001			195x10^{-6}
R2	RNR55E2212FS		22.1K	1	1/10	.5 mw	.005 ✓			Bias	.195	A		.001			195x10^{-6}
R3	RNR55E4750FS		475	1	1/10	.001	.01 ✓			Bias	.195	A		.001			195x10^{-6}
R4	RNR55E FS			1	1/10	.010	.1 ✓			Bias	.195	A		.001			195x10^{-6}
R5	RNR55E3241FS			1	1/10	.003	.03 ✓			Bias	.195	A		.001			195x10^{-6}
R6	RNR55E1001FS		1 K	1	1/10	.106	1.06 ✓			Bias	.387	A		.001			387x10^{-6}
R7	RNR55E3320FS		332	1	1/10	.035	.35 ✓			Bias	.251	A		.001			251x10^{-6}
R8	RNR55E1002FS		10 K	1	1/10	.0025	.025 ✓			Scaling	.191	A		.001			195x10^{-6}
R9	RNR55E8250FS		825	1	1/10	.0224	.224 ✓			Input Current Limit	.233	A		.001			233x10^{-6}
R10	RNR55E1502FS		15 K	1	1/10	0.6mw	.006 ✓			Bias	.145	A		.001			195x10^{-6}
R11	RNR55E3652FS		36.5 K	1	1/10	.96mw	.009 ✓			Scaling	.195	A		.001			195x10^{-6}
R12	RNR55E6190FS		619	1	1/10	.049	.49 ✓			Collect or Current Limit	.266	A		.001			266x10^{-6}
R13	RNR55E4750FS		475	1	1/10	.0105	.105 ✓			Voltage Divider	.214	A		.001			214x10^{-6}
R14	RNR55E2001FS		2 K	1	1/10	.0664	.664 ✓			Voltage Divider	.309	A		.001			309x10^{-6}
R15	TBD			1	1/10	.01	.1 ✓			Timing	.195	A		.001			195x10^{-6}
R16	TBD			1	1/10	.01	.1 ✓			Timing	.195	A		.001			195x10^{-6}
R17	RNR55E5620FS		562	1	1/10	.15mw	.0015 ✓			Bias	.195	A		.001			195x10^{-6}
R18	RNR55E5620FS		562	1	1/10	.00257	.0257 ✓			Voltage Divider	.195	A		.001			195x10^{-6}

FOR USE OF RELIABILITY ONLY

19. FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM1605 B
C D

20. CALCULATED MTBF HRS

21. TOTAL FAILURE RATE 3.164x10^{-3} %/1000 HRS

FORM 9004

BS-321A

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: ALSEP

DATE: 7-20-71

ASSEMBLY:

SUB ASSEMBLY: Signal Processor

SCHEMATIC NO: 2348356

(Resistors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or NSTR) AND CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	6 MAXIMUM OPERATING POWER (WATTS)	7 POWER RATIO OPERATING/RATED	8 MAXIMUM DUTY CYCLE	9 RMS AIR TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (%/1000 HRS)	13 FAILURE RATE SOURCE	14 SPECIAL ENVIRONMENTS DERATING	15 FAILURE RATE SOURCE	16 TOTAL FAILURE RATE (%/1000 HRS)	17 TOTAL RESISTOR COUNT PER TYPE	18 TOTAL FAILURE RATE (%/1000 HRS)
R19	RNR55E1821FS		1.82 K	1	1/10	.0562	.562			Voltage Divider	.195	A		.001			195×10^{-6}
R20	RNR55E1001FS		1 K	1	1/10	.025	.25			Load	.233	A		.001			233×10^{-6}
R21	RNR55E1000FS		100	1	1/10	.0025	.025			Bias	.195	A		.001			195×10^{-6}
R22	RNR55E1502FS		15 K	1	1/10	.0384	.384			Input Current Limit	.251	A		.001			251×10^{-6}
R23	RNR55E1820FS		182	1	1/10	.0074	.074			Current Limit	.195	A		.001			195×10^{-6}
R24	RCR20G222JS		2.2	5	1/2	.175	.35			Current Limit	.251	A		.001			251×10^{-6}

FOR USE OF RELIABILITY DEPT

19. FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 605 A B

C D

20. CALCULATED MTBF HRS

21. TOTAL FAILURE RATE 1.32×10^{-3} %/1000 HRS

BS-321A

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: ALSEP
DATE: 7-20-71
ASSEMBLY:
SUB ASSEMBLY: Signal Processor
SCHEMATIC NO: 2348356

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT ACTUAL T_A	MAX. TEMP °C: AMBIENT RATED T_A	MAX. TEMP °C: JUNCTION T_J	MAX. TEMP °C: CASE ACTUAL HOT SPOT T_C	AVG PWR DISSIPATION (mw): RATED AT 25°C: AMBIENT	AVG PWR DISSIPATION (mw): RATED AT 25°C: CASE	AVG PWR DISSIPATION (mw): ACTUAL: AMBIENT ACTUAL T_A	AVG PWR DISSIPATION (mw): ACTUAL: CASE ACTUAL T_C	AVG PWR DISSIPATION (mw): ACTUAL	POWER RATIO: ACTUAL % OF RATED (Ambient case)	POWER RATIO: ACTUAL T_J % OF T_J RATED	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CEO} RATED V	MAXIMUM VOLTAGES: V_{CE} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION OR APPLICATION	PART SPECIAL DEVELOPMENT (Outline)	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE (See Column 23)	DETAIL RATE	TOTAL DETAIL RATE (%/1000 HRS)	TOTAL DETAIL PER TYPE	QUALITY	TOTAL FAILURE RATE (%/1000 HRS)
CR1	SM1N914																		75	0	bias		.0017	A					.0017
CR2	SM1N914																		75	0	bias		.0017	A					.0017
VR1	S1N751A							400			45.4	11.4%									ref.		.00385	A					.00385
Q_1	SM4419C						300	600			48.9	16.3%		30	5.5	15	5.5				amp.		.00255	A					.00255
Q_2	SM4419C						300	600			7.5 mw	2.5%		30	5.1	15	5.1				amp.		.00255	A					.00255
Q_3	SM4419C						300	600			25	8.3%		30	5.1	15	5.1				amp.		.00255	A					.00255

FAILURE RATE SOURCE (See Column 23)
A ATM605
B
C
D

NOTE: It is assumed the transient and peak power does not exceed the safe limit.

TOTAL FAILURE RATE .0159 %/1000 HRS.

BS-321A

ATM 775
APPENDIX C

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

(Semiconductors)

PROJECT: ALSEP **DATE:** 7-20-71

ASSEMBLY: _____ **SUB ASSEMBLY:** Firing Pulse Gen **SCHEMATIC NO:** 2348360

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT T_A	MAX. TEMP °C: ACTUAL T_A	MAX. TEMP °C: RATED T_J	MAX. TEMP °C: ACTUAL JUNCTION T_J	MAX. TEMP °C: ACTUAL CASE HOT SPOT T_C	AVG PWR DISSIPATION (mw): RATED AT 25°C: AMBIENT	AVG PWR DISSIPATION (mw): RATED AT 25°C: CASE	AVG PWR DISSIPATION (mw): ACTUAL: AMBIENT T_A	AVG PWR DISSIPATION (mw): ACTUAL: CASE T_C	AVG PWR DISSIPATION (mw): ACTUAL	POWER RATIO: °C DERATING ACTUAL (Ambient case)	POWER RATIO: °C DERATING ACTUAL T_A to T_C	MAXIMUM VOLTAGES: V_{CBO} RATED	MAXIMUM VOLTAGES: V_{CB} ACTUAL	MAXIMUM VOLTAGES: V_{CBO} RATED	MAXIMUM VOLTAGES: V_{CE} ACTUAL	DIODE PIV: RATED	DIODE PIV: ACTUAL	CIRCUIT FUNCTION or APPLICATION	PART SPECIAL ENVIRONMENT (Define)	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE (See Below)	FOR RELIABILITY USE ONLY: FAIL RATE	FOR RELIABILITY USE ONLY: MULTIPLIER	FOR RELIABILITY USE ONLY: FAIL RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: TOTAL FOR TYPE	FOR RELIABILITY USE ONLY: COUNT	TOTAL FAILURE RATE (%/1000 HRS)
1	2	3	4				5	6					7		8					9										
CR1	2340388-1							8.6 (W)		72.7			4%		400	24.7			400		Power Switch		.0134	A						.0134
CR2	SM1N914																		75	5	Block		.00127	A						.00127
CR3	SM1N914																		75	13.75			.00127	A						.00127
Q1	SM4419C							300	600			25	8.3%		30	5.1	15	5.1			Buffer		.00255	A						.00255

FAILURE RATE SOURCE (See Column 23)
A ATM 605 C _____
B _____ D _____

NOTE: It is assumed the transient and peak power does not exceed the safe limit.

TOTAL FAILURE RATE .0849 %/1000 HRS.

FORM BS-321A

PARTS APPLICATION ANALYSIS

RESISTORS

(Resistors)

PROJECT: ALSEP DATE: 7-20-71

ASSEMBLY: SUB ASSEMBLY: Firing Pulse Gen SCHEMATIC NO: 2368360

1 CIRCUIT SYMBOL NUMBER	3 TYPE DESIGNATION (MIL or MFR) AND CONSTRUCTION	5 MANUFACTURER	6 RESISTANCE VALUE (OHMS)	7 TOLERANCE (%)	8 POWER RATING (WATTS)	9 MAXIMUM OPERATING POWER (WATTS)	10 POWER RATIO (OPERATING/RATED)	11 MAXIMUM DUTY CYCLE	12 BULK AIR TEMPERATURE °C	13 CIRCUIT FUNCTION OR APPLICATION	14 BASIC FAILURE RATE (%/1000 HRS) AT 40°C BULK AIR TEMP (SEE BELOW)	15 USE CODE (SEE BELOW)	16 SPECIAL ENVIRONMENTS (SEE BELOW)	17 FAILURE RATE MULTIPLIER	18 FINAL FAILURE RATE (%/1000 HRS)	19 TOTAL QUANTITY COUNT PER TYPE	20 TOTAL FAILURE RATE (%/1000 HRS)
R1	RCR20G681JS		680	5%	1/2	.898	<.01			Decoupling	.022	A		.001			22×10^{-6}
R2	RNR55E1003FS		100K	1%	1/10	.061 mw	< 1%			Bleed	.195	A		.001			195×10^{-6}
R3	RNR55E1001FS		1 K	1%	1/10	25mw	25%			Noise Suppression	.233	A		.001			233×10^{-6}
R4	RNR55E1000FS		100	1%	1/10	250 mw	2.5			Current Limit	.195	A		.001			195×10^{-6}

19 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 605 B

C D

20 CALCULATED MTBF HRS

21 TOTAL FAILURE RATE 645×10^{-6} %/1000 HRS

BS-321A

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: ALSEP
ASSEMBLY: _____ SUBASSEMBLY: Firing Pulse Gen
DATE: 7-20-71
SCHEMATIC NO: 2348360

(Capacitors)

1 Circuit Symbol Number	2 Type Designation (Mil. Yr. Mfr) and Construction	3 Manufacturer	4 Capacitance Value (pf)	5 Tolerance %	6 Manufacturer's Rated Voltage	7 Operating Voltage DC	7 Operating Voltage Peak AC	8 Voltage Derating Operating/Rated	9 Maximum Duty Cycle	10 Hole Air Temperature (°C)	11 Circuit Function or Application	12 Basic Failure Rate (λb) Table	13 Factors	14 Special Environment Factors	15 Failure Rate Multiplier	16 Final Failure Rate	17 Total Capacitor Count Per Type	18 Total Failure Rate (1/1000 Hrs)
C1	2346246-17		300	10%	30	24.7		.823			Decouple	.104 A		.001				104×10^{-6}
C2	2346231-36		.1	10%	50	24.7		.494			Delay	.013 A		.001				13×10^{-6}
C3	2346246-17		300	10%	30	24.7		.823			Decouple	.104 A		.001				104×10^{-6}
C4	2346246-24		1.0	10%	100	5.1		.0494			Delay	.005 A		.001				5×10^{-6}

FOR USE OF RELIABILITY ONLY

20 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM605 B _____
C _____ D _____

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE 226×10^{-6} / 1000 HRS

BS-321A

ATM 475
APPENDIX C

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: ALSEP
ASSEMBLY: _____ SUBASSEMBLY: LSP Transmitter
DATE: 7-26-68
SCHEMATIC NO: 2347821

(Capacitors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL-C-XXX CONSTRUCTION)	3 MANUFACTURER	4 CAPACITANCE VALUE (MF)	5 TOLERANCE %	6 MANUFACTURER'S RATED VOLTAGE	7 OPERATING VOLTAGE DC	7 OPERATING VOLTAGE PEAK AC	8 VOLTAGE PERCENTAGE RATED (OPERATING/RATED)	9 MAXIMUM DUTY CYCLE	10 MAX AMBIENT TEMPERATURE (°C)	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (FAILURES/10⁶ HOURS)	13 SOURCE	14 SPECIAL ENVIRONMENT CONDITION	15 FAILURE RATE MULTIPLIER	16 FINAL FAILURE RATE	17 TOTAL CAPACITOR COUNT PER TYPE	18 TOTAL FAILURE RATE PER TYPE (FAILURES/10⁶ HOURS)
C1	2346246-35		160	±10	50	28		.56			Filter	.040	A		.001			40 x 10^{-6}
C2	2346246-35		160	±10	50	28		.56				.040	A		.001			40 x 10^{-6}
C3	2346246-35		160	±10	50	28		.56				.040	A		.001			40 x 10^{-6}
C4	2346246-35		160	±10	50	28		.56				.040	A		.001			40 x 10^{-6}
C5	2346231-4		.0022	±10	200	28		.14				.005	A		.001			5 x 10^{-6}
C6	2346330-25		.001	±10	200	28		.14			By-pass	.005	A		.001			5 x 10^{-6}
C7	2346231-4		.0022	±10	200	28		.14			By-pass-decouple	.005	A		.001			5 x 10^{-6}
C8	2346285-10		.8-10 μμf		250	28		.14			Trim	.0004	A		.001			0.4 x 10^{-6}
C9	2346231-4		.0022	±10	200	28		.14			By-pass	.005	A		.001			5 x 10^{-6}
C10	2346231-36		1	±10	50	5		.10			Coupling	.005	A		.001			5 x 10^{-6}
C11	2346230-20		390 μμf	±10	200	28		.14			Coupling	.005	A		.001			5 x 10^{-6}
C12	2346233-5		22 μμf	±10	100		28	.28			Coupling-filter	.005	A		.001			5 x 10^{-6}
C13	2346230-8		39 μμf	±10	200		28	.14			Coupling-filter	.005	A		.001			5 x 10^{-6}
C14	2340391-17		470 μμf	± 1	200		28	.14			Coupling-filter	.005	A		.001			5 x 10^{-6}
C15	2346230-25		82μμf	±10	200		28	.14			Filter	.005	A		.001			5 x 10^{-6}
C16	2346230-14		120 μμf	±10	200		28	.14			Filter	.005	A		.001			5 x 10^{-6}
C17	2346230-9		47 μμf	±10	200		28	.14			Filter	.005	A		.001			5 x 10^{-6}
C18	2346283-10		.8-10 μμf		250		28	.112			Trim	.0004	A		.001			3 x 10^{-6}
C19	2346231-4		.0022	±10	200		28	.14			Coupling	.005	A		.001			5 x 10^{-6}

20 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM 605 B _____
C _____ D _____

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE 210 x 10^{-6} / 1000 HRS

BS-321A

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: ALSEP **DATE:** 7-20-71

ASSEMBLY: _____ **SUBASSEMBLY:** LSP Transmitter **SCHEMATIC NO:** 2347821

(Capacitors)

1 Circuit Symbol Number	2 Type Designation (Det. of Mfr) and Construction	3 Manufacturer	4 Capacitance Value	5 Tolerance %	6 Manufacturer's Rated Voltage	7 Operating Voltage DC	7 Operating Voltage AC	8 Working Peak Overstress Rated	9 Failure Duty Cycle	10 Failure Ambient Temperature (°C)	11 Circuit Function or Application	12 Base Failure Rate (λb) @ 1000 hrs	13 Factors	14 For Use of Alternate Data	15 Special Environment Factor(s)	16 Failure Rate Multiplier	17 Final Failure Rate	18 Total Capacitor Count Per Type	19 Total Failure Rate (λ) /1000 hrs
C20	2346231-4		.0022	±10	200	12		.06			By-pass	.005	A		.001				$.5 \times 10^{-6}$
C21	2346283-10		8-10μμf		250		28	.112			Trim	.0004	A		.001				$.04 \times 10^{-6}$
C22	2346230-8		39 μμf	±10	200		28	.14			Tuning-coupling	.005	A		.001				$.5 \times 10^{-6}$
C23	2346230-17		220 μμf	±10	200	.7		.0035			Tuning	.005	A		.001				$.5 \times 10^{-6}$
C24	2346230-25		.001	±10	200	.7		.035			Filter	.005	A		.001				$.5 \times 10^{-6}$
C25	2346230-25		.001	±10	200	.7		.035			Filter	.005	A		.001				$.5 \times 10^{-6}$
C26	2346231-4		.0022	±10	200	24		.012			By-pass	.005	A		.001				$.3 \times 10^{-6}$
C27	EC410270G5		27μμf	± 2	500		26	.052			Divider	.005	A		.001				$.5 \times 10^{-6}$
C28	EC410241J3		240 μμf	± 5	300		2	.0067			Divider	.005	A		.001				$.5 \times 10^{-6}$

20 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM 605 B _____
C _____ D _____

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE 40.4×10^{-6} /1000 HRS

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PARTS APPLICATION ANALYSIS

(INDUCTORS & TRANSFORMERS)

PROJECT: ALSEP **DATE:** 7-20-71

ASSEMBLY: **SUB ASSEMBLY:** LSP Transmitter **SCHEMATIC NO:** 2347821

(Inductors & Transformers)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or MFR) AND CONSTRUCTION	3 MANUFACTURER	CONSTRUCTION 4 TYPE OF CASE (SEE BELOW)	5 WIRE SIZE, PRIMARY	6 WIRE SIZE, SECONDARY	7 INSULATION CLASS	8 VA RATING	9 INDUCTANCE AT RATED CUR.	10 SPECIFIED FREQ	11 MISCELLANEOUS	TEMPERATURE (°C) 12 OPERATING AMBIENT (HOT SPOT SURFACE)	13 RISE (AS METHOD)	14 HOT SPOT ACTUAL RISE	15 OPERATING TEMP MAX.	16 PRIMARY CURRENT ACTUAL	17 PRIMARY CURRENT RATED	18 PRIMARY VOLTAGE	19 SECONDARY NO. WINDINGS	20 WINDING NO.	21 VOLTAGE	22 WINDINGS	HIPOT READING 23 VOLTS	24	25 BASIC FAILURE RATE (λb) (1/1000 HRS) — Δ (SEE SOURCE BELOW)	26 TOTAL FAILURE RATE (λ/1000 HRS)
														ma	ma									REL. DEPT USE ONLY		
L1	2340319-23						10	3.70						56	0 180	57	0 msec.							0002		0002
L2	2340319-38						.12	.08						66	4 1100	rms								0002		0002
L3	2340319-7						.47	.35						47	0 590	rms								0002		0002
L4	2340319-6						.39	.30						57	2 640	rms								0002		0002
L5	2340319-2						.18	.12						122	0 1010	rms								0002		0002
L6	2340319-7						.47	.35						47	0 590	rms								0002		0002
L7	2340319-23						10	3.70						8	180	dc								0002		0002
L8	2340319-12						1.2	.18						30	825	rms								0002		0002
L9	2365416																							0002		0002
L10	2340319-38						.12	.08						20	1100	rms								0002		0002
L11	2340319-1						.15	.10						0	1100									0002		0002
L12	2340319-23						10	3.70						20	180	rms								0002		0002
L13	2340319-13						1.5	.22						3	745	dc								0002		0002

28 TYPE OF CASE
A. HER. SEAL
B. VAC. IMP.
C. ENCAP.
D. OPEN

29 FAILURE RATE SOURCES (FOR COLUMN #26)
A. ATM 1605 B.
C. D.

30 CALCULATED MTBF _____ HRS

31 TOTAL FAILURE RATE 2.6×10^{-3} %/1000 HRS

DD FORM 9248

BxA 321A

APPENDIX C

PARTS APPLICATION ANALYSIS

(MISC. PARTS)

PROJECT: ALSEP **DATE:** 7-20-71

ASSEMBLY: _____ **SUB ASSEMBLY:** LSP Transmitter **SCHEMATIC NO:** 2347821

(Misc. Parts)

CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (USC, MIL OR MFR) AND CONSTRUCTION	MANUFACTURER	TEMPERATURE RANGE		ELECTRICAL STRESS		PERCENT DUTY CYCLE	MAJOR CHARACTERISTICS AND APPLICATION	PER RELIABILITY DUE ONLY				
			MAX	MIN	RATED	USED			BASIC FAILURE RATE (F/1000 HOURS) AT °C	ADJUSTED FAILURE RATE	PART SPECIAL ENVIRONMENT RATING	FAIL-URE RATE QUALITY CLASS	TOTAL FAILURE RATE (F/1000 HOURS)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Y-1	2346288-4							Crystal-oscillater	.002				.002

15 FAILURE RATE SOURCES (FOR COLUMN 11)
A. ATM 60T B. _____
C. _____ D. MIL-HDBK-217 Chart XIIIV

16 CALCULATED MTBF _____ HOURS

17 TOTAL FAILURE RATE .002 /1000 HOURS

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APPENDIX C

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: ALSEP

DATE: 7/20-71

ASSEMBLY:

SUB ASSEMBLY: LSP Transmitter

SCHEMATIC NO: 2347820

(Resistors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or NON) AND CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	7 MAXIMUM OPERATING POWER (WATTS)	8 POWER RATIO (OPERATING/RATED)	9 MAXIMUM RMT CYCLE	10 AMBIENT TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (% PER 1000 HRS)	13 FAILURE RATE SOURCE	14 SPECIAL ENVIRONMENTS (DEFINED)	15 FAILURE RATE SOURCE	16 TOTAL FAILURE RATE (% PER 1000 HRS)	17 TOTAL RESISTOR CIRCUIT FAILURE RATE	18 TOTAL FAILURE RATE (% PER 1000 HRS)
R1	RNR55E3320FS		332	1	1/10	2360	23.6	pulse			.195	A		.001			195×10^{-6}
R2	RNA55E1003FS		100K	1	1/10	8	.08	pulse			.195	A		.001			195×10^{-6}
R3	RNR55E4751		4.75K	1	1/10	.108	1/1000	pulse			.195	A		.001			195×10^{-6}
R4	RNR55E4751		4.75K	1	1/10	50	.05	pulse			.195	A		.001			195×10^{-6}
R5	RNR55E4751		4.75K	1	1/10	153	1.53	pulse			.195	A		.001			195×10^{-6}
R6	RNR55E1002		10K	1	1/10	72.9	72.9	pulse			.195	A		.001			195×10^{-6}
R7	RNR55E49R9		49.9	1	1/10	17.8	17.8	pulse			.214	A		.001			214×10^{-6}
R8	RNR55E2210		221	1	1/10	56.5	56.6	pulse			.195	A		.001			214×10^{-6}
R9	RNR55E7520		75	1	1/10	1860	18.8	pulse			.195	A		.001			214×10^{-6}
R10	RNR55E1211		1.21K	1	1/10	19.1	.19x1	pulse			.214	A		.001			214×10^{-6}
R11	RCR076122JS		1.2K	5	1/8	76.8	.614	pulse			.195	A		.001			145×10^{-6}
R12	RNR55E49R9FS		49.9	1	1/10	17.8	17.8	pulse			.214	A		.001			145×10^{-6}
R13	RNR5FC10R0FS		10	1	1/8	49	.49	pulse			.266	A		.001			145×10^{-6}
R14	RNR55E49R9		49.9	1	1/10	1260	12.6	pulse			.195	A		.001			145×10^{-6}
R15	RNR55E6810		681	1	1/10	0	0	pulse			.195	A		.001			145×10^{-6}
R16	RNR55E1210		121	1	1/10	4.05	4.05	pulse		bias	.195	A		.001			145×10^{-6}
R17	RNR55E75R0		75	1	1/10	1.68	1.68	pulse			.195	A		.001			145×10^{-6}
R18	RNR55E1820		182	1	1/10	45.4	.454	pulse			.266	A		.001			145×10^{-6}

FOR USE OF RELIABILITY ONLY

19 FAILURE RATE SOURCES (FOR COLUMN #16)

A ATM605 B

C D

20 CALCULATED MTBF HRS

21 TOTAL FAILURE RATE 3.19×10^{-3} %/1000 HRS

FORM 9091

BS-321A

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: ALSEP DATE: 7-20-71

ASSEMBLY: SUB ASSEMBLY: LSP Transmitter SCHEMATIC NO: 2347821

(Resistors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or NEMA) AND CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (MW)	7 MAXIMUM OPERATING POWER (MW)	8 POWER RATIO OPERATING/RATED	9 MAXIMUM DUTY CYCLE	10 AMBIENT TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (%/1000 HRS)	13 FOR USE OF RELIABILITY DEPT	14 SPECIAL ENVIRONMENTS (RATING)	15 FAILURE RATE MULTIPLIER	16 FINAL FAILURE RATE (%/1000 HRS)	17 TOTAL RESISTOR COUNT PER TYPE	18 TOTAL FAILURE RATE (%/1000 HRS)
R19	RNR55E2210FS		22	1	100	26	.26				.235	A		.001			235×10^{-6}

19 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 1&2S B

C D

20 CALCULATED MTBF HRS

21 TOTAL FAILURE RATE 235×10^{-6} %/1000 HRS

BS-321A

APPENDIX C

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: ALSEP **DATE:** 7-20-72

ASSEMBLY: _____ **SUB ASSEMBLY:** LSP Transmitter **SCHEMATIC NO:** 2347821

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT T_A ACTUAL	MAX. TEMP °C: RATED JUNCTION T_J	MAX. TEMP °C: ACTUAL CASE HOT SPOT T_C	AVG PWR DISSIPATION (mw): RATED AT 25°C: AMBIENT	AVG PWR DISSIPATION (mw): RATED AT 25°C: CASE	AVG PWR DISSIPATION (mw): ACTUAL: AMBIENT T_A	AVG PWR DISSIPATION (mw): ACTUAL: CASE T_C	AVG PWR DISSIPATION (mw): ACTUAL	POWER RATIO: °C OR CIRCUIT ACTUAL / RATED	POWER RATIO: °C OR CIRCUIT ACTUAL / RATED	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION OR APPLICATION	PART SPECIAL DEVIATION (Define)	FOR RELIABILITY USE ONLY: RATE (% PER 1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE (See Below)	FOR RELIABILITY USE ONLY: FAIL RATE MULTIPLIER	FOR RELIABILITY USE ONLY: FINAL FAIL RATE (% PER 1000 HRS)	FOR RELIABILITY USE ONLY: TOTAL FAIL RATE	FOR RELIABILITY USE ONLY: CODE TYPE	TOTAL FAILURE RATE (%/1000 HRS)
Q1	S2N2222A					500				3			75	28	40	28					.00255	A					.00255
Q2	SM2N2907A					1800				80			60	28	60	28					.0134	A					.0134
Q3	2346250-2					70W				6.64W			65	28	30	28			570 μ sec		.0051	A					.0051
Q4	S2N918					200							30	28	15	25					.00255	A					.00255
Q5	2340389-1					5000							55	28	30	28					.00510	A					.00510
Q6	S2N918					200							30	12	15	12					.00255	A					.00255
CR1	2340379-1																50				.00127	A					.00127
CR2	2340379-1																50	20	det.		.00127	A					.00127
CR3	SIN916B																75	7.0	det.		.00127	A					.00127

FAILURE RATE SOURCE (See Column 22)
A ATM 605 C _____
B _____ D _____

NOTE: It is assumed the transient and peak power does not exceed the safe limit.

TOTAL FAILURE RATE = .08474 %/1000 HRS.

BS-321A

ATM 475
APPENDIX C

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: ALSEP DATE:

ASSEMBLY: SUB ASSEMBLY: LSP Transmitter SCHEMATIC NO: 2347820

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT T_A ACTUAL	MAX. TEMP °C: AMBIENT T_A RATED	MAX. TEMP °C: JUNCTION T_J ACTUAL	MAX. TEMP °C: CASE HOT SPOT T_C ACTUAL	AVG PWR DISSIPATION (watts): RATED AT 25°C: AMBIENT	AVG PWR DISSIPATION (watts): RATED AT 25°C: CASE	AVG PWR DISSIPATION (watts): AMBIENT T_A ACTUAL	AVG PWR DISSIPATION (watts): CASE T_C ACTUAL	AVG PWR DISSIPATION (watts): ACTUAL	POWER RATIO: ACTUAL (Ambient case)	POWER RATIO: ACTUAL RATED T_J or T_C	MAXIMUM VOLTAGES: V_{CEO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CEO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MODE PIV: RATED V	MODE PIV: ACTUAL V	CIRCUIT FUNCTION OR APPLICATION	PART SPECIAL CONSIDERATIONS (Defined)	FOR RELIABILITY USE ONLY: RATE (Use Table)	FOR RELIABILITY USE ONLY: SOURCE (See Table)	FOR RELIABILITY USE ONLY: FAIL RATE MULTIPLIER	FOR RELIABILITY USE ONLY: FINAL FAIL RATE (% per 1000 hrs)	FOR RELIABILITY USE ONLY: TOTAL QUANT PER TYPE	FOR RELIABILITY USE ONLY: CKT QUANT	TOTAL FAILURE RATE (% per 1000 hrs)
VR1	2340355-1						400				19.2								2.4v	2.4v			.00385					.00385

FAILURE RATE SOURCE (See Column 22)
A ATM 1605 C
B D

NOTE: R is assumed the transient and peak power does not exceed the safe limit.

TOTAL FAILURE RATE .00385 %/1000 HRS.

BS-321A

APPENDIX C

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: ALSEP **DATE:** 7-20, 1971

ASSEMBLY: DC-DC Converter **SUBASSEMBLY:** _____ **SCHEMATIC NO:** 2347809

(Capacitors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL-C-XXX) AND CONSTRUCTION	3 MANUFACTURER	4 CAPACITANCE VALUE and	5 TOLERANCE %	6 MANUFACTURER'S RATED VOLTAGE	7 OPERATING VOLTAGE DC	8 OPERATING VOLTAGE PEAK AC	9 VOLTAGE DERATING OPERATING/RATED	10 MAXIMUM DUTY CYCLE	11 HOT SPOT TEMPERATURE (°C)	12 CIRCUIT FUNCTION OR APPLICATION	13 BASIC FAILURE RATE λb (%/1000 HRS)	14 ENVIRONMENTAL STRESS	15 SPECIAL ENVIRONMENT CONTROL	16 FAILURE RATE SOLUTION	17 FINAL FAILURE RATE	18 TOTAL CAPACITOR COUNT PER TYPE	19 TOTAL FAILURE RATE (%/1000 HRS
C1	2346240-78		1.0	10	50	28		.56	100%			.10725	A	.001				10.7×10^{-5}
C2	2346231-36		4.7	10	50	28		.56	100%			.10725	A	.001				10.7×10^{-5}
C3	2346234-4			10	100	5		.05				.005	A	.001				0.5×10^{-5}
C4	2346240-78		1.0	10	50	15		.30				.02002	A	.001				2×10^{-5}
C5	2346240-34		15	10	20	20		.60				.10725	A	.001				10.7×10^{-5}
C6	2346240-93		18	10	50		86.5	.53				.10725	A	.001				10.7×10^{-5}
C7	2346240-78		1.0	10	50	10		.20				.01287	A	.001				1.2×10^{-5}
C8	2346240-22		22	10	15	5		.33				.033	A	.001				3.3×10^{-5}
C9	2346231-16		.022	10	100	10		.10				.005	A	.001				0.5×10^{-5}
C10	2346230-25		.001	10	200		86.5	.133				.005	A	.001				0.5×10^{-5}
C11	2346240-78		1.0	10	50	20		.40				.033	A	.001				3.3×10^{-5}
C12	2346240-34		15	10	20	12		.60				.10725	A	.001				10.7×10^{-5}
C13	2346230-17		220 pf	10	200	4		.02				.005	A	.001				0.5×10^{-5}
C14	2346240-98		18	10	50	30		.60				.10725	A	.001				10.7×10^{-5}
C15	2346230-10		56 pf	10	200	30		.15				.005	A	.001				0.5×10^{-5}
C16	2346231-36		1.0	10	50V	29		.58				.107	A	.001				10.7×10^{-5}
C17	2346231-36		1.0	10	50	28		.56				.107	A	.001				10.7×10^{-5}
C18	2346231-36		1.0	10	50	30		.60				.107	A	.001				10.7×10^{-5}

20 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM605a B _____
C _____ D _____

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE 128.5×10^{-5} / 1000 HRS

BS-321A

APPENDIX C

PARTS APPLICATION ANALYSIS

(INDUCTORS & TRANSFORMERS)

PROJECT: ALSEP **DATE:** 7-20-71

ASSEMBLY: DC/DC Converter **SUB ASSEMBLY:** **SCHEMATIC NO:** 2347809

(Inductors & Transformers)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (REL. OR MFR) AND CONSTRUCTION	3 MANUFACTURER	CONSTRUCTION 4 TYPE OF CASE (SEE BELOW)	5 WIRE SIZE, PRIMARY	6 WIRE SIZE, SECONDARY	7 INSULATION CLASS	8 VA RATING	9 IMPEDANCE AT RATED COND.	10 SPECIFIED FREQ	11 MISCELLANEOUS	TEMPERATURE (°C) 12 OPERATING AMBIENT (OR HOT SPOT)	13 RISE (AS METHOD)	14 RISE, ACTUAL	15 OPERATING TEMP MAX.	16 PRIMARY CURRENT (MA) ACTUAL	17 RATED	18 PRIMARY VOLTAGE	19 NO. WINDINGS	SECONDARY 20 WINDING NO.	21 VOLTAGE	22 WINDINGS	23 VOLTS	24 INPUT READING	25 BASIC FAILURE RATE (λ/1000 HRS) — ASSUME 25°C AMBIENT UNLESS OTHERWISE SHOWN BELOW	26 TOTAL FAILURE RATE (λ/1000 HRS)
																									BEG.	INPUT USE ONLY
L_1	2346223-1		B	#28	NA	Film	NA	90	UH		+85					1	MA 155							.0002	A	.0002
L_2	2346223-1		B	#28	NA	Film	NA	90			+85						MA 155							.0002	A	.0002
L_3	2346223-1		B	#28	NA	Film	NA	90			+85						MA 155							.0002	A	.0002
L_4	2346223-1		B	#28	NA	Film	NA	90			+85						MA 155							.0002	A	.0002
L_5	2346223-1		B	#28	NA	Film	NA	90			+85						MA 155							.0002	A	.0002
T_1	2346268-1		B	#30	#30	Film	NA				+85						UNK	30.6	1	1	3.5			.002	A	.002
T_2	2346269-		B	#24	#24 #28	Film	UNK				+85							13	2	1	28.7			.002	A	.002
																		13	2	2	5.89					

28 TYPE OF CASE
A. HER. SEAL
B. VAC. IMP.
C. ENCAP.
D. OPEN

29 FAILURE RATE SOURCES (FOR COLUMN #26)
A. ATM 605 B.
C. D.

30 CALCULATED MTBF _____ HRS

31 TOTAL FAILURE RATE .005 λ/1000 HRS

BxA 321A

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: DC-DC Converter
SUB ASSEMBLY:
DATE: 7-20-71
SCHEMATIC NO: 2347809

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: AMBIENT ACTUAL	MAX TEMP °C: JUNCTION RATED	MAX TEMP °C: JUNCTION ACTUAL	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (% / 1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
AR1	SM105G	National AL			150°C		50V	30		—	—		15ma	—	—	Regulator		A			.0036

22 FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

30 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5 (V_{NOM} - V_{RATED\ MIN})$

35 TOTAL FAILURE RATE .0036 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

RESISTORS

(Resistors)

PROJECT: ALSEP DATE: 7-20-71

ASSEMBLY: DC-DC Converter SUB ASSEMBLY: SCHEMATIC NO: 2347809

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL or MFR) CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	7 MAXIMUM OPERATING POWER (WATTS)	8 POWER RATIO (OPERATING/RATED)	9 MAXIMUM DUTY CYCLE	10 BULB AIR TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (% PER 1000 HRS)	13 FOR USE OF RELIABILITY DEPT ONLY	14 SPECIAL ENVIRONMENTS (DEFINE)	15 FAILURE RATE MULTIPLIER	16 TOTAL FAILURE RATE (% PER 1000 HRS)	17 TOTAL CIRCUITS COUNT PER TYPE	18 TOTAL FAILURE RATE (% PER 1000 HRS)	
R1	RCR07G153JS		15K	5%	0.25	.053	.212		55°C		.022			.001			2.2×10^{-5}	
R2	RCR07G912JS		9.1K	5%	0.25	.074	.292				.034			.001			3.4×10^{-5}	
R3	RCR07G560JS		56	5%	0.25	.10	.400				.051			.001			5.1×10^{-5}	
R4	RCR07G620JS		62	5%	0.25	.032	.128				.022			.001			2.2×10^{-5}	
R5	RWR7153241FR		3240	1%	2.0	.5	.25				.150			.001			15.0×10^{-5}	
R6	RCR07G392JS		3900	5%	0.25	.036	.144				.022			.001			2.2×10^{-5}	
R7	RCR076102JS		1000	5%	0.25	.025	.100				.022			.001			2.2×10^{-5}	~~BD#1~~
R8	RNR55E280FS		2800	1%	0.10	.029	.29				.233			.001			23.3×10^{-5}	~~BD#2~~
R9	RCR07G47JS		470	5%	0.25	.050	.20				.022			.001			2.2×10^{-5}	
R10	RCR07 S Unknown		unknown								.022			.001			2.2×10^{-5}	
R8	RNR55E1002FS		10,000	1%	0.1	1.6	.016				.195			.001			19.5×10^{-5}	
R1	RNR55E4324FS		432	1%	0.1	.015	.15				.214			.001			21.4×10^{-5}	
R2	RNR55E1331FS		1330	1%	0.1	0	0				.195			.001			21.4×10^{-5}	
R3	RNR55E1211FS		1210	1%	0.1	.025	.25				.233			.001			23.3×10^{-5}	
R4	RNR55E3011FS		3010	1%	0.1	0	0				.195			.001			19.5×10^{-5}	
R5	RNR55E5231FS		5230	1%	0.1	.0014	.014				.195			.001			19.5×10^{-5}	
R6	RNR55E5361FS		5360	1%	0.1	.0012	.012				.195			.001			19.5×10^{-5}	
R7	RNR55E2002FS		20,000	1%	0.1	.0008	.008				.195			.001			19.5×10^{-5}	
R9	RNR55E2941FS		2740	1%	0.1	.0006	.006				.195			.001			19.5×10^{-5}	

FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 605 B

C D

CALCULATED MTBF HRS

TOTAL FAILURE RATE 250.7×10^{-5} %/1000 HRS

FORM 9091

BS-321A

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: ALSEP
ASSEMBLY: DC-DC Converter
SUB ASSEMBLY:
DATE: 7-20-71
SCHEMATIC NO: 2347809

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	HERMETIC SEAL	MAX. TEMP °C: AMBIENT ACTUAL T_A	MAX. TEMP °C: RATED JUNCTION T_J	MAX. TEMP °C: ACTUAL CASE HOT SPOT T_C	AVG PWR DISSIPATION (mw): RATED AT 25°C: AMBIENT	AVG PWR DISSIPATION (mw): RATED AT 25°C: CASE	AVG PWR DISSIPATION (mw): ACTUAL AMBIENT T_A	AVG PWR DISSIPATION (mw): ACTUAL CASE T_C	AVG PWR DISSIPATION (mw): ACTUAL	POWER RATIO: DC OPER VOLTAGE / RATED VOLTAGE	POWER RATIO: T_C OPER / T_C RATED	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CEO} RATED V	MAXIMUM VOLTAGES: V_{CE} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION or APPLICATION	PART (SPECIAL ENVIRONMENT) (Define)	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE (See below)	FAIL RATE	MULTIPLIERS	FINAL FAIL RATE (%/1000 HRS)	TOTAL FAIL RATE	CONT. FEE TYPE	TOTAL FAILURE RATE (%/1000 HRS)
Q_1	N S2N4863			200			@ 100°C 4				.110	.0275	140	56	120	57			Driver		.0051	A						.0051
Q_2	N S2N4863			200			@ 100°C 4				.110	.0275	140	56	120	57			Driver		.0051	A						.0051
Q_3	N S2N4863			200			@ 100°C 4				.6	.150	140	30	120	31			Driver		.0051	A						.0051
Q_4	N S2N2222A			175			0.5				.012	.25	75	30	40	31			Driver		.00255	A						.00255
VR_1	1N939A					100 MW				62 MW	.62						9.45				.00385	A						.00385
VR_2	2340338-20					480 MW				30 MW	.06						6.4				.00385	A						.00385

FAILURE RATE SOURCE (See Column 22)
A ATM 1605 C
B D

NOTE: It is assumed the transient and peak power does not exceed the safe limit.

.0255
TOTAL FAILURE RATE .0255 %/1000 HRS.

BS-321A

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: ALSEP **DATE:** 7-10-71

ASSEMBLY: DC-DC Converter **SUB ASSEMBLY:** **SCHEMATIC NO:** 2347809

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT T_A ACTUAL	MAX. TEMP °C: AMBIENT T_A RATED	MAX. TEMP °C: JUNCTION T_J ACTUAL	MAX. TEMP °C: CASE HOT SPOT T_C ACTUAL	AVG PWR DISSIPATION (watts): RATED AT 25°C: AMBIENT	AVG PWR DISSIPATION (watts): RATED AT 25°C: CASE	AVG PWR DISSIPATION (watts): ACTUAL: AMBIENT T_A	AVG PWR DISSIPATION (watts): ACTUAL: CASE T_C	AVG PWR DISSIPATION (watts): ACTUAL	POWER RATIO: ACTUAL DISS RATED DISS (Ambient or Case)	POWER RATIO: ACTUAL T_J RATED T_J	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION or APPLICATION	PART SPECIAL ENVIRONMENT (Define)	PER RELIABILITY DUE ONLY: RATE (E/1000 HRS)	PER RELIABILITY DUE ONLY: SOURCE (See Below)	PER RELIABILITY DUE ONLY: PART FAIL RATE	PER RELIABILITY DUE ONLY: MULTIPLIER	PER RELIABILITY DUE ONLY: PART FAIL RATE (E/1000 HRS)	PER RELIABILITY DUE ONLY: TOTAL PER TYPE	PER RELIABILITY DUE ONLY: COUNT	TOTAL FAILURE RATE (E/1000 HRS)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
CR1	SIN5417																		200	40				A					.00127
CR2	SIN5417																		200	40				A					.00127
CR3	SIN5417																		200	16				A					.00122
CR4	SIN5417																		200	16				A					.00127
CR5	SIN916B																		75	10				A					.00127
CR6	SIN5417																		200	6				A					.00127
CR7	SIN916B																		75	10				A					.00127
CR8	SIN5417																		200	6				A					.00127
CR9	SIN916B																		75	10				A					.00123

30 FAILURE RATE SOURCE (See Column 22)
A ATM 605 C
B D

30 NOTE: It is assumed the transient and peak power does not exceed the safe limit.

30 TOTAL FAILURE RATE .01143 %/1000 HRS.

30000

BS-321A

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: AISEP **DATE:** 7-20-71

ASSEMBLY: DC-DC Converter **SUB ASSEMBLY:** **SCHEMATIC NO:** 2347809

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C: AMBIENT T_A ACTUAL	MAX. TEMP °C: JUNCTION RATED T_J	MAX. TEMP °C: CASE ACTUAL HOT SPOT T_C	AVG PWR DISSIPATION (mw): RATED AT 55°C: AMBIENT	AVG PWR DISSIPATION (mw): RATED AT 55°C: CASE	AVG PWR DISSIPATION (mw): ACTUAL AMBIENT T_A	AVG PWR DISSIPATION (mw): ACTUAL CASE T_C	AVG PWR DISSIPATION (mw): ACTUAL	POWER RATIO: °C/°C DERATING ACTUAL (Each unit rated)	POWER RATIO: ACTUAL TOTAL DERATING	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	MAXIMUM VOLTAGES: V_{CBO} RATED V	MAXIMUM VOLTAGES: V_{CB} ACTUAL V	DIODE PIV: RATED V	DIODE PIV: ACTUAL V	CIRCUIT FUNCTION OR APPLICATION	PART SPECIAL ENVIRONMENT (Defines)	FOR RELIABILITY USE ONLY: RATE (% / 1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE (See Below)	FOR RELIABILITY USE ONLY: FAIL RATE	FOR RELIABILITY USE ONLY: MULTIPLIER	FOR RELIABILITY USE ONLY: TRIAL FAIL RATE (% / 1000 HRS)	FOR RELIABILITY USE ONLY: TOTAL PER TYPE	FOR RELIABILITY USE ONLY: COUNT	TOTAL FAILURE RATE (%/1000 HRS)
CR10	SIN5417																200	16			.00127	A					.00127
CR11	SIN5417																200	16			.00127	A					.00127
CR12	SIN916B																75	30			.00127	A					.00127
CR13	SIN916B																75	30			.00127	A					.00127

FAILURE RATE SOURCE (See Column 22)
A ATM 605A C
B D

NOTE: It is assumed the transient and peak power does not exceed the safe limit.

TOTAL FAILURE RATE .0508 %/1000 HRS.

BS-321A

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: ALSEP
ASSEMBLY:
SUBASSEMBLY: Digital Processor Board Data Formatter #2
DATE: 7-20-17
SCHEMATIC NO: 2347826

(Capacitors)

1 CIRCUIT SYMBOL DESIGN	2 TYPE DESIGNATOR SER. & SPEC. NO. AND CONSTRUCTION	3 MANUFACTURER	4 CAPACITANCE VALUE MFD	5 TOLERANCE %	6 DC WORKING VOLTAGE RATED VOLTAGE	7 OPERATING VOLTAGE AC	7 OPERATING VOLTAGE DC	8 MAXIMUM CIRCUIT OPERATING VOLTAGE RATIO	9 MAXIMUM DUTY CYCLE	10 AMBIENT OR CASE TEMPERATURE (°C)	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (λb)	13	14	15 GENERAL ENVIRONMENT FACTOR	16 TOTAL FAILURE RATE (λp)	17 TOTAL FAILURE RATE	18 TOTAL CAPACITORS COUNT PER TYPE	19 TOTAL FAILURE RATE (λ) PER 1000 HRS
C1	2346230-25		.001	±10%	200	5		.025			Filter	005	A		.001				$5x10^{-6}$
C2	2346230-25		.001	±10%	200	5		.025			Filter	005	A		.001				$5x10^{-6}$
C3	2346231-36		1	±10%	50	5		.1			Filter	005	A		.001				$5x10^{-6}$
C4	2346230-25		.001	±10%	200	5		.025			Filter	005	A		.001				$5x10^{-6}$
C5	2346230-25		.001	±10%	200	5		.025			Filter	005	A		.001				$5x10^{-6}$
C6	2346230-25		.001	±10%	200	5		.025			Filter	005	A		.001				$5x10^{-6}$
C7	2346240-13		39	±10%	100	5		.5			Timing	05836	A		.001				$58.36x10^{-6}$
C8	2346240-13		39	±10%	10	5		.5			Timing	05836	A		.001				$58.36x10^{-6}$
C9	2346230-25		.001	±10%	200	5		.025			Filter	005	A		.001				$5x10^{-6}$
C10	2346230-25		.001	±10%	200	5		.025			Filter	005	A		.001				$5x10^{-6}$

FOR USE OF [illegible]

20 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM605 B
C D

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE $156.72x10^{-6}$ / 1000 HRS

BS-321A

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP — Digital Processor — DATE: 7-20-71

ASSEMBLY: — SUB ASSEMBLY: Board No. 2 — SCHEMATIC NO: 2347826

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: AMBIENT ACTUAL	MAX TEMP °C: JUNCTION RATED	MAX TEMP °C: JUNCTION ACTUAL	VOLTAGES: MAXIMUM DERATED	VOLTAGES: ACTUAL	VOLTAGES: MINIMUM DERATED	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	MULTIPLIER	TOTAL	TOTAL FAILURE RATE
U1A	2346201-3		DIG				5.3	5	4.7			20%				NAND	.0006	A			.0006
U1B							5.3	5	4.7			10%					.0006	A			.0006
U1C							5.3	5	4.7			10%					.0006	A			.0006
U2A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U2B							5.3	5	4.7			10%					.0006	A			.0006
U2C							5.3	5	4.7			20%					.0006	A			.0006
U3A	2346201-18		DIG				5.3	5	4.7			20%				MULTIVIB	.0005	A			.0005
U3B							5.3	5	4.7			10%					.0005	A			.0005
U3C							5.3	5	4.7			10%					.0005	A			.0005

FAILURE RATE SOURCE (See Column 19): A ATM 605 B — C — D —

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0051 %/1000 HRS

8xA 679

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP — Digital Processor — DATE: 7-20-71

ASSEMBLY: _____ SUB ASSEMBLY: Board No. 2 SCHEMATIC NO: 2347826

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: AMBIENT ACTUAL	MAX TEMP °C: JUNCTION RATED	MAX TEMP °C: JUNCTION ACTUAL	VOLTAGES: MAXIMUM DERATED	VOLTAGES: ACTUAL	VOLTAGES: MINIMUM DERATED	INPUTS: FAN IN %	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT %	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U3D	2346201-18		DIG				5.3	5	4.7			10%				MULTIVIB	.0005	A			.0005
U4A	2346201-1		DIG				5.3	5	4.7			20%				NAND	.0005	A			.0005
U4B							5.3	5	4.7			10%					.0005	A			.0005
U4C							5.3	5	4.7			20%					.0005	A			.0005
U4D							5.3	5	4.7			10%					.0005	A			.0005
U5A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U5B							5.3	5	4.7			10%					.0006	A			.0006
U5C							5.3	5	4.7			20%					.0006	A			.0006
U6A	2346201-2		DIG				5.3	5	4.7			10%					.0003	A			.0003

23 FAILURE RATE SOURCE (See Column 19)
A ATM 605
B _____ C _____ D _____

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0046 %/1000 HRS

8xA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: _____ SUB ASSEMBLY: Digital Processor Bd. No. 2

DATE: 7-20-71

SCHEMATIC NO: 2347826

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U6B	2346201-2		DIG				5.3	5	4.7			20%				INV	.0003	A			.0003
U6C							5.3	5	4.7			10%					.0003	A			.0003
U6D							5.3	5	4.7			10%					.0003	A			.0003
U6E							5.3	5	4.7			60%					.0003	A			.0003
U6F							5.3	5	4.7			60%					.0003	A			.0003
U7A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U7B							5.3	5	4.7			10%					.0006	A			.0006
U7C							5.3	5	4.7			10%					.0006	A			.0006
U8A	2346201-2		DIG				5.3	5	4.7			10%				INV	.0003	A			.0003

22 FAILURE RATE SOURCE (See Column 19)
A ATM 605
B _____ C _____
D _____

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0036 %/1000 HRS

BxA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: AISEP — Digital Processor — DATE: 7-20-71

ASSEMBLY: — SUB ASSEMBLY: Board #2 — SCHEMATIC NO: 2347826

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAIL RATE MULTIPLIER	FOR RELIABILITY USE ONLY: TOTAL FAIL PER TYPE	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U8B	2346201-2		DIG				5.3	5	4.7			10%				INV	.0003	A			.0003
U8C							5.3	5	4.7			20%					.0003	A			.0003
U8D							5.3	5	4.7			10%					.0003	A			.0003
U8E							5.3	5	4.7			40%					.0003	A			.0003
U8F							5.3	5	4.7			10%					.0003	A			.0003
U9A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U9B							5.3	5	4.7			10%					.0006	A			.0006
U9C							5.3	5	4.7			20%					.0006	A			.0006
U10A	2346201-2		DIG				5.3	5	4.7			50%				INV	.0003	A			.0003

23 FAILURE RATE SOURCE (See Column 19)
A ATM605 C
B D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0036 %/1000 HRS

BxA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP — Digital Processor — DATE: 7.20.71

ASSEMBLY: — SUB ASSEMBLY: Board #2 — SCHEMATIC NO: 2347826

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: % LOADING	SPEED: % OF MAX	CLOCK WIDTH: RATED / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U10B	2346201-2		DIG				5.3	5	4.7			10%				INV	.0003	A				.0003
U10C							5.3	5	4.7			20%					.0003	A				.0003
U10D							5.3	5	4.7			10%					.0003	A				.0003
U10E							5.3	5	4.7			40%					.0003	A				.0003
U10F							5.3	5	4.7			20%					.0003	A				.0003
U11A	2346201-1		DIG				5.3	5	4.7			10%				NAND	.0005	A				.0005
U11B							5.3	5	4.7			10%					.0005	A				.0005
U11C							5.3	5	4.7			10%					.0005	A				.0005
U11D							5.3	5	4.7			10%					.0005	A				.0005

23 FAILURE RATE SOURCE (See Column 19)
A ATM605 — C —
B — D —

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6\,(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6\,(V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0035 %/1000 HRS

8xA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP — Digital Processor — DATE: 7-20-71

ASSEMBLY: — SUB ASSEMBLY: Board #2 — SCHEMATIC NO: 2347820

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT %	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: RATED / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIERS	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U12A	2346201-2		DIG				5.3	5	4.7			10%				INV	.0003	A			.0003
U12B							5.3	5	4.7			10%					.0003	A			.0003
U12C							5.3	5	4.7			10%					.0003	A			.0003
U12D							5.3	5	4.7			10%					.0003	A			.0003
U12E							5.3	5	4.7			10%					.0003	A			.0003
U12F							5.3	5	4.7			10%					.0003	A			.0003
U13G	2346201-18		DIG				5.3	5	4.7			10%				1-Shot	.0005	A			.0005
U14	2346201-18		DIG				5.3	5	4.7			10% 20%				1-Shot	.0005	A			.0005
U15A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006

FAILURE RATE SOURCE (See Column 19)

A — MIL-M-38510 — C —

B — D —

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0034 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP — Digital Processor — DATE: 7-20-71

ASSEMBLY: _____ SUB ASSEMBLY: Board #2 SCHEMATIC NO: 2347826

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: % LOADING	SPEED: % OF MAX	CLOCK WIDTH: ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TCOUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U18B	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U18C							5.3	5	4.7			10%					.0006	A			.0006
U19	2346201-7		DIG				5.3	5	4.7			10%				And-or-Invert	.0005	A			.0005
U20A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U20B							5.3	5	4.7			10%					.0006	A			.0006
U20C							5.3	5	4.7			10%					.0006	A			.0006
U21	2346201-7		DIG				5.3	5	4.7			10%				And-or Invert	.0005	A			.0005
U22A	2346201-11		DIG				5.3	5	4.7			Q30% / Q20%				F/F	.001	A			.001
U22B							5.3	5	4.7			Q20% / Q20%					.001	A			.001

FAILURE RATE SOURCE (See Column 19)
A ATM 605 C _____
B _____ D _____

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0060 %/1000 HRS

8xA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP — Digital Processor — DATE: 7-20-71

ASSEMBLY: _____ SUB ASSEMBLY: Board #2 SCHEMATIC NO: 2347826

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U15B	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U15C							5.3	5	4.7			10%					.0006	A			.0006
U16A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U16B							5.3	5	4.7			10%					.0006	A			.0006
U16C							5.3	5	4.7			10%					.0006	A			.0006
U17A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U17B							5.3	5	4.7			10%					.0006	A			.0006
U17C							5.3	5	4.7			10%					.0006	A			.0006
U18A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006

FAILURE RATE SOURCE (See Column 19)
A ATM 605 C _____
B _____ D _____

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0054 _____ %/1000 HRS

8xA 679

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Bd #2
DATE: 7-20-71
SCHEMATIC NO: 23478-26

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT %	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / APPLIED %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL PART TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U18B							5.3	5	4.7			10%					.0006	A			.0006
U18C							5.3	5	4.7			10%					.0006	A			.0006
U19	2346201-7		DIG.				5.3	5	4.7			10%				AND/OR INVERT	.002	A			.002
U20A	2346201-3		DIG.				5.3	5	4.7			10%				NAND	.0006	A			.0006
U20B							5.3	5	4.7			10%					.0006	A			.0006
U20C							5.3	5	4.7			10%					.0006	A			.0006
U21	2346201-7		DIG.				5.3	5	4.7			10%				AND/OR INVERT	.002	A			.002
U22A	2346201-11		DIG.				5.3	5	4.7			Q 30 $\bar{Q}$ 20				F-F	.001	A			.001
U22B							5.3	5	4.7			Q 20 $\bar{Q}$ 20					.001	A			.001

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0090 %/1000 HRS

BxA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: ALSEP

ASSEMBLY:

SUB ASSEMBLY: Digital Processor Board Data Formatter #2

DATE: 7-20-71

SCHEMATIC NO: 2347826

(Resistors)

1 CIRCUIT SYMBOL	2 TYPE, MFR'S NAME & NUMBER	3 SPECIFICATION	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 RATED POWER (WATTS)	7 OPERATING POWER (WATTS)	8 MAXIMUM OPERATING POWER RATIO	9 MAXIMUM DUTY CYCLE (%)	10 RELATIVE TEMPERATURE (°C)	11 CIRCUIT FUNCTION APPLICATION	12 BASE FAILURE RATE (%/1000 HRS)	13 ENVIRONMENTAL FACTOR	14 QUALITY FACTOR	15 STRESS FACTOR	16 FAILURE RATE (%/1000 HRS)
R1	RCR07G202JS		2K	5	1/4	.25	.05			Collector Load,	.022	A		.001	22×10^{-6}
R2	RCR05G272JS		2.7K	5	1/8	9.26	.08			Collector Load	.022	A		.001	22×10^{-6}
R3	RCR05G243JS		24K	5	1/8	1	.01			Current Limit	.022	A		.001	22×10^{-6}
R4	RCR05G303JS		30K	5	1/8	.8	< .01			Timing	.022	A		.001	22×10^{-6}
R5	RCR05G222JS		2.2K	5	1/8	11.4	.1			Collector Load Current Limit	.022	A		.001	22×10^{-6}
R6	RCR05G391JS		390	5	1/8	9.33	.08			Collector Load	.022	A		.001	22×10^{-6}
R7	RCR05G471JS		470	5	1/8	11.25	.1			Bias,	.022	A		.001	22×10^{-6}
R8	RCR07G202JS		2K	5	1/4	12.5	.05			Collector Load	.022	A		.001	22×10^{-6}
R9	RCR07G202JS		2K	5	1/4	12.5	.05			Collector Load	.022	A		.001	22×10^{-6}

FOR USE OF RELIABILITY DEPT

19 FAILURE RATE SOURCES (FOR COLUMN #16)

A MIL-HDBK-217 B

C D

20 CALCULATED MTBF HRS

21 TOTAL FAILURE RATE 198×10^{-6} %/1000 HRS

BS-321A

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(SEMICONDUCTORS)

PROJECT: ALSEP
ASSEMBLY:
SUB ASSEMBLY: Digital Processor Board #2
DATE: 8-20-71
SCHEMATIC NO: 2347826

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C AMBIENT °A	MAX. TEMP °C ACTUAL °A	MAX. TEMP °C RATED JUNCTION °J	MAX. TEMP °C ACTUAL CASE °C	ANS PER DERATING (psa) RATED AT 25°C AMBIENT °A	ANS PER DERATING (psa) RATED AT 25°C CASE °C	ANS PER DERATING (psa) ACTUAL AMBIENT °A	ANS PER DERATING (psa) ACTUAL CASE °C	ANS PER DERATING (psa) ACTUAL	POWER RATIO DC CIRCUIT VOLTAGE	POWER RATIO DC RATED VOLTAGE	MAXIMUM VOLTAGES V_{CBO} RATED	MAXIMUM VOLTAGES V_{CB} ACTUAL	MAXIMUM VOLTAGES V_{CEO} RATED	MAXIMUM VOLTAGES V_{CE} ACTUAL	DIODE PIV RATED	DIODE PIV ACTUAL	CIRCUIT FUNCTION OR APPLICATION	MOST CRITICAL OPERATING MODE (Note)	FOR RELIABILITY AND QUALITY DATA SOURCE	FOR RELIABILITY AND QUALITY DATA QUALITY	FOR RELIABILITY AND QUALITY DATA TOTAL FAILURE RATE %/1000 HRS
Q1-A	2335191-1 MPN							350			3.5	.01		70	5	55	5					.002 55	A			.00255
Q1-B	2335191-1										4	.01		70	5	55	5					.002 55	A			.00255
VR1	2340392-5							430			2.8	.065						2.7 159 ma	2.7 1 ma			.005 55	A			.00385

FAILURE RATE SOURCE (See Column 19)
A ATM605 C
B D

NOTE: It is assumed the transient and peak power does not exceed the safe limit.

TOTAL FAILURE RATE .00895 %/1000 HRS.

BS-321A

ATM 375
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: AIMSEP
ASSEMBLY: AMPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 7.30.71
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: % LOADING	SPEED: % OF MAX	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAILURE RATE SOURCE	FOR RELIABILITY USE ONLY: TC CIRCUIT TYPE	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U1A	2346207-15		Dig.				5.3	5	4.7			15%				Hex	.0003	A			.0003
U1B							5.3	5	4.7			30%					.0003	A			.0003
U1C							5.3	5	4.7			30%					.0003	A			.0003
U1D							5.3	5	4.7			15%					.0003	A			.0003
U1E	(Spare)																				
U1F							5.3	5	4.7			15%					.0003	A			.0003
U2A	2346201-11		Dig.				5.3	5	4.7			Q60 $\overline{Q40}$				F-F	.001	A			.001
U2B							5.3	5	4.7			Q0 $\overline{Q10}$					.001	A			.001
U3A	2346201-11		Dig.				5.3	5	4.7			Q50 $\overline{Q40}$				F-F	.001	A			.001

23 FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0045 %/1000 HRS

BxA 679

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: AISEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 30 July 1971
SCHEMATIC NO: 2347216

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: SEE ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAILURE RATE MULTIPLIER	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE PER TYPE	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U3B							5.3	5	4.7			Q40 $\overline{Q50}$					.001	A			.001
U4	2346207-18		Dig.				5.3	5	4.7			20%				Multivib	.002	A			.002
U5A	2346201-11		Dig.				5.3	5	4.7			Q30 $\overline{Q10}$				F-F	.001	A			.001
U5B							5.3	5	4.7			Q10 $\overline{Q10}$					.001	A			.001
U6	2346207-18		Dig.				5.3	5	4.7			Q40 $\overline{Q10}$				Multivib	.002	A			.002
U7A	2346201-1		Dig.				5.3	5	4.7			10%				Nand	.0005	A			.0005
U7B							5.3	5	4.7			10%					.0005	A			.0005
U7C							5.3	5	4.7			10%					.0005	A			.0005
U7D							5.3	5	4.7			10%					.0005	A			.0005

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0090 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #1

DATE: 30 July 1971

SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: RATED / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL QUANTITY PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U8A	2346201-2		DIG				5.3	5	4.7			20%				HEX	.0003	A			.0003
U8B	(Spare)																				
U8C	(Spare)																				
U8D	(Spare)																				
U8E							5.3	5	4.7			10%					.0003	A			.0003
U8F							5.3	5	4.7			50%					.0003	A			.0003
U9A	2346201-4		DIG				5.3	5	4.7			20%				NAND	.001	A			.001
U9B							5.3	5	4.7			20%					.001	A			.001
U10A	2346201-2		DIG				5.3	5	4.7			10%				HEX	.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)

A ATM 605

B

C

D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6\,(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6\,(V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .00032 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #1

DATE: 30 July 1971

SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE (See Column 19)	FAILURE RATE MULTIPLIER	TOTAL ALT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U10B	(Test Point)			—																	
U10C	(Test Point)																				
U10D	(Test Point)																				
U10E	(Test Point)																				
U10E	(Test Point)																				
U11A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U11B							5.3	5	4.7			10%					.0006	A			.0006
U11C							5.3	5	4.7			10%					.0006	A			.0006
U12	2346201-5		DIG				5.3	5	4.7			10%				NAND	.0003	A			.0003
U13A	2346201-4		DIG				5.3	5	4.7			10%				NAND	.001	A			.001

23 FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0031 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #1

DATE: 30 July 1971

SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TC COUNT TOTAL / PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U13B							5.3	5	4.7			10%					.001	A			.001
U14A	2346201-1		DIG				5.3	5	4.7			10%				NAND	.0005	A			.0005
U14B							5.3	5	4.7			10%					.0005	A			.0005
U14C							5.3	5	4.7			20%					.0005	A			.0005
U14D							5.3	5	4.7			10%					.0005	A			.0005
U15A	23462201-2		DIG				5.3	5	4.7			10%				HEX	.0003	A			.0003
U15B	(Test Point)																				
U15C							5.3	5	4.7			10%					.0003	A			.0003
U15D	(Test Point)																				

FAILURE RATE SOURCE (See Column 19)

A ATM 605

B

C

D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0036 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #1

DATE: 30 July 1971

SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: AMBIENT ACTUAL	MAX TEMP °C: JUNCTION RATED	MAX TEMP °C: JUNCTION ACTUAL	VOLTAGES: MAXIMUM DERATED	VOLTAGES: ACTUAL	VOLTAGES: MINIMUM DERATED	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TQ ANALYSIS PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U15E							5.3	5	4.7			10%					.0003	A			.0003
U15F							5.3	5	4.7			10%					.0003	A			.0003
U16A	2346201-4		Dig.				5.3	5	4.7			10%				Nand	.001	A			.001
U16B							5.3	5	4.7			10%					.001	A			.001
U17A	2346201-4		Dig.				5.3	5	4.7			10%				Nand	.001	A			.001
U17B							5.3	5	4.7			10%					.001	A			.001
U18A	2346201-11		Dig.				5.3	5	4.7			Q30 $\overline{Q40}$				F-F	.001	A			.001
U18B							5.3	5	4.7			Q60 $\overline{Q40}$					.001	A			.001
U19A	2346201-11		Dig.				5.3	5	4.7			Q40 $\overline{Q30}$				F-F	.001	A			.001

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0076 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #1

DATE: 30 July 1971

SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN #	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT #	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAIL RATE MULTIPLIER	FOR RELIABILITY USE ONLY: TOTAL QUALITY PER TYPE	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U19B							5.3	5	4.7			Q30 / $\overline{Q50}$					.001	A			.001
U20A	2346201-11		Dig.				5.3	5	4.7			Q20 / $\overline{Q40}$				F-F	.001	A			.001
U20B							5.3	5	4.7			Q70 / $\overline{Q50}$					.001	A			.001
U21A	2346201-11		Dig.				5.3	5	4.7			Q30 / $\overline{Q30}$				F-F	.001	A			.001
U21B							5.3	5	4.7			Q60 / $\overline{Q30}$					.001	A			.001
U22A	2346201-11		Dig.				5.3	5	4.7			Q40 / $\overline{Q40}$				F-F	.001	A			.001
U22B							5.3	5	4.7			Q30 / $\overline{Q40}$					.001	A			.001
U23A	2346201-11		Dig.				5.3	5	4.7			Q20 / $\overline{Q20}$				F-F	.001	A			.001
U23B							5.3	5	4.7			Q20 / $\overline{Q20}$					.001	A			.001

23 FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0090 %/1000 HRS

BxA 679

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN. ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	MULTIPLIER	TOTAL	TOTAL FAILURE RATE (%/1000 HRS)
U24A	2346201-1		DIG				5.3	5	4.7			Q30 $\overline{Q30}$				F-F	.0005	A			.0005
U24B	(SPARE)																				
U25A	2346201-2		DIG				5.3	5.	4.7			50%				HEX	.0003	A			.0003
U25B							5.3	5	4.7			10%					.0003	A			.0003
U25C							5.3	5	4.7			20%					.0003	A			.0003
U25D							5.3	5	4.7			10%					.0003	A			.0003
U25E							5.3	5	4.7			10%					.0003	A			.0003
U25F							5.3	5	4.7			20%					.0003	A			.0003
U26A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006

FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

NOTE. DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0029 %/1000 HRS

8xA 679

ATM 475
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board # 1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAIL. RATE MULTIPLIER	FOR RELIABILITY USE ONLY: TQ COUNT PER TYPE	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U26B							5.3	5	4.7			10%					.0006	A			.0006
U26C							5.3	5	4.7			10%					.0006	A			.0006
U27A	2346201-2		DIG				5.3	5	4.7			50%				HEX	.0006	A			.0006
U27B							5.3	5	4.7			30%					.0006	A			.0006
U27C							5.3	5	4.7			20%					.0006	A			.0006
U27D							5.3	5	4.7			10%					.0006	A			.0006
U27E							5.3	5	4.7			60%					.0006	A			.0006
U27F							5.3	5	4.7			70%					.0006	A			.0006
U28A	2346201-1		DIG.				5.3	5	4.7			20%				NAND	.0005	A			.0005

33 FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

34 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

35 TOTAL FAILURE RATE .0053 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board # 1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U28B							5.3	5	4.7			10%					.0005	A			.0005
U28C							5.3	5	4.7			10%					.0005	A			.0005
U28D							5.3	5	4.7			10%					.0005	A			.0005
U29A	2346201-2		DIG.				5.3	5	4.7			10%				HEX	.0003	A			.0003
U29B							5.3	5	4.7			10%					.0003	A			.0003
U29C							5.3	5	4.7			30%					.0003	A			.0003
U29D							5.3	5	4.7			20%					.0003	A			.0003
U29E							5.3	5	4.7			20%					.0003	A			.0003
U29F							5.3	5	4.7			60%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0033 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: DIGITAL PROCESSOR BOARD # 1

DATE: 30 July 1971

SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT %	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: MULTIPLICATION FACTOR	FOR RELIABILITY USE ONLY: TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U30A	2346201-2		DIG.				5.3	5	4.7			50%				HEX	.0003	A			.0003
U30B							5.3	5	4.7			10%					.0003	A			.0003
U30C							5.3	5	4.7			10%					.0003	A			.0003
U30D							5.3	5	4.7			20%					.0003	A			.0003
U30E							5.3	5	4.7			20%					.0003	A			.0003
U30F							5.3	5	4.7			10%					.0003	A			.0003
U31A	2346201-2		DIG.				5.3	5	4.7			20%				HEX	.0003	A			.0003
U31B							5.3	5	4.7			60%					.0003	A			.0003
U31C							5.3	5	4.7			60%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)

A ATM 605 C

B D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0027 %/1000 HRS

BxA 679

ATM 975
Appendix C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: DIGITAL PROCESSOR BOARD #1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C				VOLTAGES			INPUTS		OUTPUTS		SPEED	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY				
				ACTUAL AMBIENT	RATED JUNCTION	ACTUAL JUNCTION		DERATED MAXIMUM	ACTUAL	DERATED MINIMUM	FAN IN	% OF MAX I OR V	FAN OUT	LOADING %	% OF MAX	MIN. ACTUAL %		RATE (% / 1000 HRS)	SOURCE (See Column 19)	FAILURE RATE	FAILURES PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U31D								5.3	5	4.7			10%					.0003	A			.0003
U31E								5.3	5	4.7			10%					.0003	A			.0003
U31F								5.3	5	4.7			60%					.0003	A			.0003
U32A	2346201-2		DIG.					5.3	5	4.7			20%				HEX	.0003	A			.0003
U32B								5.3	5	4.7			10%					.0003	A			.0003
U32C								5.3	5	4.7			10%					.0003	A			.0003
U32D								5.3	5	4.7			10%					.0003	A			.0003
U32E								5.3	5	4.7			10%					.0003	A			.0003
U32F								5.3	5	4.7			10%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6\,(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6\,(V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0027 %/1000 HRS

8xA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: RATED %	CLOCK WIDTH: ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAILURE RATE MULTIPLIER	FOR RELIABILITY USE ONLY: TOTAL PER TYPE	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U33A	2346201-4		DIG				5.3	5	4.7			10%					NAND	.001	A			.001
U33B							5.3	5	4.7			10%						.001	A			.001
U34A	2346201-4		DIG				5.3	5	4.7			10%					NAND	.001	A			.001
U34B							5.3	5	4.7			10%						.001	A			.001
U35A	2346201-1		DIG				5.3	5	4.7			10%					NAND	.0005	A			.0005
U35B							5.3	5	4.7									.0005	A			.0005
U35C							5.3	5	4.7			10%						.0005	A			.0005
U35D							5.3	5	4.7			10%						.0005	A			.0005
U36A	2346201-1		DIG				5.3	5	4.7			10%					NAND	.0005	A			.0005

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0065 %/1000 HRS

8xA 679

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: AISEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 30 July 1971
SCHEMATIC NO: 2342816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: AMBIENT ACTUAL	MAX TEMP °C: JUNCTION RATED	MAX TEMP °C: JUNCTION ACTUAL	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAIL RATE MULTIPLIER	FOR RELIABILITY USE ONLY: TC COUNT PER TYPE	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U36B							5.3	5	4.7			10%					.0005	A			.0005
U36C							5.3	5	4.7			10%					.0005	A			.0005
U36D							5.3	5	4.7			10%					.0005	A			.0005
U37A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U37B							5.3	5	4.7			10%					.0006	A			.0006
U37C							5.3	5	4.7			10%					.0006	A			.0006
U38A	2346201-1		DIG				5.3	5	4.7			10%					.0005	A			.0005
U38B							5.3	5	4.7			10%					.0005	A			.0005
U38C							5.3	5	4.7			10%					.0005	A			.0005

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0048 %/1000 HRS

BxA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: 1SPE

SUB ASSEMBLY: Digital Processor Board #1

DATE: 30 July 1971

SCHEMATIC NO: 2346216

(Microcircuits)

CKT SYM BOL NO.	TYPE DESIGNATION	BASE/CASE SERIES	TYPE	MAX TEMP °C: AMBIENT ACTUAL	MAX TEMP °C: JUNCTION RATED	MAX TEMP °C: JUNCTION ACTUAL	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN WIDTH, n	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE (A–D)	FOR RELIABILITY USE ONLY: ENVIRONMENT	FOR RELIABILITY USE ONLY: TC CYCLES (25°C TYP)	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U38B							5.3	5	4.7			10%					.0006	A			.0006
U39A	2346201-3		DIG				5.3	5	4.7			10%					.0006	A			.0006
U39B							5.3	5	4.7			10%					.0006	A			.0006
U39C							5.3	5	4.7			10%					.0006	A			.0006
U40A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U40B							5.3	5	4.7			10%					.0006	A			.0006
U40C							5.3	5	4.7			10%					.0006	A			.0006
U41A	2346201-2		DIG				5.3	5	4.7			10%				NAND	.0003	A			.0003
U41B							5.3	5	4.7			20%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)

A — ATM 605 — C —

B — D —

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5\,(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5\,(V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0047 %/1000 HRS

BuA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE (See Column 23)	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U41C							5.3	5	4.7			10%					.0003	A			.0003
U41D							5.3	5	4.7			10%					.0003	A			.0003
U41E							5.3	5	4.7			10%					.0003	A			.0003
U41F							5.3	5	4.7			10%					.0003	A			.0003
U42A	2346201-11		DIG				5.3	5	4.7			10%				NAND	.0005	A			.0005
U42B							5.3	5	4.7			10%					.0005	A			.0005
U42C							5.3	5	4.7			10%					.0005	A			.0005
U42D							5.3	5	4.7			10%					.0005	A			.0005
U43A	2346201-16		DIG				5.3	5	4.7			Q 30 ± Q 20				F - F	.001	A			.001

23 FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0042 %/1000 HRS

8xA 679

ATM 775
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAIL. RATE MULTIPLIER	TCOUNT TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U43B							5.3	5	4.7			Q 20 / Q 10					.001	A			.001
U44A	2346201-16		DIG				5.3	5	4.7			Q 30 / Q 20				F-F	.001	A			.001
U44B							5.3	5	4.7			Q 20 / Q 10					.001	A			.001
U45A	2346201-16		DIG				5.3	5	4.7			Q 30 / Q 20				F - F	.001	A			.001
U45B							5.3	5	4.7			Q 10 / Q 10					.001	A			.001
U46A	2346201-2		DIG				5.3	5	4.7			10%				HEX	.0003	A			.0003
U46B							5.3	5	4.7			40%					.0003	A			.0003
U46C							5.3	5	4.7			10%					.0003	A			.0003
U46D							5.3	5	4.7			10%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0062 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C				VOLTAGES			INPUTS		OUTPUTS		SPEED	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY				
				ACTUAL AMBIENT	RATED JUNCTION	ACTUAL JUNCTION		DERATED MAXIMUM	ACTUAL	DERATED MINIMUM	FAN IN %	% OF MAX I OR V	FAN OUT %	LOADING %	% OF MAX			RATE (%/1000 HRS)	SOURCE	FAILURE RATE	SUBTOTALS	TOTAL FAILURE RATE
U46E								5.3	5	4.7			20%					.0003	A			.0003
U46F								5.3	5	4.7			10%					.0003	A			.0003
U47	2346207-18		DIG					5.3	5	4.7			Q 0 Q 20				MULTIVIB	.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A _____ C _____
B _____ D _____

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE _____ %/1000 HRS

8xA 679

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: AISEP

ASSEMBLY: LSPE

SUBASSEMBLY: Digital Processor Board #1

DATE: 7-30-71

SCHEMATIC NO: 2347816

(Capacitors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION (MIL-C-SPEC) AND CONSTRUCTION	3 MANUFACTURER	4 CAPACITANCE VALUE mfd	4 TOLERANCE %	5 DC/PEAK AC RATED VOLTAGE	6 7 8 OPERATING VOLTAGE DC / PEAK AC / POWER (WHEN OPERATING RATED)	9 MAXIMUM DUTY CYCLE	10 BULK AIR TEMPERATURE (°C)	11 12 CIRCUIT FUNCTION OR APPLICATION	13 14 BASE FAILURE RATE (F/1000 HRS) ACTIVE / STORAGE	15 16 SPECIAL ENVIRONMENT (OPTION) / FAILURE RATE MULTIPLIER	17 FINAL FAILURE RATE	18 TOTAL CAPACITOR COUNT PER TYPE	19 TOTAL FAILURE RATE (F/1000 HRS)
C1	2346230-25		.001	±10	200	5 / .025			Timing	.005/A	.001			5×10^{-6}
C2	2346230-25		.001	±10	200	5 / .025			Timing	.005/A	.001			5×10^{-6}
C3	2346230-25		.001	±10	200	5 / .025			Timing	.005/A	.001			5×10^{-6}
C4	2346231-36		1.0	±10	50	5 / .1			Filter	.005/A	.001			5×10^{-6}
C5	2346231-36		1.0	±10	50	5 / .1			Timing	.005/A	.001			5×10^{-6}

20 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 605 B

C D

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE 25×10^{-6} X 1000 HRS

BS-321A

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

RESISTORS

(Resistors)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #1
DATE: 30 July 1971
SCHEMATIC NO: 2347816

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION MIL # AND CONSTRUCTION	3 MANUFACTURER	4 RESISTANCE VALUE (OHMS)	5 TOLERANCE (%)	6 POWER RATING (WATTS)	7 MAXIMUM OPERATING POWER (WATTS)	8 POWER RATIO (OPERATING/RATED)	9 RATIONALE WITH CYCLE	10 RATIONALE AIR TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (% / 1000 HRS)	13 FACTORS (SEE ENDED)	14 SPECIAL ENVIRONMENTS DESIRED	15 FAILURE RATE MULTIPLIER	16 FINAL FAILURE RATE (% / 1000 HRS)	17 TOTAL ELEMENT COUNT PER TYPE	18 TOTAL FAILURE RATE (% / 1000 HRS)
R1	RCR05G332JS		3300	5	.125	1MW	< 1			TIMING	.022	A					22×10^{-6}
R2	RCR05G272JS		2700	5	.125	1MW	< 1			CURRENT LIMITING	.022	A					22×10^{-6}

FOR USE OF RELIABILITY GROUP ONLY

19 FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM 605 B
C D

20 CALCULATED MTBF HRS

21 TOTAL FAILURE RATE 44×10^{-6} %/1000 HRS

BS-321A

PARTS APPLICATION ANALYSIS

CAPACITORS

PROJECT: ALSEP

ASSEMBLY: LSPE

SUBASSEMBLY: Digital Processor Board #3

DATE: 30 July 1971

SCHEMATIC NO: 2346836

(Capacitors)

1 CIRCUIT SYMBOL NUMBER	2 TYPE DESIGNATION, STYLE AND CONSTRUCTION	3 MANUFACTURER	4 CAPACITANCE VALUE μF	5 TOLERANCE %	6 DC WORKING VOLTAGE RATED VOLTAGE	7 OPERATING VOLTAGE DC	7 OPERATING VOLTAGE PEAK AC	8 VOLTAGE RATIO OPERATING/RATED	9 MAXIMUM DUTY CYCLE	10 HOT SPOT TEMPERATURE (°C)	11 CIRCUIT FUNCTION OF APPLICATION	12 BASE FAILURE RATE (PER 10⁶ HOURS)	13	14	15 GENERAL ENVIRONMENT RATING - FAILURE RATE MULTIPLIER	16 TOTAL FAILURE RATE	17 TOTAL CAPACITOR COUNT FOR TYPE	18 TOTAL FAILURE RATE (1/10⁶ HRS)
C1	2346231-36		1.0	±10	50	5	.1				FILTER	.005	A		.001			5×10^{-6}
C2	2346230-25		.001	±10	200	5	.025				FILTER	.005	A		.001			5×10^{-6}

FOR USE OF THIS DATA SEE TEXT

20 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 605 B

C D

21 CALCULATED MTBF HRS

22 TOTAL FAILURE RATE 10×10^{-6} X 1000 HRS

BS-321A

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

RESISTORS

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #A
DATE: 30 July 1971
SCHEMATIC NO: 2342836

(Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
R1	RCR05G331JS		330	5	.125	1MW	< 1			Current Limiting	.022 A						22×10^{-6}

FOR USE OF NEXT HIGHER ASSY ONLY

19. FAILURE RATE SOURCES (FOR COLUMN #14)
A ATM 975 B
C D

20. CALCULATED MTBF _____ HRS

21. TOTAL FAILURE RATE 22×10^{-6} %/1000 HRS

FORM 6001

BS-321A

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2346036

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL PER TYPE	TOTAL FAILURE RATE
U1A	2346201-6		DIG.				5.3	5	4.7			10%				and/or invert	.001	A			.001
U1B							5.3	5	4.7			10%					.001	A			.001
U2A	2346201-6		DIG.				5.3	5	4.7			10%				and/or invert	.001	A			.001
U2B							5.3	5	4.7			10%					.001	A			.001
U3A	2346201-2		DIG.				5.3	5	4.7			10%				HEX	.0003	A			.0003
U3B							5.3	5	4.7			30%					.0003	A			.0003
U3C							5.3	5	4.7			20%					.0003	A			.0003
U3D							5.3	5	4.7			10%					.0003	A			.0003
U3E	(Spare)																.0003				.0003

FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0055 %/1000 HRS

8xA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2346836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN %	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT %	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE (See Col. 19)	FOR RELIABILITY USE ONLY: FAILURE RATE MULTIPLIER	FOR RELIABILITY USE ONLY: TOTAL FAILURE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U3F							5.3	5	4.7			50%					.0003	A			.0003
U4A	2346201-4		DIG.				5.3	5	4.7			10%				NAND	.001	A			.001
U4B							5.3	5	4.7			10%					.001	A			.001
U5	2346201-7		DIG.				5.3	5	4.7			10%				and/or invert	.0005	A			.0005
U6A	2346201-2		DIG.				5.3	5	4.7			10%				HEX	.0003	A			.0003
U6B							5.3	5	4.7			20%					.0003	A			.0003
U6C							5.3	5	4.7			20%					.0003	A			.0003
U6D							5.3	5	4.7			20%					.0003	A			.0003
U6E							5.3	5	4.7			20%					.0003	A			.0003

19 FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

20 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5(V_{NOM} - V_{RATED\ MIN})$

21 TOTAL FAILURE RATE .0043 %/1000 HRS

BxA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #3

DATE: 30 July 1971

SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C				VOLTAGES			INPUTS		OUTPUTS		SPEED	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY				
				ACTUAL AMBIENT	RATED JUNCTION	ACTUAL JUNCTION		DERATED MAXIMUM	ACTUAL	DERATED MINIMUM	FAN IN	% OF MAX I OR V	FAN OUT	LOADING %	% OF MAX	MIN ACTUAL %		RATE (%/ 1000 HRS)	SOURCE	FAILURE RATE	TOTAL ACTUAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U6E								5.3	5	4.7			20%					.0003	A			.0003
U7A	2346201-3		DIG.					5.3	5	4.7			10%				NAND	.0006	A			.0006
U7B								5.3	5	4.7			10%					.0006	A			.0006
U7C								5.3	5	4.7			10%					.0006	A			.0006
U8A	2346201-6		DIG.					5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U8B								5.3	5	4.7			10%					.001	A			.001
U9A	2346201-2 (Spare)		DIG.														HEX					
U9B								5.3	5	4.7			50%					.0003	A			.0003
U9C								5.3	5	4.7			40%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0047 %/1000 HRS

8xA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347886

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / RETURN %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIERS	TOTAL QUALITY PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U9D							5.3	5	4.7			50%					.0003	A			.0003
U9E							5.3	5	4.7			60%					.0003	A			.0003
U9F							5.3	5	4.7			20%					.0003	A			.0003
U10A	2346201-2		DIG.				5.3	5	4.7			10%				HEX	.0003	A			.0003
U10B							5.3	5	4.7			10%					.0003	A			.0003
U10C							5.3	5	4.7			20%					.0003	A			.0003
U10D							5.3	5	4.7			10%					.0003	A			.0003
U10E							5.3	5	4.7			10%					.0003	A			.0003
U10F							5.3	5	4.7			10%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0027 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U11A	2346201-1		DIG.				5.3	5	4.7			10%				NAND	.0005	A			.0005
U11B							5.3	5	4.7			20%					.0005	A			.0005
U11C							5.3	5	4.7			10%					.0005	A			.0005
U11D							5.3	5	4.7			20%					.0005	A			.0005
U12A	2346201-2		DIG.				5.3	5	4.7			80%				HEX	.0003	A			.0003
U12B							5.3	5	4.7			10%					.0003	A			.0003
U12C	(Spare)																				
U12D							5.3	5	4.7			10%					.0003	A			.0003
U12E							5.3	5	4.7			40%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A — ATM605
B —
C —
D —

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6(V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0032 %/1000 HRS

BxA 679

ATM 475
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN %	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT %	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE	TOTAL FAILURE RATE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U12F							5.3	5	4.7			70%					.0003	A			.0003
U13A	2346201-6 (Spare)		Dig.													And/Or Invert					
U13B							5.3	5	4.7			10%					.001	A			.001
U14	2346201-7		Dig.				5.3	5	4.7			10%				And/Or Invert	.002	A			.002
U15A	2346201-3		Dig.				5.3	5	4.7			10%				Nand	.0006	A			.0006
U15B							5.3	5	4.7			10%					.0006	A			.0006
U15C							5.3	5	4.7			10%					.0006	A			.0006
U16A	2346201-1		Dig.				5.3	5	4.7			10%				Nand	.0005	A			.0005
U16B							5.3	5	4.7			10%					.0005	A			.0005

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0061 %/1000 HRS

8xA 679

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIERS	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U16C							5.3	5	4.7			10%					.0005	A			.0005
U16D							5.3	5	4.7			10%					.0005	A			.0005
U17A	2346201-2		Dig.				5.3	5	4.7			20%				Hex	.0003	A			.0003
U17B							5.3	5	4.7			10%					.0003	A			.0003
U17C							5.3	5	4.7			20%					.0003	A			.0003
U17D							5.3	5	4.7			10%					.0003	A			.0003
U17E							5.3	5	4.7			10%					.0003	A			.0003
U17F							5.3	5	4.7			20%					.0003	A			.0003
U18A	2346201-2		Dig.				5.3	5	4.7			20%				Hex	.0003	A			.0003

23 FAILURE RATE SOURCE (See Column #9)
A ATM 605
B
C
D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5\,(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5\,(V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0031 %/1000 HRS

BxA 679

ATM 715
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U18B							5.3	5	4.7			20%					.0003	A			.0003
U18C							5.3	5	4.7			10%					.0003	A			.0003
U18D							5.3	5	4.7			20%					.0003	A			.0003
U18E							5.3	5	4.7			20%					.0003	A			.0003
U18F							5.3	5	4.7			10%					.0003	A			.0003
U19A	2346201-6		DIG				5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U19B							5.3	5	4.7			10%					.001	A			.001
U20	2346201-7		DIG				5.3	5	4.7			10%				And / Or Invert	.002	A			.002
U21A	2346201-6		DIG				5.3	5	4.7			10%				And/OR Invert	.001	A			.001

FAILURE RATE SOURCE (See Column 19)
A ATM 605 C
B D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0065 %/1000 HRS

8xA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #3

DATE: 30 July 1971

SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: RATED / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	MULTIPLIER FAIL RATE	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U21B							5.3	5	4.7			10%					.001	A			.001
U22A	2346201-6		DIG				5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U22B							5.3	5	4.7			10%					.001	A			.001
U23A	2346201-6		DIG				5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U23B							5.3	5	4.7			10%					.001	A			.001
U24A	2346201-6		DIG				5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U24B							5.3	5	4.7			10%					.001	A			.001
U25A	2346201-16		DIG				5.3	5	4.7			00 00				F-F	.001	A			.001
U25B							5.3	5	4.7			00 10 00					.001	A			.001

FAILURE RATE SOURCE (See Column 19)

A ATM 695

B

C

D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0090 %/1000 HRS

8xA 679

ATM 775
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U26A	2346201-16		DIG				5.3	5	4.7			Q10 - Q10				F-F	.001	A			.001
U26B							5.3	5	4.7			Q10 Q10					.001	A			.001
U27A	2346201-16		DIG				5.3	5	4.7			Q10 - Q10				F-F	.001	A			.001
U27B							5.3	5	4.7			Q10 - Q10					.001	A			.001
U28A	2346201-16		DIG				5.3	5	4.7			Q10 - Q10				F-F	.001	A			.001
U28B							5.3	5	4.7			Q10 - Q10					.001	A			.001
U29A	2346201-16		DIG				5.3	5	4.7			Q10 - Q10				F-F	.001	A			.001
U29B							5.3	5	4.7			Q10 - Q10					.001	A			.001
U30A	2346201-2		DIG				5.3	5	4.7			60%				HEX	.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0083 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U30B							5.3	5	4.7			40%					.0003	A			.0003
U30C							5.3	5	4.7			40%					.0003	A			.0003
U30D							5.3	5	4.7			40%					.0003	A			.0003
U30E							5.3	5	4.7			40%					.0003	A			.0003
U30F							5.3	5	4.7			20%					.0003	A			.0003
U31A	2346201-2		DIG				5.3	5	4.7			10%				HEX	.0003	A			.0003
U31B							5.3	5	4.7			70%					.0003	A			.0003
U31C							5.3	5	4.7			50%					.0003	A			.0003
U31D							5.3	5	4.7			30%					.0003	A			.0003

23 FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6(V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0027 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN %	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT %	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN / ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAIL. RATE MULTIPLIER	TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U31E							5.3	5	4.7			10%					.0003	A			.0003
U31F							5.3	5	4.7			40%					.0003	A			.0003
U32A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U32B							5.3	5	4.7			10%					.0006	A			.0006
U32C							5.3	5	4.7			10%					.0006	A			.0006
U33A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006
U33B							5.3	5	4.7			10%					.0006	A			.0006
U33C							5.3	5	4.7			10%					.0006	A			.0006
U34A	2346201-3		DIG				5.3	5	4.7			10%				NAND	.0006	A			.0006

23 FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6\,(V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6\,(V_{NOM} - V_{RATED\ MIN})$

25 TOTAL FAILURE RATE .0048 %/1000 HRS

BxA 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #5
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (% / 1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE PER TYPE	TOTAL FAILURE RATE
U34B							5.3	5	4.7			10%					.0006	A			.0006
U34C							5.3	5	4.7			20%					.0006	A			.0006
U35A	2346201-3		Dig.				5.3	5	4.7			10%				Nand	.0006	A			.0006
U35B							5.3	5	4.7			10%					.0006	A			.0006
U35C							5.3	5	4.7			10%					.0006	A			.0006
U36A	2346201-2		Dig.				5.3	5	4.7			10%				Hex	.0003	A			.0003
U36B							5.3	5	4.7			10%					.0003	A			.0003
U36C							5.3	5	4.7			60%					.0003	A			.0003
U36D							5.3	5	4.7			60%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A ATM 605 C
B D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0042 %/1000 HRS

BxA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #3

DATE: 30 July 1971

SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: MIN. ALLOWABLE %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAIL RATE MULTIPLIER	FOR RELIABILITY USE ONLY: TOTAL QUANTITY PER TYPE	FOR RELIABILITY USE ONLY: TOTAL FAILURE RATE (%/1000 HRS)
U36E							5.3	5	4.7			10%					.0003	A			.0003
U36F	(Spare)																				
U37A	2346201-2		Dig.				5.3	5	4.7			10%				Hex	.0003	A			.0003
U37B							5.3	5	4.7			10%					.0003	A			.0003
U37C							5.3	5	4.7			10%					.0003	A			.0003
U37D							5.3	5	4.7			20%					.0003	A			.0003
U37E							5.3	5	4.7			10%					.0003	A			.0003
U37F							5.3	5	4.7			20%					.0003	A			.0003
U38A	2346201-2		Dig.				5.3	5	4.7			60%				Hex	.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)

A ATM 605 C

B D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0024 %/1000 HRS

BxA 679

ATM 475
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #3

DATE: 2 30 July 1971

SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: % LOADING	SPEED: % OF MAX	CLOCK WIDTH: MIN RETURN %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	FOR RELIABILITY USE ONLY: SOURCE	FOR RELIABILITY USE ONLY: FAILURE RATE	FOR RELIABILITY USE ONLY: TOTAL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U38B							5.3	5	4.7			50%					.0003	A			.0003
U38C							5.3	5	4.7			60%					.0003	A			.0003
U38D							5.3	5	4.7			10%					.0003	A			.0003
U38E							5.3	5	4.7			10%					.0003	A			.0003
U38F							5.3	5	4.7			10%					.0003	A			.0003
U39A	2346201-1		Dig.				5.3	5	4.7			10%				Nand	.0005	A			.0005
U39B							5.3	5	4.7			10%					.0005	A			.0005
U39C							5.3	5	4.7			10%					.0005	A			.0005
U39D							5.3	5	4.7			20%					.0005	A			.0005

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .5 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .5 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0035 %/1000 HRS

B-A 679

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #3

DATE: 30 July 1971

SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: % LOADING	SPEED: % OF MAX	CLOCK WIDTH: MIN ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE MULTIPLIER	TC COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U40A	2346201-6		Dig.				5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U40B							5.3	5	4.7			10%					.001	A			.001
U41	2346201-7		Dig.				5.3	5	4.7			10%				And/Or Invert	.002	A			.002
U42	2346201-7		Dig.				5.3	5	4.7			10%				And/Or Invert	.002	A			.002
U43	2346201-7		Dig.				5.3	5	4.7			10%				And/Or Invert	.002	A			.002
U44A	2346201-2		Dig.				5.3	5	4.7			60%				Hex	.0003	A			.0003
U44B							5.3	5	4.7			20%					.0003	A			.0003
U44C							5.3	5	4.7			10%					.0003	A			.0003
U44D							5.3	5	4.7			20%					.0003	A			.0003

FAILURE RATE SOURCE (See Column 19)
A ATM605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0092 %/1000 HRS

8xA 679

APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LSPE

SUB ASSEMBLY: Digital Processor Board #3

DATE: 30 July 1971

SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: LOADING %	SPEED: % OF MAX	CLOCK WIDTH: ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (%/1000 HRS)	SOURCE	FAILURE RATE	TOTAL FAILURE RATE (%/1000 HRS)
U44E							5.3	5	4.7			10%					.0003	A		.0003
U44F							5.3	5	4.7			50%					.0003	A		.0003
U45A	2346201-2		Dig.				5.3	5	4.7			80%				Hex	.0003	A		.0003
U45B							5.3	5	4.7			40%					.0003	A		.0003
U45C							5.3	5	4.7			40%					.0003	A		.0003
U45D							5.3	5	4.7			40%					.0003	A		.0003
U45E							5.3	5	4.7			40%					.0003	A		.0003
U45F							5.3	5	4.7			10%					.0003	A		.0003
U46A	2346201-6		Dig.				5.3	5	4.7			10%				And/Or Invert	.001	A		.001

FAILURE RATE SOURCE (See Column 19)

A ATM 605 C

B D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .6 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .6 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0034 %/1000 HRS

B&A 679

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP
ASSEMBLY: LSPE
SUB ASSEMBLY: Digital Processor Board #3
DATE: 30 July 1971
SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C: ACTUAL AMBIENT	MAX TEMP °C: RATED JUNCTION	MAX TEMP °C: ACTUAL JUNCTION	VOLTAGES: DERATED MAXIMUM	VOLTAGES: ACTUAL	VOLTAGES: DERATED MINIMUM	INPUTS: FAN IN	INPUTS: % OF MAX I OR V	OUTPUTS: FAN OUT	OUTPUTS: % LOADING	SPEED: % OF MAX	CLOCK WIDTH: MIN. ACTUAL %	CIRCUIT FUNCTION OR APPLICATION	FOR RELIABILITY USE ONLY: RATE (% / 1000 HRS)	SOURCE (See Col. 19)	FAIL RATE MULTIPLIER	TOTAL FAIL RATE PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U46B							5.3	5	4.7			10%					.001	A			.001
U47A	2346201-6		Dig.				5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U47B							5.3	5	4.7			10%					.001	A			.001
U48A	2346201-6		Dig.				5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U48B							5.3	5	4.7			10%					.001	A			.001
U49A	2346201-6		Dig.				5.3	5	4.7			10%				And/Or Invert	.001	A			.001
U49B							5.3	5	4.7			10%					.001	A			.001
U50A	2346201-16		Dig.				5.3	5	4.7			Q 10 Q 10				F-F	.001	A			.001
U50B							5.3	5	4.7			Q 10 Q 10					.001	A			.001

FAILURE RATE SOURCE (See Column 19)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE .0090 %/1000 HRS

BxA 679

ATM 975
APPENDIX C

PARTS APPLICATION ANALYSIS

(MICROCIRCUITS)

PROJECT: ALSEP

ASSEMBLY: LRRR

SUB ASSEMBLY: Digital Processor Board #3

DATE: 30 July 1971

SCHEMATIC NO: 2347836

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLI-CATION	FOR RELIABILITY USE ONLY				
				ACTUAL AMBIENT	RATED JUNCTION	ACTUAL JUNCTION	DERATED MAXIMUM	ACTUAL	DERATED MINIMUM	FAN IN	% OF MAX IOR V	FAN OUT	LOADING %	% OF MAX			RATE (1% 1000 HRS)	SOURCE	FAILURE RATE	TOTAL FOR TYPE	TOTAL FAILURE RATE
U51A	2346201-16		Dig.				5.3	5	4.7			Q 10 Q 10				F-F	.001	A			.001
U51B							5.3	5	4.7			Q 10 Q 10					.001	A			.001
U52A	2346201-16		Dig.				5.3	5	4.7			Q 10 Q 10				F - F	.001	A			.001
U52B							5.3	5	4.7			Q 10 Q 10					.001	A			.001
U53A	2346201-16		Dig.				5.3	5	4.7			Q 10 Q 10				F-F	.001	A			.001
U53B							5.3	5	4.7			Q 20 Q 0					.001	A			.001
																	Subtotal =				.006

FAILURE RATE SOURCE (Use Column to)
A ATM 605
B
C
D

NOTE: DERATED VOLTAGE IS DETERMINED BY:
$V_{MAX} = V_{NOM} + .8 (V_{RATED\ MAX} - V_{NOM})$
$V_{MIN} = V_{NOM} - .8 (V_{NOM} - V_{RATED\ MIN})$

TOTAL FAILURE RATE 1.3×10^{-6} %/1000 HRS

8nA 079