



**Aerospace
Systems Division**

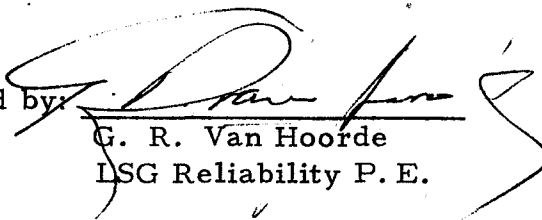
LSG Parts Application Analysis

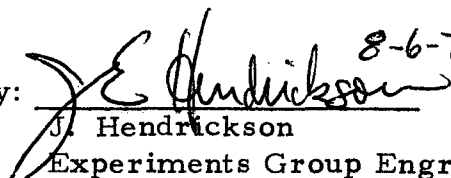
NO.	REV. NO.
ATM 1009	A
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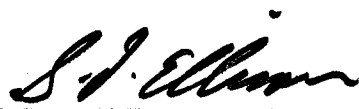
The purpose of this ATM is to document the results of the Parts Application Analysis study performed on the LSG Experiment.

The stress levels shown were determined on the basis of electronic piece parts operating at their worst case values of resistance, capacitance, etc., and worst case application of voltage and current levels. Operating temperatures were established at 50°C.

The attached sheets demonstrate that all parts are applied well within both the LSG and Bendix operating criteria. From the analysis it can be concluded that the LSG is designed in a manner to ensure that the reliability and two (2) year operating rationale life requirements of the LSG can be met. This ATM, Revision A, reflects the PAA results of the LSG "High Data Rate Model".

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**Aerospace
Systems Division**

LSG Parts Application Analysis

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LSG SUMMARY OF PARTS APPLICATION ANALYSIS

Electronics

<u>Component</u>	<u>BxA Derating</u>	<u>ATM-241 Ratings</u>
IC's Linear	50-70% of current loading	75% or less of manufacturer's rating
IC's Digital	40-70% of fan-out	75% or less of manufacturer's rating
Resistors	1-15% of rated power	50% of rated power
Diodes	1-10% of rated power	50% of rated power
Transistors	1-15% of rated power	50% of rated power
Capacitors	1-30% of rated voltage	50-60% of rated voltage

THERMAL & MECHANICAL COMPONENTS



**Aerospace
Systems Division**

LSG Parts Application Analysis

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<u>Qty</u>	<u>Component</u>	<u>ADL Derating (%)</u> <u>(Ref Mfg Rating)</u>	<u>ATM-241 Rating</u>
2	Connectors	4.45 Power	
1	Arrestment Motor	3.33 Torque	
1	Mass Changing Motor	70.00 Torque	
1	Potentiometer	.37 Power Dissipation	
2	Stepper Motors (Screw)	3.03 Torque	
1	Stepper Motor (Leveling)	41.6 Torque	
4	Resistors (RER 65)	5.4 Power	50% Rated Power
4	Instrument Hsg Heaters	16.3 Power	
4	Survival Heaters	11.6 Power	
1	Survival Heaters	11.6 Power	
1	Heater Box Heater	.48 Power	
1	Capacitor	58. Voltage	Stress ratio is .35 per ATM-605A
1	Thermal Switch	2.6 Power	
2	Encoders	9.0 Contact current	
1	Pressure Transducer	15.0 Power	

PARTS APPLICATION ANALYSIS
SUMMARY

PROJECT: LSGDATE: 8/20/71

ASSEMBLY: _____ SUB ASSEMBLY: _____

SCHEMATIC NO: _____

DEVICE TYPE	TOTAL NO. USED	TOTAL FAILURE RATE	COMMENTS
CAPACITORS	300	.09758	
RESISTORS	378	.41353	
DIODES	116	.09683	
TRANSISTORS	48	.09255	
RELAYS	20	.08000	
TRANSFORMERS	5	.01000	
IC'S CONDUCTORS	173	.40600	
COILS & CHOKES			
		1.19649	

TOTAL ASSEMBLY FAILURE RATE 1.19649 %/1000 HOURSMEAN-TIME-TO-FAILURE 83,600 HOURSMISSION SUCCESS PROBABILITY N/A

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #1

Logic A/D Conv/DGTL
SUB ASSEMBLY: MUX & DGTL MUX Cont

DATE: 8/20/71
SCHEMATIC NO: 2362181

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANU FACTURER	T YPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				A M B I E N T	J U N C T I O N	J U N C T I O N	M A X I M U M	A C T U A L	M I N I M U M	FAN IN %	% OF MAX I/O R V	FAN OUT %	L O A D I N G %				RATE (%/1000 HRS)	SOURCE (See Notes)	F A I L U R E R A T E P E R T Y P E	T O T A L F A I L U R E R A T E (%/1000 HRS)
U1	SN54L73T 2346201-1	TI	Dig	50	125	60	5.3	5	4.7				50 to 60			Gate		A		.0020
U2	2346201-11															Flip Flop				
U3	" "															" "				
U4	SN54L00T 2346201-2															Inverter				
U5	2346201-1															Gate				
U6	2346201-11															Flip Flop				
U7	SN54L73T 2346201-11															Flip Flop				
U8	2346201-1															Gate				
U9	SN54L00T 2346201-1															" "				

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605A 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 .018000 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

Logic A/D Conv/DGTL

DATE: 8/20/71

ASSEMBLY: Board #1

SUB ASSEMBLY: MUX & DGTL MUX Cont.

SCHEMATIC NO: 2362181

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	M A N U F A C T U R E R	T Y P E	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				A C T U A L	J U N C T I O N	J U N C T I O N	M A X I M U M	A C T U A L	M I N I M U M	FAN IN %	% OF MAX I/O V	FAN OUT %	L O A D I N G				R A T E (%/1000 HRS)	S O L D I N G	F M U L T I P L I C A T I O N	T O T A L F A I L U R E R A T E (%/1000 HRS)
U10	LN54L00T 2346201-11	TI	Dig	50	125	60	5.3	5	4.7				60			Flip Flop		A		.0020
U11	2346201-2															Inverter				
U12	SN54L95T 2346201-2															Inverter				
U13	2346201-1															Gate				
U14	SN54L54T 2346201-4															Gate				
U15	2346201-3															" "				
U16	2346201-1															" "				
U17	2346201-11															Flip Flop				
U18	2346201-14															Counter				

23 FAILURE RATE SOURCE (See Column 19)

A ATM605A C _____

B _____ 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 .01800 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

Logic A/D Conv/DGTL

DATE: 8/20/71

ASSEMBLY: Board #1

SUB ASSEMBLY: MUX & DGTL MUX Cont.

SCHEMATIC NO: 2362181

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	M A N U F A C T U R E R	T Y P E	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				A M B I E N T	J U N C T I O N	J U N C T I O N	M A X I M U M D E R A T E D	A C T U A L	M I N I M U M D E R A T E D	FAN IN %	% OF MAX I OR V	FAN OUT %	L O A D I N G %				R A T E (%/1000 HRS)	S O U R C E (See Footnote)	F M A I L U R E R A T E P E R T Y P E	T O T A L F A I L U R E R A T E (%/1000 HRS)	
U19	SN54L95T 2346201-7	TI	Dig	50	125	60	5.3	5	4.7				50 to 60			Gate		A			.0020
U20	SN54L54T 2346201-7															Gate					
U21	2346201-7																				
U22	2346201-15															Shift Register					
U23	2346201-7															Gate					
U24	2346201-7																				
U25	SN54L20T 2346201-7															Gate					
U26	SN54L10T 2346201-15															Shift Register					
U27	SN54L04T 2346201-7	↓	↓	↓	↓	↓	↓	↓	↓				↓			Gate	↓			↓	

23 FAILURE RATE SOURCE (See Column 19)

A ATM605A C _____

B _____ D _____

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:

$V_{MAX} = V_{NOM} \cdot .8 (V_{RATED MAX} \cdot V_{NOM})$

$V_{MIN} = V_{NOM} \cdot .6 (V_{NOM} \cdot V_{RATED MIN})$

25 TOTAL FAILURE RATE .01800 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

Logic A/D Conv/DGTL

DATE: 8/20/71

ASSEMBLY: Board #1

SUB ASSEMBLY: MUX & DGTL MUX Cont

SCHEMATIC NO: 2362181

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				AC TUAL	JUN TION	JUN TION	MAX TUM	ACT UAL	MIN TUM	FAN IN %	% OF MAX I OR V	FAN OUT %	LOAD ING %				RATE (%/1000 HRS)	SOURCE (See Notes)	FULL RATED PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)	
U28	SN54L93T	TI	Dig	50	125	60	6.3	5	4.7				50 to 60			Gate		A			.0020
U29	SN54L00T 2346201-7															Gate					
U30	SN54L04T 2346201-7															Gate					
U31													50 to 60			Shift Register					
U31	2346201-15	TI	Dig	50	125	60	5.3	5	4.7				50 to 60				A			.0020	
23 FAILURE RATE SOURCE (See Column 19) A <u>ATM605A</u> 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 <u>.0080</u> %/1000 HRS						

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #2

2 RVR
Dig Line Buffer & RVR Command
SUB ASSEMBLY: Decoder & Driver Command Counter DATE: 8/20/71
SCHEMATIC NO: 2362172

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANU FACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				AM BUI EAL	R JUN CTED	A JUN CTU AL	DM EX AT EUM	A CT UAL	DM EX AT EUM	FAN IN %	% OF MAX I OR V	FAN OUT %	L O A D I N G				RATE (%/1000 HRS)	S O U R C E (See Notes)	F M A I L U R E R A T E PER TYPE	T O T A L F A I L U R E R A T E (%/1000 HRS)	
U1	T2L 2346201-16	TI	Logic	50	125	60	5.3	5	4.7			50				Flip Flop	A			.0020	
U2	T2L F.F. 2346201-16	TI	Logic	50	125	60	5.3	5	4.7			60				Flip Flop	A		.0020		
U3	T2L F.F. 2346201-10	TI	Logic	50	125	60	5.3	5	4.7			60				Flip Flop	A		.0020		
U4	T2L F.F. 2346201-1	TI	Logic	50	125	60	5.3	5	4.7			60				Gate	A		.0020		
U5	T2L Gate 2346201-2	TI	Logic	50	125	60	5.3	5	4.7			60				Inverter	A		.0020		
U6	T2L Gate 2346201-2	TI	Logic	50	125	60	5.3	5	4.7			60				Inverter	A		.0020		
U7	T2L Gate 2346201-2	TI	Logic	50	125	60	5.3	5	4.7			60				Gate	A		.0020		

22 FAILURE RATE SOURCE (See Column 19)

A ATM 605A C _____

B _____ 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 .0140 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

Line Buffers and RVR Command

DATE: 8/20/71

ASSEMBLY: Board #2

SUB ASSEMBLY: Decoder & Driver CMD Counter

SCHEMATIC NO: 2362172

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				AMBI- ENT	JUNC- TION	ACTU- AL	DE R- ATE TEMP °C	ACTU- AL	DE R- ATE TEMP °C	FAN IN %	% OF MAX I OR V	FAN OUT %	LO- AD- ING				RATE (%/1000 HRS)	SOURCE (See below)	FM ALT R- ATE	TOT- AL PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U8	2346201-12	Sig- netics	Dig	50	125	60	6.0	5.2	4.8			70				Gate		A			.0020
U9	2346201-1	TI	Dig	50	125	60	5.3	5	4.7			60				Gate		A			.0020
U10	2346201-2	TI	Dig	50	125	60	5.3	5	4.7			60				Gate		A			.0020
U11	2346201-2	TI	Dig	50	125	60	5.3	5	4.7			60				Hex in- ter Inter- face		A			.0020
U12	2346201-1	TI	Dig	50	125	60	5.3	5	4.7			60				Gate		A			.0020
U22	2346275-2	TI	Dig	50	125	60	5.3	5	4.7			60				Gate		A			.0020

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605A 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 .0120 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #2

Digital Line Buffer & Revr Command DATE: 8/20/71
SUB ASSEMBLY: Decode & Driver Command Counter SCHEMATIC NO: 2362172

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	M A N U F A C T U R E R	T Y P E	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				A M B I E N T	J U N C T I O N	J U N C T I O N	D E R A T E D	A C T U A L	D E R A T E D	FAN IN %	% OF MAX I/O R V	FAN OUT %	L O A D I N G				RATE (%/1000 HRS)	S O U R C E (See notes)	F M U L T I P L I C A T I O N	T O T A L F A I L U R E P E R T Y P E	TOTAL FAILURE RATE (%/1000 HRS)
U13	2346297-1	Sig- netics	Logic	50	125	60	6	5.1	4.8			50				Decoder		A			.0020
U14	2346201-2	Sig- netics	Logic	50	125	60	6	5.1	4.8			50				Hex Inverter Interface		A		.0020	
U15	2346275-2	TI	Logic	50	125	60	5.3	5.0	4.7			60				Gate		A		.0020	
U16	2346297-1	TI	Logic	50	125	60	5.3	5.0	4.7			60				Decoder		A		.0020	
U17	2346201-2	Fair- child	Logic	50	125	60	7.0	3.5	0.5			60				Inverter		A		.0020	
U18	2346275-2	TI	↓	↓	↓	↓	↓	↓	↓			↓				Gate		A		.0020	
U19	2346201-2	TI	Logic	50	125	60	5.3	5	4.7			60				Inverter		A		.0020	
U20	2346275-2			50	125	60	6	5.1	4.8			50				Gate		A		.0020	
U21	2346201-2			50	125	60	5.3	5	4.7			60				Inverter		A		.0020	

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605A C _____

B _____ D _____

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:
 $V_{MAX} = V_{NOM} \cdot .8 (V_{RATED MAX} - V_{NOM})$
 $V_{MIN} = V_{NOM} \cdot .6 (V_{NOM} - V_{RATED MIN})$

25 TOTAL FAILURE RATE .0180 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #3

Analog Output Buffer
SUB ASSEMBLY: and Analog MUX

DATE: 8/20/71
SCHEMATIC NO: 2362183

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				AMBI- ENT	JUN- TION	JUN- TION	DE- XIM- EUM	ACT- UAL	DE- XIM- EUM	FAN IN %	% OF MAX I/O R V	FAN OUT %	LO- AD ING				RATE (%/1000 HRS)	SOURCE (See Notes)	FMA- ULT- RATED PER TYPE	TOT- AL	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
U3	2340368-1	TI	Dig	50	125	60	5.3	5	4.7			50				Multiplex		A			.0020
U6	2340368-1	TI	Dig	50	125	60	5.3	5	4.7			60				"		A			.0020
U2	2346201-3	TI	Dig	50	125	60	5.3	5	4.7			70				Gate		A			.0020
U1	2346201-2	"	"	"	"	"	"	"	"			60				Inverter		A			.0020
U4	2346201-2	"	"	"	"	"	"	"	"			60				"		A			.0020
U5	2346201-2	"	"	"	"	"	"	"	"			70				"		A			.0020
AR8	2346272-1	NAT Sem	Linear	50	125	60	< ±20	±10	±5<				70			OP. AMPL		A			.0140
ARI	2346270-2	"	"	"	"	"	"	"	"				"			"		A			.0140
thru AR7	2346270-2	"	"	"	"		"	"	"				"			"					
FAILURE RATE SOURCE (See Column 19)										NOTE: DERATED VOLTAGE IS DETERMINED BY: V _{MAX} = V _{NOM} + .8 (V _{RATED MAX} - V _{NOM}) V _{MIN} = V _{NOM} - .6 (V _{NOM} - V _{RATED MIN})					TOTAL FAILURE RATE .0280 %/1000 HRS						
A ATM605A C _____																					
B _____ D _____																					

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

Screw Servo/~~Servo Control~~

DATE: 8/20/71

ASSEMBLY: Board #4

SUB ASSEMBLY: and Tilt Servo

SCHEMATIC NO: 2362174

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANU FACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				AMBI- ENT	JUNC- TION	JUNC- TION	MAXI- MUM DERA- TED	ACTU- AL	MINI- MUM DERA- TED	FAN IN %	% OF MAX I OR V	FAN OUT %	LOAD AD- DING %				RATE (%/1000 HRS)	SOURCE (See Ref)	FULL RATED TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U1	LPT ² L Gate 2346201-14	TI	Log- ic	50	125	60	5.3	5	4.7			60				Counter		A		.0020
U2	LPT ² L Gate 2346201-14	TI	Log- ic	50	125	60	5.3	5	4.7			60				Counter		A	.0020	
U3	LPT ² L Gate 2346201-14	TI	Log- ic	50	125	60	5.3	5	4.7			60				Counter		A	.0020	
U4	LPT ² L Gate 2346201-14	TI	Log- ic	50	125	60	5.3	5	4.7			60				Counter		A	.0020	
U25	LPT ² L Gate 2346201-14	TI	Log- ic	50	125	60	5.3	5	4.7			60				Counter		A	.0020	
U5	LPT ² L Gate 2346201-1	TI	Log- ic	50	125	60	5.3	5	4.7			60				Gate		A	.0020	
U8	LPT ² L F.F. 2346201-1	TI	Log- ic	50	125	60	5.3	5	4.7			50				Gate		A	.0020	
U11	LPT ² L F.F. 2346201-1	TI	Log- ic	50	125	60	5.3	5	4.7			50				Gate		A	.0020	
U12	LPT ² L Control 2346201-1	TI	Log- ic	50	125	60	5.3	5	4.7			50				Gate		A	.0020	

22 FAILURE RATE SOURCE (See Column 19)

A ATM 605 A C

B D

24 NOTE: DERATED VOLTAGE IS DETERMINED BY:

$V_{MAX} - V_{NOM} \cdot \delta (V_{RATED MAX} - V_{NOM})$

$V_{MIN} - V_{NOM} \cdot \delta (V_{NOM} - V_{RATED MIN})$

25 TOTAL FAILURE RATE .0180 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #4

SUB ASSEMBLY: Screw Servo/Tilt Servo

SCHEMATIC NO: 2362174

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				AMBI- ENT	JUNCTION	APPLICATION	DE-RATED	ACTUAL	DE-RATED	FAN IN %	% OF MAX I OR V	FAN OUT %	LOADING				DATE (%/1000 HRS)	SOURCE (See Table)	FULLY APPLIED 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
U17	LPT2L Gate 2346201-1	TI	Logic	50	125	60	5.30	5.0	4.7			50				Gate		A			.0020
U18	LPT2L Gate 2346201-1	TI	Logic	50	125	60	5.30	5.0	4.7			60				Gate		A			.0020
U20	LPT2L Gate 2346201-1	TI	Logic	50	125	60	5.30	5.0	4.7			60				Gate		A			.0020
U21	LPT2L Gate 2346201-1	TI	Logic	50	125	60	5.30	5.0	4.7			50				Gate		A			.0020
U22	LPT2L F. F. 2346201-1	TI	Logic	50	125	60	5.30	5.0	4.7			70				Gate		A			.0020
U23	LPT2L F. F. 2346201-1	TI	Logic	50	125	60	5.30	5.0	4.7			60				Gate		A			.0020
U6	LPT2L Contr. 2346201-10	TI	Logic	50	125	60	5.30	5.0	4.7			50				Flip Flop		A			.0020
U24	2346201-10	Sig-netics	Logic	50	125	60	6.0	5.2	4.8			60				Flip Flop		A			.0020
U7	2346201-3		Logic	50	125	60	6.0	5.2	4.8			60				Nand Gate		A			.0020

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605A C _____

B _____ 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 .0180 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #4

SUB ASSEMBLY: Screw Servo/Tilt Servo

SCHEMATIC NO: 2362174

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL "	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				AMBI- ENT	JUN- TION	JUN- TION	DE- AT- MUM	ACT- UAL	DE- AT- MUM	FAN IN %	% OF MAX I OR V	FAN OUT %	LO- AD ING				RATE (%/1000 HRS)	SOURCE	FM LTP R T L E R	TC OU T A N T PER TYPE
U14	2346201-3	Sig- netics	Dig	50	125	60	6.0	5.2	4.8			60				Nand Interface Gate		A		.0020
U9	2346207-18		Dig	50	125	60	6.0	5.0	4.8			60				Multi- vibrator		A		.0020
U10	2346201-16		Dig	50	125	60	6.0	5.0	4.8			60				Flip Flop		A		.0020
U19	2346201-16		Dig	50	125	60	6.0	5.0	4.8			50				Flip Flop		A		.0020
U13	2346275-1		Dig	50	125	60	6.0	5.2	4.8			50				Voltage Vibrator		A		.0020
U16	2346275-1		Dig	50	125	60	6.0	5.2	4.8			60				Voltage Vibrator		A		.0020
U15	2346201-4		Dig	50	125	60	6.0	5.0	4.8			60				Nand Gate		A		.0020

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605 A C _____

B _____ D _____

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

25 TOTAL FAILURE RATE .0140 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #6

Instrument Housing Temp.
SUB ASSEMBLY: Control/Mass Changing Servo

DATE: 8/20/71
SCHEMATIC NO: 2362176

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				A C T U A L	J U N C T I O N	J U N C T I O N	D E R A T E D M A X I M U M	A C T U A L	D E R A T E D M A X I M U M	FAN IN %	% OF MAX I OR V	FAN OUT %	L O A D I N G %				RATE (%/1000 HRS)	SOURCE (See Notes)	F A U L T R A T E P E R T Y P E	T O T A L F A I L U R E R A T E (%/1000 HRS)	
AR ₁	2346270-2		Linear	50	125	60	±20	±10	±2				60			Op. Ampl		A			.0080
Thru AR ₄	"		"	50	125	60	±20	±10	±2				60			"					
VR ₅	SM105G		"	50	125	60	>5	5	4				60			Voltage Reg.				.0020	
VR ₆	"		"													"					
VR ₇	2346273-12		"													Voltage Ref.					
Thru VR ₁₀	"		"													"					
VR ₁	2346273-13		"													"					
VR ₃	"		"	↓	↓	↓	↓	↓	↓				↓			"				↓	
U ₂	2346201-16		Logic	50	125	60	5.3	5	4.7				70			Flip Flop				.0020	

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605 A 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 .0020 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #6

Inst. Housing Temp Control/
SUB ASSEMBLY: Mass Changing Servo

DATE: 8/20/71
SCHEMATIC NO: 2362176

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				AMBI- ENT	JUNC- TION	ACTU- AL	MAX I TEM- PERA- TURE	ACTU- AL	MIN I TEM- PERA- TURE	FAN IN %	% OF MAX I OR V	FAN OUT %	LO- AD ING				RATE (%/1000 HRS)	SOURCE (See Notes)	FULT R PLIER	TC O TUN- ALY PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
U3	2346201-11		Logic	50	125	60	5.3	5	4.7			70				Flip Flop		A			.0620
U4	2346201-11		Logic	11	11	11	11	11	11			11				Flip Flop		11		11	
U1	2346201-1		Logic	11	11	11	11	11	11			11				Dual Input Gate		11		11	
23 FAILURE RATE SOURCE (See Column 19)				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 <u>.0060</u> %/1000 HRS							
A <u>ATM605A</u> C _____ B _____ D _____																					

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #7

Seismic Ampl & Filter/
SUB ASSEMBLY: Free Mode Filter

DATE: 8/20/71
SCHEMATIC NO: 2362187

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				AMBI- ENT	JUNC- TION	JUNC- TION	MAX TUM	ACTU- AL	MIN TUM	FAN IN %	% OF MAX I/O V	FAN OUT %	LOAD ING %				RATE (%/1000 HRS)	SOURCE (See Notes)	FIL- TER	TOT- AL	TOTAL FAILURE RATE (%/1000 HRS)
AR1	Op. Ampl. LM108AH/883 2346272-1	Nat. Semi.	Lin-ear	50	125	60	±20	±10	±2				60			Op. Ampl.		A			.0020
AR3	Op. Ampl. LM108AH/883 2346271-2	Nat. Semi.	Lin-ear	50	125	60	±20	±10	±2				60			Op. Ampl.		A		.0020	
AR2	Op. Ampl. 1402-02 2346272-1	Phil-brick	Lin-ear	50	85	55	±24	±10	±4				70			Op. Ampl.		A		.0064	
AR4	1402-02 2346271-2	Phil-brick	Lin-ear	50	85	55	±24	±10	±4				70			Op. Ampl.		A		.0064	
AR5	2346272-1		Lin-ear	50	125	60	±20	±10	±2				60			Op. Ampl.		A		.0020	
AR6	2346271-2		Lin-ear	50	125	60	±20	±10	±2				60			Op. Ampl.		A		.0020	

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605A 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 .0208 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #8

SUB ASSEMBLY: Post-Ampl./Osc/Demo/Int.

DATE: 8/20/71
SCHEMATIC NO: 2362188

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				AMBI- ENT	JUN- TION	JUN- TION	MAX TEMP °C	ACTU- AL	DERI- VATION	FAN IN %	% OF MAX V	FAN OUT %	LO- AD %				RATE (%/1000 HRS)	SOURCE (See Notes)	FAC- TOR	TOTAL FAILURE RATE (%/1000 HRS)
AR2 thru AR4	2346270-2	85MO 3910	Lin- ear	50	85	55	±24	±10	±4				70			Op. Amplifier		A		.0256
U4	2346201-16		DIG	50	125	60	±20	10	4				70			Flip Flop		A		.0064
U5	2346201-5		DIG	50	125	60	±20	10	4				70			Nand Gate		A		.0064
U1	2346274-2		Lin- ear	50	125	60	5.3	5	4.7				50			Gate Analog		A		.0020
U2	2346274-2		Lin- ear	50	125	60	5.3	5	4.7				50			Analog Gate		A		.0020
U3	2346201-16		Log- ic	50	125	60	5.3	5	4.7				50			Flip Flop		A		.0020
AR1	Sml01G-1		Lin- ear	50	85	55	±24	±10	±4				70			Op. Ampl				.0064

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605A C

B D

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

25 TOTAL FAILURE RATE .0508 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

ASSEMBLY: Board #9

SUB ASSEMBLY: A/D Converter

DATE: 8/20/71

SCHEMATIC NO: 2362179

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANU FACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				A C T U A L	J U N C T I O N	J U N C T I O N	D E R A T E D	A C T U A L	D E R A T E D	FAN IN %	% OF MAX I OR V	FAN OUT %	L O A D I N G				RATE (%/1000 HRS)	S O U R C E	F A I L U R E R A T E	T O T A L F A I L U R E R A T E	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
U1	2346274-1		Lin- ear	50	125	60	±20	10	4			70				Analog Switch		A			.0064
U2																					
U3																					
U4																					
U5																					
VR1	2346273-12						75	5	4			60				Voltage Regulator					.0020
AR1	2346270-2				85	55	±24	±10	±4			70				Oper- Ampl.					.0020
thru																					
AR5																					
23 FAILURE RATE SOURCE (See Column 19) A <u>ATM 605 A</u> 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 <u>.0400</u> %/1000 HRS							

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

ASSEMBLY: Board #13

SUB ASSEMBLY: Fixed Gain Preamplifier

DATE: 8/20/71

SCHEMATIC NO: 2362182

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANU FACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				AMBI- ENT	JUN- TION	JUN- TION	MAX TEMP °C	ACTU- AL	MIN TEMP °C	FAN IN %	% OF MAX I/O R V	FAN OUT %	LOAD ING %				RATE (%/ 1000 HRS)	SOURCE	FIL- TER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
AR1	2346271-2 LM108A		Linear	50	85	55	+24	+10	+4				70			op Ampl.		A		.0064
23 FAILURE RATE SOURCE (See Column 19) A ATM605A 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 .0064 %/1000 HRS																				

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #14 A1

SUB ASSEMBLY: Shaft Encoder Elec.

DATE: 8/20/71
SCHEMATIC NO: 2362184

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				A C T U A L	J U N C T I O N	J U N C T I O N	M A X I M U M	A C T U A L	M I N I M U M	FAN IN %	% OF MAX I OR V	FAN OUT %	L O A D I N G				RATE (%/1000 HRS)	SOURCE	F A U L T R A P P E R	T O T A L F A I L U R E P E R T Y P E
U1	2346201-3 SNA54L10	TI	DIG	50	125	60	5.3	5	4.7			60				Nand Gates		A		.0020
U3																			.0020	
U5																			.0020	
U7																			.0160	
Thru U15																				
U4	2346201-2	TI														Inverter			.0020	
U6	2346201-2	TI														Inverter			.0020	
U2	2346201-6	TI														Gate			.0020	

23 FAILURE RATE SOURCE (See Column 19)

A ATM605A C _____

B _____ 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 .0280 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #14A2

SUB ASSEMBLY: Shaft Encoder Elec.

DATE: 8/20/71
SCHEMATIC NO: 2362189

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	M A N U F A C T U R E R	T Y P E	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				A M B I E N T	J U N C T I O N	A C T U A L	D E R A T E D	A C T U A L	D E R A T E D	FAN IN %	% OF MAX I OR V	FAN OUT %	L O A D I N G				RATE (%/1000 HRS)	S O U R C E	F A U L T R I P P L E R	T O O L A N L Y
U5	2346201-2		DIG	50	125	60	5.3	5	4.7			50				Hex Inverter		A		.0020
U7	2346201-2											50				"				
U6	2346201-6											60				Dual and/or Inverter				
U9												60				"				
U12												60				"				
U15												60				"				
U4	2346201-3											70				Nand				
U8												70				"				
U10												60				"				

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605A C _____

B _____ 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 .0180 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #14A2

SUB ASSEMBLY: Shaft Encoder Elec.

DATE: 8/20/71
SCHEMATIC NO: 2362189

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	M A N U F A C T U R E R	T Y P E	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED	CLOCK WIDTH	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				A M B I E N T	J U N C T I O N	J U N C T I O N	D E R A T E D	A C T U A L	D E R I V E D	FAN IN %	% OF MAX I OR V	FAN OUT %	L O A D I N G	% OF MAX	MIN ACTUAL %		RATE (%/1000 HRS)	S O U R C E (See below)	F A U L T R I P L E T E R	T O T A L F A I L U R E R A T E (%/1000 HRS)	
U11	2346201-3		DIG	50	125	60	5.3	5	4.7			60				Nand		A		.0020	
U13	//											11				//					
U14	//											11				//					
U16	//											11				//					
U2	2346201-11											70				Flip Flop					
U3	2346207-3											70				Nand					
U1	2346201-16			✓	✓	✓	✓	✓	✓			60				Flip Flop	✓		✓		

23 FAILURE RATE SOURCE (See Column 19)

A ATM 605A C _____

B _____ 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 .0140 %/1000 HRS

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #15A1

SUB ASSEMBLY: Temp. Controller/Monitor Assy.

SCHEMATIC NO: 2362185

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY				
				A C T U A L	J U N C T I O N	A C C U R A C Y	D E R A T E D M	A C T U A L	D E R A T E D M	FAN IN %	% OF MAX I O R V	FAN OUT %	L O A D I N G				RATE (%/1000 HRS)	S O U R C E (See Notes)	F A U L T R A T E R	T O T A L F A I L U R E P E R T Y P E	TOTAL FAILURE RATE (%/1000 HRS)
VR1	Voltage Ref. LM103-5.1/883 2346273-60	Nat.	Lin- ear	50	125	60	>5	5	4				70			Voltage Regulator		A			.0020
VR3	2346273-60 Voltage Ref. LM103-5.1/883	Nat.	Lin- ear	50	125	60	>5	5	4				70			Voltage Regulator		A			.0020
AR1	Op. Ampl NH0001AH/883 2346270-52	Nat.	Lin- ear	50	125	60	≤±20	10	±5≤				70			Op. Amplifier		A			.0020
22 FAILURE RATE SOURCE (See Column 19) A <u>ATM 605A</u> C _____ B _____ 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 <u>.0060</u> %/1000 HRS							

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #15A2

SUB ASSEMBLY: Temp. Controller/Monitor Assy.
DATE: 8/20/71
SCHEMATIC NO: 2362190

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				AMBI- ENT	JUN- CTION	JUN- CTION	MAX EX- TREM- UM	ACT- UAL	MIN EX- TREM- UM	FAN IN %	% OF MAX I/O R V	FAN OUT %	LO- AD ING				RATE (%/1000 HRS)	SOURCE	FMT PLT RPL- IER	TC OU- ALT PER TYPE
VR2	2346273-63			50	125	60	>5	5	4				60			Voltage Ref.	A			.0020
VR3	2346273-63			50	125	60	>5	5	4				60			Voltage Ref.	A		.0020	
VR4	2346273-63			50	125	60	>5	5	4				60			Voltage Ref.	A		.0020	
AR1	2346270-52			50	85	55	±24	±10	±4				70			Op. Ampl.	A		.0020	
23 FAILURE RATE SOURCE (See Column 19) A ATM 605A C B D				24 NOTE: DERATED VOLTAGE IS DETERMINED BY: V _{MAX} = V _{NOM} * .5 (V _{RATED MAX} - V _{NOM}) V _{MIN} = V _{NOM} * .6 (V _{NOM} - V _{RATED MIN})										25 TOTAL FAILURE RATE .0080 %/1000 HRS						

PARTS APPLICATION ANALYSIS

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(MICROCIRCUITS)

PROJECT: LSG
ASSEMBLY: Board #16

SUB ASSEMBLY: Zener Diode Ref

DATE: 8/20/71
SCHEMATIC NO: 2362186

(Microcircuits)

CKT SYM NO.	TYPE DESIGNATION	MANUFACTURER	TYPE	MAX TEMP °C			VOLTAGES			INPUTS		OUTPUTS		SPEED % OF MAX	CLOCK WIDTH MIN ACTUAL %	CIRCUIT FUNCTION OR APPLI- CATION	FOR RELIABILITY USE ONLY			
				AMBI- ENT	JUN- TION	JUN- TION	MAX- IMUM	ACTU- AL	MIN- IMUM	FAN IN %	% OF MAX I OR V	FAN OUT %	LO- AD ING				RATE (%/ 1000 HRS)	SOURCE (See Notes)	FULL RATED PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)
AR1			Lin- ear	50	125	85	55	±24	±10	±4		70				Op. Ampl.		A		.0020
23 FAILURE RATE SOURCE (See Column 19) A <u>ATM 605A</u> C _____ B _____ D _____				24 NOTE: DERATED VOLTAGE IS DETERMINED BY: V _{MAX} = V _{NOM} + .8 (V _{RATED MAX} - V _{NOM}) V _{MIN} = V _{NOM} - .6 (V _{NOM} - V _{RATED MIN})										25 TOTAL FAILURE RATE <u>.0020</u> %/1000 HRS						

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PROJECT: LSG
ASSEMBLY: Board #1

SUBASSEMBLY: A/D Converter
Dig. MUX/Dig. MUX Control

DATE: 8/20/71
SCHEMATIC NO: 2362181

[illegible]

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PROJECT: LSG
ASSEMBLY: Board #2

SUBASSEMBLY: Digital Line Buffer & RVR Command

DATE: 8/20/71

SCHEMATIC NO: 23462172

[illegible]

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #3

SUBASSEMBLY: Analog Output Buffer/Analog MUX

SCHEMATIC NO: 23462183

(Capacitors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
CIRCUIT SYMBOL NUMBER	TYPE DESCRIPTION (MIL-STD-883C) CONSTRUCTION	MANUFACTURER	CAPACITANCE VALUE μF	TOLERANCE %	MANUFACTURING TEMPERATURE °C	DC VOLTAGE V	OPERATING VOLTAGE V	VOLTAGE RATIO OPERATING/DC	MAXIMUM DUTY CYCLE %	BULK AIR TEMPERATURE (°C)	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (A) (1000 HRS)	RELIABILITY DEPT. CORRECTION FACTOR (B)	SPECIAL ENVIRONMENT (DEFENSE) FAILURE RATE MULTIPLIER	FINAL FAILURE RATE	TOTAL CAPACITOR COUNT PER TYPE	TOTAL FAILURE RATE (B/1000 HRS)	
C ₂₀	2346231-36		1.0	±10	50	15	1	30%	1	50	Decoupling	A		.01			.0005	
C ₆	2346231-36		1.0		50	5		10%			Lag Compensation							
C ₇	2346231-36		1.0		50	5		10%										
C ₈	2346233-5		22PF		100	15		15%										
C ₉	2346233-5		22PF		100	10		10%										
C ₁₀	2346233-8		39PF		100	10		10%										
C ₁₁	2346233-8		39PF		100	15		15%										
C ₁₂	2346231-28		22PF		50	2.5		5%										
C ₁₃	2346231-36		1.0		50	5		10%										
C ₁₄	2346233-5		22PF		100	20		20%										
C ₁₅	2346233-5		22PF		100	5		5%										
C ₁₆	2346233-5		22PF		100	5		5%										
C ₁₇	2346233-8		39PF		100	5		5%										
C ₁₈	2346233-8		39PF	↓	100	15		15%	↓	↓		↓		↓			↓	
C ₁₉	2346233-8		39PF	±10	100	10		10%	1	50	Lag Compensation	A		.01			.0005	
20						21						22						
FAILURE RATE SOURCES (FOR COLUMN #14)						CALCULATED MTBF _____ HRS						TOTAL FAILURE RATE .0075 / 1000 HRS						
A. ATM 605A B. _____																		
C. _____ D. _____																		

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PROJECT: LSG
ASSEMBLY: Board #3

SUBASSEMBLY: Analog Output Buffer/Analog MUX

DATE: 8/20/71
SCHEMATIC NO: 2362183

(Capacitors)

[illegible]

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG

ASSEMBLY: Board #14

SUBASSEMBLY: Tilt/Servo/Screw Servo

DATE: 8/20/71

SCHEMATIC NO: 2362174

(Capacitors)

[illegible]

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PARTS APPLICATION ANALYSIS

Page 33 of 100CAPACITORSPROJECT: LSGASSEMBLY: Board #5SUBASSEMBLY: Screw Servo/Buffer/Dig Line
Buffer/Caging ControlDATE: 8/20/71SCHEMATIC NO: 23462175

(Capacitors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (MIL OR MFR) CONSTRUCTION	MANUFACTURER	CAPACITANCE VALUE and	TOLERANCE %	MANUFACTURER'S RATED VOLTAGE	DC OPERATING VOLTAGE	OPERATING VOLTAGE	VOLTAGE RATIO, OPERATING/ RATED	MAXIMUM DUTY CYCLE	MILS IN TEMPERATURE (°C)	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (E/1000 HRS) (SEE REF. 1)	TEMPERATURE CORRECTION FACTOR (SEE REF. 2)	SPECIAL ENVIRONMENT (DEFINED)	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE	TOTAL CAPACITOR COUNT per TYPE	TOTAL FAILURE RATE (E/1000 HRS)	
C ₁	2346231-36	Sanyo	1.0	±10	15	3	20%	1	50			A						.000108	
C ₂					75	5	6%												
C ₃					6	1	15%												
C ₄																			
C ₅																			
C ₇																			
C ₈																			
C ₉																			
C ₁₀	↓		↓	↓	↓	↓	↓	↓	↓									↓	
C ₆	2346240-12		33	±10	15	3	20%	1	50			↓						.000108	
C ₁₁	2346230-25		.001	±10	100	10	10%	1	50			A						.0005	
C ₁₂	2346230-18		270PF	±10	200	20	10%	1	50			A						.0005	
C ₁₃	2346237-20		.047	±10	100	10	10%	1	50			A						.0005	
C ₁₄	2346240-44		6.8	±10	50	15	30%	1	50			A						.0005	
C ₁₅	"		"	"	"	"	"	1	50			A			"			"	
C ₁₆	"		"	"	"	"	"	1	50			A			"			"	
20										21									
FAILURE RATE SOURCES (FOR COLUMN #14)										CALCULATED MTBF _____ HRS									
A <u>ATM 605A</u> B _____																			
C _____ D _____																			
										22									
										TOTAL FAILURE RATE <u>.00408</u> E/1000 HRS									

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG
ASSEMBLY: Board #6SUBASSEMBLY: Inst. Housing Temp. Control/
Mass Changing ServoDATE: 8/20/71
SCHEMATIC NO: 23462176

(Capacitors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
CIRCUIT SYMBOL NUMBER	TYPE DESCRIPTION (MFG. # AND CONSTRUCTION)	MANUFACTURER	CAPACITANCE VALUE and TOLERANCE	MANUFACTURER'S RATED VOLTAGE	DC OPERATING VOLTAGE	OPERATING VOLTAGE RATED	MAXIMUM DUTY CYCLE	BULK AIR TEMPERATURE (°C)	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (S/1000 HRS) A - 100°C B - 125°C C - 150°C	SPECIAL ENVIRONMENT (DEFINING) FAILURE RATE MULTIPLIER	FINAL FAILURE RATE	TOTAL CAPACITOR COUNT PER TYPE	TOTAL FAILURE RATE (S/1000 HRS)				
C ₈	2346240-44		6.8 ±10	35	5	15%	1	50		A				.0005				
C ₂₅	2346231-32		.47 ±10	50	5	10%	1							.0005				
C ₁	2346231-36		1.0 ±10	50	5	10%								.0005				
C ₁₀	↓		↓	↓	↓	↓	↓	↓					↓					
C ₁₃	↓		↓	↓	↓	↓	↓	↓					↓					
C ₂₃	↓		↓	↓	↓	↓	↓	↓					↓					
C ₂₆	↓		↓	↓	↓	↓	↓	↓					↓					
C ₃₀	↓		↓	↓	↓	↓	↓	↓					↓					
C ₂₁	2346231-24		.1 ±10	100	15	15%								.0005				
C ₂₀	↓		↓	↓	↓	↓	↓	↓					↓					
C ₆	↓		↓	↓	↓	↓	↓	↓					↓					
C ₉	↓		↓	↓	↓	↓	↓	↓					↓					
C ₂	2346231-12		.01 ±10	200	10	5%								.0005				
C ₂₄	"		"	"	"	"	↓	↓						.0005				
C ₁₆	2346230-5		22PF ±10	200	15	7%	1	50						.0005				
C ₁₇	↓		↓	↓	↓	↓	↓	↓					↓					
C ₅	↓		↓	↓	↓	↓	↓	↓					↓					
C ₇	↓		↓	↓	↓	↓	↓	↓					↓					
C ₃	2346230-8		39PF ±10	200	15	7%	↓	↓						.0005				
20										21					22			
FAILURE RATE SOURCES (FOR COLUMN #14) A <u>ATM 605A</u> B _____ C _____ D _____										CALCULATED MTBF _____ HRS					TOTAL FAILURE RATE <u>.0095</u> S/1000 HRS			

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PROJECT: LSG
ASSEMBLY: Board #6

SUBASSEMBLY: Inst. Housing Temp. Control/
Mass Changing Servo

DATE: 8/20/71
SCHEMATIC NO: 23462176

[illegible]

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CAPACITORS

PROJECT: LSG

ASSEMBLY: Board #7

SUBASSEMBLY: Seismic Filter/Free Modes Filter

DATE: 8/20/71

SCHEMATIC NO: 2362187

(Capacitors)

[illegible]

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG

ASSEMBLY: Board #7

SUBASSEMBLY: Free Modes Filter/Seismic Filter

DATE: 8/20/71

SCHEMATIC NO: 23462187

(Capacitors)

[illegible]

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG
ASSEMBLY: Board #8SUBASSEMBLY: Integrator/DEMO/OSC/Post
AMPLDATE: 8/20/71
SCHEMATIC NO: 23462188

(Capacitors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
CIRCUIT PARTIAL NUMBER	TYPE DESCRIPTION (MIL or MFD) CONSTRUCTION	MANUFACTURER	CAPACITANCE VALUE MFD	TOLERANCE %	MANUFACTURER'S RATED VOLTAGE	DC OPERATING VOLTAGE	OPERATING VOLTAGE %	VOLTAGE RATIO OPERATING/ RATED	MAXIMUM DFT CYCLE	BULK AIR TEMPERATURE (°C)	CIRCUIT FUNCTION OR APPLICATION	BASE FAILURE RATE (1/100 HRS)	TEMPERATURE CORRECTION MULTIPLIER	SPECIAL ENVIRONMENT (NOTES)	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE	TOTAL CAPACITOR COUNT PER TYPE	TOTAL FAILURE RATE (1/100 HRS)
C ₁	2346230-5		22	±10	200	10	5%	1	50			A			.01			.0005
C ₁₅	2346231-24		0.1	±10	50	15	30%								.01			.0005
C ₁₂	2346231-2		1500 PF	±10	200	10	5%											
C ₃	2346230-1		10PF	±10	200	30	15%											
C ₂₂	2346247-30		4700 PF	±1	100	10	10%											
C ₂₃	"			±1	100	10	10%											
C ₃₀	2346230-8		39PF	±10	200	20	10%											
C ₁₈	2346230-5		22PF	±10	200	20	10%											
C ₁₉	2346230-25		.001	±10	200	40	20%											
C ₂₄	ECY10200J5		20PF	±10	200	10	5%											
C ₃₁	2346230																	
C ₂₀	"																	
C ₁₃	2346231-12		.01	±10	50	15	30%											
C ₂₉	"		"	±10	50	15	30%											
C ₂	2346231-36		1.0	±10	50	10	20%											
C ₄	"		"	"	"	"	"											
C ₅	"		"	"	"	"	"											
C ₆	"		"	"	"	"	"											
C ₇	"		"	"	"	"	"											
20										21	22							
FAILURE RATE SOURCES (FOR COLUMN #14)										CALCULATED MTBF _____ HRS		TOTAL FAILURE RATE .0095 1/1000 HRS						
A ATM 605A B _____																		
C _____ D _____																		

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG

ASSEMBLY: Board #8

SUBASSEMBLY:Demodulator/INT/OSC/Post

AMPL

DATE: 8/20/71

SCHEMATIC NO: 2362188

(Capacitors)

[illegible]

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #9

SUBASSEMBLY: A/D Converter

SCHEMATIC NO: 2362179

(Capacitors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (MIL or MFR) CONSTRUCTION	MANUFACTURER	CAPACITANCE VALUE and	TOLERANCE	MANUFACTURER'S RATED VOLTAGE	OPERATING VOLTAGE	VOLTAGE RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	BULK AIR TEMPERATURE (°C)	CIRCUIT FUNCTION OR APPLICATION	BASE FAILURE RATE (F/100,000 HRS)	TEMPERATURE CORRECTION FACTOR	SPECIAL ENVIRONMENT FAILURE RATE (DESIGN)	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE	TOTAL CAPACITOR COUNT PER TYPE	TOTAL FAILURE RATE (F/1000 HRS)	
C ₁	2346231-24 CKR06BX105K	Aerovox	1.0	±10	50	15	30%	1	50	Decoupling	1A		1.01				.0005	
C ₂	2346221-24 CKR11BX220K		↓		200	20	10%			Lag Compensation								
C ₃	2346231-24 CKR11BX220K		↓															
C ₄	2346231-24 CKR11BX220K		↓															
C ₆	2346233-5 CKR11BX220K		22PF															
C ₇	2346233-5 CKR11BX220K		22PF															
C ₁₀	2346233-5 CKR12BX390K		↓															
C ₁₁	2346233-5 CKR12BX390K		↓															
C ₁₃	2346233-5 CKR12BX390K		↓															
C ₁₄	CKR12BX390K		39PF		200	20	10%			Lag Compensation								
C ₅	CKR12BX390K		39PF		200	20	10%			Lag Compensation								
C ₈	CKR06BX105K		↓				10%											
C ₉	CKR06BX105K		↓				10%											
C ₁₂	CKR06BX105K		↓				10%											

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CAPACITORS

PROJECT: LSG
ASSEMBLY: Board #10

SUBASSEMBLY: Power Converter

DATE: 8/20/71
SCHEMATIC NO: 2362180

(Capacitors)

CIRCUIT SYMBOL NUMBER	TYPIC DESIGNATION (REL OR MFR) CONSTRUCTION	MANUFACTURER	CAPACITANCE VALUE AND TOLERANCES	VOLTAGE RATED	OPERATING VOLTAGE	POLYMER OPERATING VOLTAGE	MILSPEC DUTY CYCLE	BULK AIR TEMPERATURE (°C)	CIRCUIT FUNCTION OR APPLICATION	SOURCE FAILURE RATE (S/100 HRS)	ENVIRONMENTAL MODIFIERS	FAILURE RATE MULTIPLIER	FINDING DATA	TOTAL CAPACITOR COUNT PER TYPE	TOTAL FAILURE RATE (S/100 HRS)
C ₄	2346231-8 CKR05BX151K	Aerovox	.0047 ±10%	200V	20V	100%	I	50		A	.	.01			.0005
C ₁₂	2346231-36 CKR05BX821K		820PF ±10%	50V	15V	30%									
C ₆	2346231-36 CKR05BX152		1.0 ±10%	50V	15V	30%									
C ₅	2346231-36 CKR06BX103K		1.0 ±10%	50V	15V	30%									
C ₂	2346231-36 CKR06BX474K		1.0 ±10%	50V	15V	30%									
C ₁₁	2346231-36 CKR06BX104K		.10 ±10%	50V	15V	30%									
C ₁	2346231-36 CKR06BX105K		1.0 ±10%	50V	15V	30%									
C ₃	2346230-37		.01 ±10%	200V	20V	100%									
C ₇	2346231-24		.1 ±10%	200V	20V	100%									
C ₈	2346231-36		1.0 ±10%	50V	15V	30%									
C ₉	2346231-36		1.0 ±10%	50V	15V	30%									
C ₁₀	2346230-24		820PF ±10%	200V	20V	100%									
C ₁₃	2346231-36		1.0 ±10%	50V	15V	30%									
C ₁₄	2346231-36		1.0 ±10%	50V	15V	30%									

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

21 CALCULATED MTBF _____ HRS

22 TOTAL FAILURE RATE .0070 S/1000 HRS

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG
ASSEMBLY: Board #13

SUBASSEMBLY: Fixed Gain Pre-amp

DATE: 8/20/71
SCHEMATIC NO: 2362182

(Capacitors)

[illegible]

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CAPACITORS

PROJECT: LSG
ASSEMBLY: Board #14 A2

SUBASSEMBLY: Shaft Encoder Electronics

DATE: 8/20/71
SCHEMATIC NO: 2362189

(Capacitors)

[illegible]

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PROJECT: LSG
ASSEMBLY: Board #15 A1

SUBASSEMBLY: Monitor Assy/Temp. Control

DATE: 8/20/71
SCHEMATIC NO: 2362185

(Capacitors)

[illegible]

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PROJECT: LSG
ASSEMBLY: Board #15 A2

SUBASSEMBLY: Temp. Monitor/Temp. Controller

DATE: 8/20/71
SCHEMATIC NO: 2362190

(Capacitors)

[illegible]

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PARTS APPLICATION ANALYSIS

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CAPACITORS

PROJECT: LSG

ASSEMBLY: Board #16

SUBASSEMBLY: Zener Diode Ref

DATE: 8/20/71

SCHEMATIC NO: 2362182

(Capacitors)

[illegible]

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PROJECT: LSG
ASSEMBLY: Board #17

SUBASSEMBLY: Caging Motor Filter

DATE: 8/20/71
SCHEMATIC NO: 2369014

[illegible]

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PROJECT: LSG
ASSEMBLY: Boards #8 & 10

Demo-Int-OSC-Post Ampl
SUB ASSEMBLY: & Pwr Converter

DATE: 8/20/71
SCHEMATIC NO: 2362188 & 2362180

[illegible]

PARTS APPLICATION ANALYSIS

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(RELAYS)

PROJECT: LSG

Screw Servo/Buffer Caging

DATE: 8/20/71

ASSEMBLY: Board #5

SUB ASSEMBLY: Control/Dig Line Buffer

SCHEMATIC NO: 2362175

(Relays)

CIRCUIT REFER- ENCE DESIG- NATION	TYPE DESIGNATION (CFC, MIL OR MFR) AND CONSTRUCTION	MANUFACTURER	CONTACT LOAD								NUMBER OF POLES T O T A L	RELAY COIL								MISCELLA- NEOUS REMARKS	F A I L U R E M O D I F I E R (% BE- LOW 1000 HRS)	T O T A L F A I L U R E R A T E (%/1000 HOURS)				
			RATED		ACTUAL				T Y P E O F L O A D	POWER		VOLTAGE		R A T E O F O P E R A T I O N S P E R H O U R O R S E C O N D	R E Q U I R E D L I F E O P E R A T I O N S											
			V O L T A G E V	C U R R E N T A	VOLTAGE		CURRENT			M A X R A T E D		A C T U A L	M A X P U L S E I			M I N P U L S E R										
					ST E A D Y S T A T E	P E A K V	ST E A D Y S T A T E	S U R G E A																		
K1	2346264-1	Teledyne 40M47506 -33									2	2	192 Min	65 Max	12	7									A	.0040
thru	"	"									"	"	"	"	"	"								"	"	
K8	"	"									"	"	"	"	"	"								"	"	
DEVICE AVERAGE AMBIENT TEMPERATURE 50 °C		FAILURE RATE SOURCES (FOR COLUMN NO. 21) A ATM 605B B _____ C _____ D _____								CALCULATED MTBF _____ HOURS								TOTAL FAILURE RATE .0320 %/1000 HRS								

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PARTS APPLICATION ANALYSIS

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(RELAYS)

PROJECT: LSG
ASSEMBLY: Board #6Inst. Housing Temp Cont/
SUB ASSEMBLY: Mass Changing ServoDATE: 8/20/71
SCHEMATIC NO: 2362176

(Relays)

CIRCUIT REFER- ENCE DESIG- NATION	TYPE DESIGNATION (CRC, MIL OR MFR) AND CONSTRUCTION	MANUFACTURER	CONTACT LOAD						TYPE OF LOAD	NUMBER OF POLES		RELAY COIL				RATE OF OPER- ATIONS PER HOUR OR SECOND	REQ'D LIFE OPER- ATIONS	MISCELLA- NEOUS REMARKS	B F A I L U R E S I S T A N C E S I N C I R C U I T S	F A I L U R E S I N C I R C U I T S	O F F M O D I F I E R	TOTAL FAILURE RATE (%/1000 HOURS)
			RATED		ACTUAL					T O T A L	A C T I V E	MAX E A T I N G	MAX A C T U A L	MAX P O W E R	MAX V O L T A G E							
			V O L T A G E V	C U R R E N T A	VOLTAGE		CURRENT															
					STEADY STATE	PEAK	STEADY STATE	SURGE														
K1	2346264-1	Teledyne 40M47506 -33								2	2	192 Min	65 Min	12	7					A		.0040
K2	"	"								"	"	"	"	"	"					A		"
K3	"	"								"	"	"	"	"	"					A		"
DEVICE AVERAGE AMBIENT TEMPERATURE 50 °C		FAILURE RATE SOURCES (FOR COLUMN NO. 21) A <u>ATM 605B</u> B _____ C _____ D _____								CALCULATED MTBF _____ HOURS				TOTAL FAILURE RATE <u>.0120</u> %/1000 HRS								

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PARTS APPLICATION ANALYSIS

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(RELAYS)

PROJECT: LSG

Free Modes Filter-Seismic
Amp-Filter Stabilized Osc./

DATE: 8/20/71

ASSEMBLY: Board #8 & 7

SUB ASSEMBLY: Demo/Int/Post Ampl

SCHEMATIC NO: 2362187 & 2362188

(Relays)

CIRCUIT REFER- ENCE DESIG- NATION	TYPE DESIGNATION (CEC, MIL OR MFR) AND CONSTRUCTION	MANUFACTURER	CONTACT LOAD						TYPE OF LOAD	RELAY COIL						MISCELLA- NEOUS REMARKS	B F A I L U R E R E C O R D E D I N T H E P A R T S A P P L I C A T I O N S C O L U M N S 11-16	O F F I C I A L F I L E S C O L U M N S 17-23	TOTAL FAILURE RATE (%/1000 HOURS)		
			RATED		ACTUAL					POWER		VOLTAGE		RATE OF OPERA- TIONS PER HOUR OR SECOND	REQ'D LIFE OPERA- TIONS						
			V O L T A G E V	C U R R E N T A	VOLTAGE		CURRENT			M A X I M U M P O W E R W A T T E R I N G W A T T E R I N G	M A X I M U M V O L T A G E V	M I N I M U M V O L T A G E V									
					STEADY STATE V	PEAK V	STEADY STATE A	SURGE A													
K1	Magnetic Latching 2346264-1	Teledyne 40M47506 -33								2	21	92	65	12	7				A	.0040	
K1	2346265-1	"								"	"	"	"	"	"				A	.0040	
K2	"	"								"	"	"	"	"	"				A	.0040	
24	DEVICE AVERAGE AMBIENT TEMPERATURE °C	FAILURE RATE SOURCES (FOR COLUMN NO. 21) A ATM 605 A B _____ C _____ D _____								CALCULATED MTBF _____ HOURS						TOTAL FAILURE RATE .0120 %/1000 HRS					

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PROJECT: LSG
ASSEMBLY: Board #15 A2

DATE: 8/20/71

SCHEMATIC NO: 2362190

CIRCUIT REFERENCE DESIGNATION	TYPE DESIGNATION (CEC, MIL OR MFR) AND CONSTRUCTION	MANUFACTURER	CONTACT LOAD							NUMBER OF POLES	RELAY COIL						MISCELLANEOUS REMARKS	FAILURE MODE DESCRIPTION (SEE PAGE 1000 OF SPEC)	TOTAL FAILURE RATE (%/1000 HOURS)			
			RATED		ACTUAL				TYPE OF LOAD		POWER		VOLTAGE		RATE OF OPERATIONS PER HOUR OR SECOND	REQ'D LIFE OPERATIONS						
			V V O L T A G E	C U R R E N T	VOLTAGE		CURRENT				MAX R A T E D	A C T U A L	MAX P U L S E	MIN O P E R								
					STEADY STATE	PEAK	STEADY STATE	SURGE														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
K ₁	422D-12 2346264-1	Teledyne 40M47506 -32			5V .1V		10 A 1 A	100 A		2	2	192 Min	65 Min	12	7						A	.0040
K ₂	422D-12 2346264-1																					
K ₃	422D-12 2346264-1																					
K ₄	422D-12 2346264-1																					
K ₅	422D-12 2346264-1																					
K ₆	422D-12 2346264-1	Teledyne 40M47506 -32			5V .1V		10 A 1 A	100 A		2	2	192 Min	65 Min	12	7						A	.0040

DEVICE
AVERAGE
AMBIENT
TEMPERATURE °C

50

FAILURE RATE SOURCES (FOR COLUMN NO. 21)

A ATM 605A B

C D

CALCULATED MTBF HOURS

TOTAL FAILURE RATE .0240 %/1000 HRS

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG

Analog Output Buffer-

DATE: 8/20/71

ASSEMBLY: Board #3

SUB ASSEMBLY: Analog Mux

SCHEMATIC NO: 2362183

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	M A N U F A C T U R E R	MAX. TEMP °C		AVG PWR DISSIPATION (mw)				POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION OR APPLI- CATION	PART SPECIAL ENVIRON- MENT (Def (see	FOR RELIABILITY USE ONLY																																																																																																																																																																																																																														
			A M B I E N T T _A	J U N C T I O N T _J	C A S E R O T S P O T T _C	RATED AT				A C T U A L R A T E D 25°C (Amb. or case)	A C T U A L R A T E D T _A or T _C	V C B O R A T E D	V C B A C T U A L	V C E O R A T E D	V C E A C T U A L	R A T E D			A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L	R A T E D	A C T U A L

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG

Screw Servo/Buffer/Dig. Line
Buffer/Caging Control

DATE: 8/20/71

ASSEMBLY: Band No. 5

SUB ASSEMBLY:

SCHEMATIC NO: 2362175

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C		AVG PWR DISSIPATION (mw)						POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY					
			AMBIENT T _A	JUNCTION T _J	CASE T _C	HOT SPOT T _C	RATED AT				ACTUAL RATED P _D Amb. or case	ACTUAL RATED T _A or T _C	V _{CEO} RATED V	V _{CB} ACTUAL V	V _{CE0} RATED V	V _{CE} ACTUAL V	RATED V	ACTUAL V			RATE (%/1000 HRS)	S O U R C E (See below)	F M I L I N I A L R P A I R	F A I L U R E R A T E (%/1000 HRS)	T O T A L F A I L U R E R A T E (%/1000 HRS)	
							25°C																			
							AMBIENT T _A	CASE T _C	ACTUAL T _A	ACTUAL T _C																
CR22	S/N 4942		50	175		4W		4W		180	4.5%					200	50					A				.0014
thru																										
CR30																										
CR37																										
CR38																										
CR39																										
CR40																										
CR41																										
CR42	✓		✓	✓		✓		✓		✓		✓				✓	✓					✓			✓	

22 FAILURE RATE SOURCE (See Column 23)

A ATM 605 A C _____

B _____ D _____

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

24 TOTAL FAILURE RATE .0126 %/1000 HRS.

PS004

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(Semiconductors)

SCHEMATIC NO: 2362175

SUB ASSEMBLY: Buffer/Caging Control

92484

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG

Screw Servo/Buffer/Dig. Line DATE: 8/20/71

ASSEMBLY: Board No. 5

SUB ASSEMBLY: Buffer/Caging Control

SCHEMATIC NO: 2362175

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C				AVG PWR DISSIPATION (mw)				POWER RATIO		MAXIMUM VOLTAGES				DIODE FIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY							
			AMBIENT T _A	JUNCTION T _J	CASE T _C	HOT SPOT T _C	RATED AT				ACTUAL RATED 25°C Amb.or (case)	ACTUAL RATED T _A or T _C	V _{CEO} R A T E D V	V _{CB} A C T U A L V	V _{CE0} R A T E D V	V _{CE} A C T U A L V	R A T E D V	A C T U A L V			RATE (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	C O U N T A L T	TOTAL FAILURE RATE (%/1000 HRS)		
							25°C		AMBIENT T _A	CASE T _C																	ACTUAL T _A	ACTUAL T _C
							A M B I E N T	C A S E																				
VR1	S/N 963B		50	175		400		400		15	4%						20		DC Regu- lator		A							.00127
CR3	S/N 916 B			200		250		214		1	1%						75		Switch									.0005
CR5																												
CR19																												
CR21																												
CR32																												
CR33																												
CR34																												
CR35			✓	✓		✓		✓		✓							✓		✓		✓							

28 FAILURE RATE SOURCE (See Column 23)

A ATM 605 A C _____

B _____ D _____

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

30 TOTAL FAILURE RATE .00527 %/1000 HRS.

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(Semiconductors)

SCHEMATIC NO: 2362175

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG

Screw Servo/Buffer/Dig Line

DATE: 8/20/71

ASSEMBLY: Board No. 5

SUB ASSEMBLY: Buffer/Caging Control

SCHEMATIC NO: 2362175

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	M A N U F A C T U R E	MAX. TEMP °C		AVG PWR DISSIPATION (mw)						POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY					
			A M B I E N T T _A	J U N C T I O N T _J	C A S E T _C	RATED AT				A C T U A L RATED 25°C Amb. or case	A C T U A L RATED T _A or T _C	V _{CEO} R A T E D V	V _{CB} A C T U A L V	V _{CE0} R A T E D V	V _{CE} A C T U A L V	R A T E D V	A C T U A L V	R A T E (%/1000 HRS) (See below)			F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	C O U N T P E R T Y P E	T O T A L F A I L U R E R A T E (%/1000 HRS)	
						25°C																				
						A M B I E N T T _A	J U N C T I O N T _J	C A S E T _C	A C T U A L T _A																	
Q21	SM2N2907A		50	200		400		343		< 1	< 1%	60		60				Switch		A					.0019	
Q2	S2N910		50	200		500		24.25		< 1	< 1%	100		60												
Q4																										
Q6																										
Q8																										
Q10																										
Q12																										
Q14																										
Q16																										

21 FAILURE RATE SOURCE (See Column 23)

A ATM 605A C _____

B _____ D _____

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

23 TOTAL FAILURE RATE .0171 %/1000 HRS.

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PROJECT: LSG

ASSEMBLY: Board No. 5

SUB ASSEMBLY: Screw Servo/Buffer/Dig. Line
Buffer/Caging Control

DATE: 8/20/71

SCHEMATIC NO: 2362175

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C		AVG PWR DISSIPATION (mw)						POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY					
			AMBI- ENT TA	JUNCTION TJ	CASE Tc	RATED AT						D ACTUAL RATED 25 Ambient case	C ACTUAL RATED TA TC	VBO RATED V	VCB ACTUAL V	VCE0 RATED V	VCE ACTUAL V	RA RATED V			AC ACTUAL V	RATE (%/1000 HRS)	S OURCE RE- TURN R ATE (%/1000 HRS)	F AIL- URE PER TYPE	T OTAL F AIL- URE RATE (%/1000 HRS)	
						25°C		AMBI- ENT TA	CASE Tc	ACTUAL TA	ACTUAL TC															ACTUAL
						A	C																			
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
Q1	SM2N2907A		50	200		400		343		< 1	< 1%		60		60				Switch- ing			A				.0019
Q3																										
Q5																										
Q7																										
Q9																										
Q11																										
Q13																										
Q15																										
Q20																										

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

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

TOTAL FAILURE RATE .0171 %/1000 HRS.

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG
ASSEMBLY: Board 6Inst. Housing Temp Control/
SUB ASSEMBLY: Mass Change ServoDATE: 8/20/71
SCHEMATIC NO: 2362176

(Semiconductors)

Circuit SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C			AVG PWR DISSIPATION (mw)				POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION OR APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY					
			AMBI- ENT T _A	ACTU- AL T _J	JUNC- TION T _J	CASE T _C	RATED AT		ACTU- AL T _C	ACTU- AL RATED NEP (Amb. or case)	ACTU- AL T _A or T _C	V _{CEO}	V _{CB}	V _{CE0}	V _{CE}	RATED V	ACTU- AL V			RATE (%/1000 HRS)	SOURCE FAULT INITIAL RATER (See Section 2)	F A I L U R E R A T E (%/1000 HRS)	C O U N T P E R (%/1000 HRS)	TOTAL FAILURE RATE (%/1000 HRS)	
							25°C																		
							AMBI- ENT T _A	CASE T _C																	
Q1	Transistor Sil. PNP S2N 2907A		50	200	400		343	1	1%		60	60					Switch- ing		A			.00195			
Q6	Transistor Sil. NPN S2N 2222A		50	200	500		417	1	1%		75	40					1		A			1			
Q5	1		1	1	1		1	1	1		1	1					1		A			.00195			
Q8	S2N 2907A		50	200	400		343	1	1%		60	60					Switch- ing		A			.00195			
Q9	SM2N 2905A		50	200	400		343	1	1%		60	60					1		A			.00195			
Q2	S2N 2907A		50	200	400		343	1	1%		60	60					Switch- ing		A			.00195			
Q3	1		1	1	1		1	1	1		1	1					1		A			1			
Q4	1		1	1	1		1	1	1		1	1					1		A			1			
Q7	S2N 3720		1	1	1		1	1	1		1	1					1		A			.00195			

20 FAILURE RATE SOURCE (See Column 23)

A ATM 605A C _____

B _____ D _____

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

22 TOTAL FAILURE RATE .01755 %/1000 HRS.

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PROJECT: LSG
ASSEMBLY: Board 6

Inst. Housing Temp. Control/

DATE: 8/20/71

SUB ASSEMBLY: Mass Change Servo.

SCHEMATIC NO: 2362176

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C		AVG PWR DISSIPATION (mw)						POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY														
			AMBI- ENT T _A	JUN- CTION T _J	CASE HOT SPOT T _C	RATED AT				ACTUAL RATED 25 °C (Amb./or case)	ACTUAL RATED T _A or T _C	V _{CB0} RATED V	V _{CB} ACTUAL V	V _{CEO} RATED V	V _{CE} ACTUAL V	RATED V	ACTUAL V	RATE (%/1000 HRS) (See below)			F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	C O U N T A L P E R T Y P E	TOTAL FAILURE RATE (%/1000 HRS)											
						35°C		AMBI- ENT T _A	CASE T _C																ACTUAL T _A	CASE T _C									
						AMBI- ENT T _A	CASE T _C																												
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									
CR2	SIN 4942 Sil Switch		50	175		4W		4W		180	4.5%						200	50	Recovery High Current				A			.0014									
CR5	↓		↓	↓		↓		↓		↓	↓						↓	↓	↓							↓									
CR12	↓		↓	↓		↓		↓		↓	↓						↓	↓	↓							↓									
VR4	2340338-1		50	175		400		400		24	6%						↓	40	Voltage Ref							.00127									
CR3	SIN 916B Sil Rectifier		50	200		250		214		< 1	1%						75	12	Current Switch							.0005									
CR4	↓		↓	↓		↓		↓		↓	↓						↓	↓	↓							↓									
CR16	↓		↓	↓		↓		↓		↓	↓						↓	↓	↓							↓									
CR14	↓		↓	↓		↓		↓		↓	↓						↓	↓	↓							↓									
CR15	↓		↓	↓		↓		↓		↓	↓						↓	↓	↓				↓			↓									
11 FAILURE RATE SOURCE (See Column 23) A <u>ATM 605A</u> C _____ B _____ D _____												12 NOTE: R is assumed the transient and peak power does not exceed the safe limit.												13 TOTAL FAILURE RATE <u>00797</u> %/1000 HRS.											

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG

Ins. Housing Temp.

DATE: 8/20/71

ASSEMBLY: Board #6

SUB ASSEMBLY: Control/Mass Chinging Servo

SCHEMATIC NO: 2362176

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	M A N U F A C T U R E R	MAX. TEMP °C			AVG PWR DISSIPATION (mw)				POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION OR APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY					
			A M B I E N T T _A	J U N C T I O N T _J	C A S E H O T S P O T T _C	RATED AT			A C T U A L R A T E D 25°C (Ambient case)	A C T U A L R A T E D T _A or T _C	V _{CEO} R A T E D V	V _{CB} A C T U A L V	V _{CE0} R A T E D V	V _{CE} A C T U A L V	I _A T _A E D V	A C T U A L V	R A T E (%/1000 HRS)			S O U R C E R E P A I R (See below)	F A I L U R E R A T E (%/1000 HRS)	F A I L U R E P E R T Y P E	T O T A L F A I L U R E R A T E (%/1000 HRS)		
						25°C																			
						A M B I E N T T _A	C A S E T _C	A C T U A L T _C																	
VR2	2340338-10		50	175		400		400	24	6%						40	Voltage Ref.		A				.00127		
CR1	2346291-21		50	200		250		214	10	2%					75	12	Signal		A				.00236		
CR13	2346291-10		50	200		600		600	20	33%							Current		A				.00059		
Q10	S2N930		50	200		800		685	40	5%	140		80				High Ampl.		A				.00195		
18 FAILURE RATE SOURCE (See Column 23) A ATM 605A C _____ B _____ D _____										19 NOTE: It is assumed the transient and peak power does not exceed the safe limit.										20 TOTAL FAILURE RATE .00617 %/1000 HRS.					

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PROJECT: LSG

Free Modes Filter/

DATE: 8/20/71

ASSEMBLY: Board #7

SUB ASSEMBLY: Seismic AMPL and Filter

SCHEMATIC NO: 2362187

[illegible]

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG

Demo/Int/Post Ampl/

DATE: 8/20/71

ASSEMBLY: Board #8

SUB ASSEMBLY: Stabilized Oscillator

SCHEMATIC NO: 2362188

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C			AVG PWR DISSIPATION (mw)						POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY						
			AMBI- ENT TA	ACTU- AL RJ	JUNC- TION TC	ACTU- AL CASE TC	RATED AT				ACTU- AL CASE TC	ACTU- AL RATED TA or TC Amb.or case	ACTU- AL RATED TA or TC	VCBO RATED V	VCB ACTU- AL V	VCEO RATED V	VCE ACTU- AL V	RATED V	ACTU- AL V			RATE (%/1000 HRS)	S O U R C E R E P A I R R A T E R (See below)	F A I L U R E R A T E (%/1000 HRS)	M I N I M A L R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	C O U N T P E R T Y P E	TOTAL FAILURE RATE (%/1000 HRS)
							25°C																					
							A M B I E N T	C A S E	A C T U A L	A C T U A L																		
CR1	SIN916B Rectifier		50	200		250		214		< 1	1%						75	12		Switch		A						.0005
CR2			50	200		250		214		< 1	1%						75	12				A						.0005
CR4																												
CR5																												
CR6																												
CR7																												
CR8	SIN4942		50	175		4W		4W		180	4.5%						200	50		Receiver High Current		A					.0014	
CR9	SIN4942		50	175		4W		4W		180	4.5%						200	50		Receiver High Current		A					.0014	
CR3	2346291-17		50	200		250		214		10	2%						75	12		Signal		A						.00236

19 FAILURE RATE SOURCE (See Column 23)

A ATM 605 C _____

B _____ D _____

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

21 TOTAL FAILURE RATE .00816 %/1000 HRS.

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PROJECT: LSG
ASSEMBLY: Board #8

OSC/INT Post Ampl. /
SUB ASSEMBLY: Demodulator

DATE: 8/20/71
SCHEMATIC NO: 2362188

(Semiconductors)

[illegible]

STORIA

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PROJECT: LSG

DATE: 8/20/71

SUB ASSEMBLY: A/D Converter

SCHEMATIC NO: 2362179

[illegible]

PC40A

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #10

SUB ASSEMBLY: Power Converter

SCHEMATIC NO: 2362180

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	M ANUFACTURER	MAX. TEMP °C		AVG PWR DISSIPATION (mw)				POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY						
			A M BI ENT T _A	J UN CT ION T _J	C ASE T _C	RATED AT			ACT UAL R ATED R _S	ACT UAL R ATED T _A or T _C	V CBO R ATED V	V CB A CT UAL V	V CEO R ATED V	V CE A CT UAL V	R ATED V	A CT UAL V			R ATE (%/1000 HRS)	S O UR CE R ATE (See below)	F A IL URE R ATE (%/1000 HRS)	F A IL URE R ATE (%/1000 HRS)	F A IL URE R ATE (%/1000 HRS)	T O T AL F A IL URE R ATE (%/1000 HRS)	
						25°C																			
						A M BI ENT T _A	C ASE T _C	A CT UAL T _J																	
Q3	Transistor Sil. NPN 2346279-1	TI	50	200	800	685	40	5%		140	80					High Ampl.		A					.00195		
Q4	Transistor Sil. NPN 2346285-1	TI																							
Q2	Transistor Sil. NPN 2346279-1	TI														High Current High Freq. Ampl.									
Q5	Transistor Sil. NPN 2346285-1	TI																							
Q6	Transistor Sil. NPN 2346285-1	TI	↓	↓	↓	↓	↓	↓	↓	↓	↓							↓				↓			
Q1	Transistor Sil. NPN S2N2907A	MOT	50	200	800	685	40	5%		140	80					High Speed Switching		A					.00195		

18 FAILURE RATE SOURCE (See Column 23)

A ATM 605 A C

B D

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

20 TOTAL FAILURE RATE .0117 %/1000 HRS.

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(SEMICONDUCTORS)

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #10

SUB ASSEMBLY: Power Converter

SCHEMATIC NO: 2362180

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	MANUFACTURER	MAX. TEMP °C		AVG PWR DISSIPATION (mw)				POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY								
			AMBI- ENT TA	JUNC- TION TJ	CASE Tc	RATED AT			ACTU- AL Tc	ACTU- AL RATED 25°C (Amb. or case)	ACTU- AL RATED TA or Tc	VCBO V	VCB V	VCR V	VCE V	RATED V			ACTU- AL V	RATE (%/1000 HRS)	SO- URCE R	FAC- TOR L	FAC- TOR I	FAC- TOR T	FAC- TOR A	FAC- TOR L	TOTAL FAILURE RATE (%/1000 HRS)
						25°C																					
						AMBI- ENT TA	JUNC- TION TJ	CASE Tc																			
CR1 thru	SIN4942 Sil Rectifier		50	175		4W		4W	3	< 1%						200	50	Recovery High Current									.0014
CR11																											
CR12	SIN916B		50	200		250		214	< 1	1%						40		Switch									.0005
CR13	SIN916B		50	200		250		214	< 1	1%						40		Switch									.0005
VR1	2340338-1		50	175		400		400	24	6%						40		Voltage Ref									.00127

22 FAILURE RATE SOURCE (See Column 22)

A ATM 605 A C _____

B _____ D _____

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

24 TOTAL FAILURE RATE .00647 %/1000 HRS.

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(SEMICONDUCTORS)

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board 14 A2

SUB ASSEMBLY: Shaft Encodes Elect.

SCHEMATIC NO: 2362189

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	M A N U F A C T U R E R	MAX. TEMP °C			AVG PWR DISSIPATION (mw)					POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION OR APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY								
			A M B I E N T T _A	J U N C T I O N T _J	C A S E H O T S P O T T _C	RATED AT				A C T U A L R A T E D 25°C Amb.or case)	A C T U A L R A T E D T _A & T _C	V _{CB0} R A T E D V	V _{CB} A C T U A L V	V _{CE0} R A T E D V	V _{CE} A C T U A L V	R A T E D V	A C T U A L V	R A T E D %			F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	F A I L U R E R A T E (%/1000 HRS)	T O T A L F A I L U R E R A T E (%/1000 HRS)			
						25°C																							
						A M B I E N T T _A	C A S E T _C	A C T U A L T _A	A C T U A L T _C																				
Q2	Transistor Sil PNP S2N2905A		50	200		600		514.2		6	1%		60		60				High Speed Switching		A								.00195
Q1	Transistor Sil NPN S2N2222A		50	200		500		417		10	2%		75		40				Medium Speed Switching		A							.00195	
10 FAILURE RATE SOURCE (See Column 23) A ATM 605 A C _____ B _____ D _____											11 NOTE: It is assumed the transient and peak power does not exceed the safe limit.											12 TOTAL FAILURE RATE .00390 %/1000 HRS.							

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PARTS APPLICATION ANALYSIS

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(SEMICONDUCTORS)

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #15 A1

SUB ASSEMBLY: Temp Controller/Monitor Assy. SCHEMATIC NO: 2362185

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	M A N U F A C T U R E R	MAX. TEMP °C		AVG PWR DISSIPATION (mw)						POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY								
			A M B I E N T T _A	J U N C T I O N T _J	C A S E H O T S P O T T _C	RATED AT			A C T U A L T _A	A C T U A L T _C	A C T U A L R A T E D T _A or T _C	V _{CEO} R A T E D V	V _{CB} A C T U A L V	V _{CE0} R A T E D V	V _{CE} A C T U A L V	R A T E D V	A C T U A L V	R A T E (%/1000 HRS)			S O U R C E R A T E (%/1000 HRS) (See below)	F A I L U R E R A T E (%/1000 HRS)	M I N I M A L R A T E (%/1000 HRS)	T O T A L F A I L U R E R A T E (%/1000 HRS)					
						25°C																							
						A M B I E N T T _A	C A S E T _C	A C T U A L T _A																					
CR3	SIN916B Sil. Switch		50	200		250		214		< 1	< 1%						75	12	Switching		A				.0005				
CR2	SIN916B Sil. Switch					250		125		< 1	< 1%							"						.0005					
CR1	IN5290 Current Reg.					600		600		25	4.0%							Current Reg.						.00059					
Q1	SM2N2907A		↓	↓		400		343		10	2.5%		60		60			Silicon PNP		↓				.00195					
Q2	S2N2060		50	200		1W		857		20	2%		60		60					A				.00195					
21 FAILURE RATE SOURCE (See Column 23) A ATM 605 A C _____ B _____ D _____										22 NOTE: It is assumed the transient and peak power does not exceed the safe limit.										23 TOTAL FAILURE RATE .00549 %/1000 HRS.									

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(SEMICONDUCTORS)

SCHEMATIC NO: 2362190

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	M A N U F A C T U R E	MAX. TEMP °C		AVG PWR DISSIPATION (mw)						POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY							
			A M B I E N T TA	A C T U A L RJ	J U N C T I O N BT SPOT TC	C A S E T	RATED AT			A C T U A L Amb.or case) TB	A C T U A L RATED TA or TC	VCBO R A T E D V	VCB A C T U A L V	VCEO R A T E D V	VCE A C T U A L V	R A T E D V	A C T U A L V	RATE (%/1000 HRS)			F A I L U R E S O U R C E (See below)	F A I L U R E P E R T Y P E (%/1000 HRS)	T O T A L C O U N T	TOTAL FAILURE RATE (%/1000 HRS)				
							25°C		A C T U A L TA																A M B I E N T TC	C A S E TC		
							A M B I E N T TA	C A S E TC																				
CR2 thru	SIN4942 Sil Rectifier		50	175		4W		4W	180	4.5%					200	50	Relay Coil Suppre		A			.0098						
CR8																												
CR1	LM103-2.4/ 883 Volt Ref			150		250		220	24	10.8%							Voltage Reg		D			.0007						
Q1	SM2N2907A		50	200		400		343	10	2.5%		60	60				PNP		A			.00195						

22 FAILURE RATE SOURCE (See Column 23)

A ATM 605 A C _____

B _____ D _____

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

24 TOTAL FAILURE RATE .01245 %/1000 HRS.

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(SEMICONDUCTORS)

PROJECT: LSG

DATE: 8/20/71

ASSEMBLY: Board #16

SUB ASSEMBLY: Zener Diode REF

SCHEMATIC NO: 2362186

(Semiconductors)

CKT SYM NO.	TYPE DESIGNATION, SEMICONDUCTOR, POLARITY	M A N U F A C T U R E R	MAX. TEMP °C			AVG PWR DISSIPATION (mw)				POWER RATIO		MAXIMUM VOLTAGES				DIODE PIV		CIRCUIT FUNCTION or APPLI- CATION	PART SPECIAL ENVIRON- MENT (Define)	FOR RELIABILITY USE ONLY						
			A M B I E N T T _A	A C T U A L T _J	J U N C T I O N T _J	A C T U A L H O T S P O T T _C	RATED AT			A C T U A L R A T E D P O W E R R A T I O A M B I E N T T _A	A C T U A L R A T E D P O W E R R A T I O A C T U A L T _J	V C B O V	V C B V	V C E O V	V C E V	R A T E D P I V	A C T U A L P I V			R A T E S /1000 HRS	F A I L U R E R A T E %/1000 HRS	F A I L U R E R A T E %/1000 HRS	F A I L U R E R A T E %/1000 HRS	T O T A L F A I L U R E R A T E %/1000 HRS		
							25°C																			
							A M B I E N T T _A	C A S E T _C	A C T U A L T _J																	
VR2	2340392-2		50	175		400		400		24	6%						40	Voltage Reg		A					.00127	
VR1	2340338-5																		A							
VR3	2340338-5																		A							
Q1	2346252-1		50	200		400		343		8	2%							Switch		A					.0019	
23 FAILURE RATE SOURCE (See Column 23) A ATM 605 A C _____ B _____ D _____										24 NOTE: It is assumed the transient and peak power does not exceed the safe limit.										25 TOTAL FAILURE RATE .00571 %/1000 HRS.						

P000A

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PARTS APPLICATION ANALYSIS

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RESISTORS

PROJECT: LSG

ASSEMBLY: BOARD #2

Command Decoder & Driver/
Command Counter/DIG Line
Buffers & Receivers

DATE: 8/20/71

SCHEMATIC NO: 2362172

[illegible]

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PARTS APPLICATION ANALYSIS

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RESISTORSPROJECT: LSG
ASSEMBLY: Board #3SUB ASSEMBLY: Analog Output Buffer/
Analog MUXDATE: 8/20/71
SCHEMATIC NO: 2362183

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (MIL or MFR) CONSTRUCTION	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	WILE IR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (%/1000 HRS) - A -	SPECIAL ENVIRONMENTS (%/1000 HRS) - B -	FAILURE RATE MULTIPLIER - C -	TOTAL FAILURE RATE (%/1000 HRS)	TOTAL RESISTOR COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)	
R29	RCR07G751JS		750	±5	1/8	10	12.5%	1	50		A					.000022	
R30	RCR07G751JS		750	±5	1/8	10	12.5%										
R33	RCR05G512JS		5.1K	±5	1/4	3.41	1.5%										
R39	RCR05G512JS		5.1K	±5	1/4	3.41	1.5%										
R5	RNR55E9092DS		909K	±.5	1/4	5	2%									.00018	
R21	RNR55E2262DS		226K	±.5	1/4	10	4%										
R3	RNR55E143BFR		143K	±.5													
R1	RNR55E1003DS		100K	±.5	1/10	5	5%										
R2	RNR55E1003DS		100K	±.5													
R16																	
R17																	
R27																	
R28																	
R12	RNR55E2002DS		20K	±.5	1/10	7	7%										
R13																	
R14	RNR55E4992FS		49.9K	±1	1/10	4.5	4.5%										
R23	RNR55E1652DS		16.5K	±.5	1/10	1.5	1.5%										
19											20						
FAILURE RATE SOURCES (FOR COLUMN #14)											CALCULATED MTBF _____ HRS						
A ATM 605 A B _____											TOTAL FAILURE RATE .00225 %/1000 HRS						
C _____ D _____																	

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PARTS APPLICATION ANALYSIS

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RESISTORSPROJECT: LSG
ASSEMBLY: Board #3SUB ASSEMBLY: Analog Output Buffer/
Analog MUXDATE: 8/20/71
SCHEMATIC NO: 2362183

(Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (MIL or MFR) CONSTRUCTION	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	BULK AIR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (S/1000 HRS) - SEE TABLE 21-1	FAILURE RATE MULTIPLIER - SEE TABLE 21-2	SPECIAL ENVIRONMENTAL DATA	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE (S/1000 HRS)	TOTAL FAILURE COUNT PER TYPE	TOTAL FAILURE RATE (S/1000 HRS)
R3	RN55E	TBD						1	50		A						.0018
R22	↓	↓															
R41	↓																
R42	↓	↓															
R31	RCRDSG103JS		10K	±5	1/8	2.97	4.2%										.000022
R32	↓																
R35	↓																
R37	↓																
R38	↓																
R40	↓																
R34	RCR05G912JS		9.1K	±5	1/4	10	4%										
R36	↓																
R43	↓																
R44	↓																
R6	RCR07G751JS		750	±5	1/8	2.97	4.2%										
R7	↓																
R18	↓																
R19	↓																
19 FAILURE RATE SOURCES (FOR COLUMN #14) A ATM 605 A B _____ C _____ D _____										20 CALCULATED MTBF _____ HRS	21 TOTAL FAILURE RATE .000308 %/1000 HRS						

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RESISTORS

PROJECT: LSG

ASSEMBLY: Board #3

SUB ASSEMBLY: Analog Output Buffer/
Analog MUX

DATE: 8/20/71

SCHEMATIC NO: 2362183

[illegible]

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PARTS APPLICATION ANALYSIS

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RESISTORS

PROJECT: LSG

ASSEMBLY: Board #4

SUB ASSEMBLY: Screw Servo/Tilt Servo

DATE: 8/20/71

SCHEMATIC NO: 2362174

(Resistors)

[illegible]

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PROJECT: LSG
ASSEMBLY: Board #5

SUB ASSEMBLY: Screw Servo/Buffer/Digital
Line Buffer/Caging
Control

DATE: 8/20/71
SCHEMATIC NO: 2362175

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PARTS APPLICATION ANALYSIS

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RESISTORS

PROJECT: LSG

Screw Servo/Buffer/Digital

DATE: 8/20/71

ASSEMBLY: Board #5

SUB ASSEMBLY: Line Buffer/Caging Control

SCHEMATIC NO: 2362175

(continued)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (MIL or MFR) CONSTRUCTION	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING RATED	MAXIMUM DUTY CYCLE	WILE AIR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (%/1000 HRS) - SEE BELOW	SPECIAL ENVIRONMENT (DEFINE)	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE (%/1000 HRS)	TOTAL RESISTOR COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)	
R30	RLR07C103GR		10K	±2	1/4	2.5	1%	1	50	Metal Film	A					.0027	
R31																	
R35																	
R36																	
R40																	
R44																	
R49																	
R50																	
R52	↓		↓	↓	↓	↓	↓										
R1	RLR07C242GR		2.4K	±5	1/4	6.5	3.8%										
R7																	
R12																	
R17																	
R21																	
R27																	
R32																	
R37	↓		↓	↓	↓	↓	↓	↓	↓		↓					↓	

19 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 605 A B _____

C _____ D _____

20 CALCULATED MTBF _____ HRS

21 TOTAL FAILURE RATE .0459 %/1000 HRS

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PARTS APPLICATION ANALYSIS

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RESISTORS

PROJECT: LSG

Screw Servo/Buffer/
Digital Time Buffer/

DATE: 8/20/71

ASSEMBLY: Board No. 5

SUB ASSEMBLY: Caging Controls

SCHEMATIC NO: 2362175

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 TEMPERATURE (°C)	8 POWER RATIO OPERATING (%)	9 MAXIMUM DUTY CYCLE	10 BULK AIR TEMPERATURE °C	11 CIRCUIT FUNCTION OR APPLICATION	12 BASIC FAILURE RATE (S/1000 HRS) - A - SOURCE (SEE BELOW)	13 SPECIAL ENVIRONMENTAL (S/1000 HRS)	14 FAILURE RATE MULTIPLIER	15 FINAL FAILURE RATE (S/1000 HRS)	16 TOTAL FAILURE COUNT PER TYPE	17 TOTAL FAILURE RATE (S/1000 HRS)
R8	RCR07C270GR		27	+5	1/4	7.5	3%	1	50	Metal Film	A					.0027
R13																
R18																
R23																
R28																
R33																
R38																
R2	RLR07C103GR		10K	+2	1/4	2.5	1%									
R5																
R6																
R10																
R11																
R15																
R16																
R20																
R22																
R25																
R26																
19 FAILURE RATE SOURCES (FOR COLUMN #14) A ATM 605A B _____ C _____ D _____							20 CALCULATED MTBF _____ HRS					21 TOTAL FAILURE RATE .0486 %/1000 HRS				

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PARTS APPLICATION ANALYSIS

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RESISTORS

PROJECT: LSG

Screw Servo/Buffer/

DATE: 8/20/71

ASSEMBLY: Board No. 5

Digital Line Buffer/

SUB ASSEMBLY: Caging Control

SCHEMATIC NO: 2362175

(Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (MIL or MFR) CONSTRUCTION	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	BULK AIR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (%/1000 HRS) - AT 25°C (SEE BELOW)	SPECIAL ENVIRONMENTS (DEFINE)	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE (%/1000 HRS)	TOTAL RESISTOR COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)			
R41	RLR07C150GR		15	+5	1/4	5.0	2%	1	50	Metal Film	1A		.01			.0027			
R43	RLR07C102GR		1K	+2	1/4	2.5	10%	1	50										
R48	RLR07C203GR		20K	+2	1/4	2.5	1%	1	50										
R53	RLR07C203GR		20K	+2	1/4	2.5	1%	1	50										
R42	RLR07C202GR		2K	+2	1/4	12.5	5%	1	50										
R51	RLR-7C104GR		100K	+2	1/4	<1	<1%	1	50										
R47	RLR20C105GR		1M	+2	1/2	<1	<1%	1	50										
R46	RLR07C392GR		3.9K	+2	1/4	6.59	3%	1	50										
R4	RLR07C512GR		5.1K	+2	1/4	5.1	2%	1	50										
R9																			
R14																			
R19																			
R24																			
R29																			
R34																			
R39																			
R45																			
R3	RLR07C270GR		27	+5	1/4	7.5	3%	1	50										
19										20									
FAILURE RATE SOURCES (FOR COLUMN #14)										CALCULATED MTBF _____ HRS									
A. ATM 605A B. _____										TOTAL FAILURE RATE .0486 %/1000 HRS									
C. _____ D. _____																			

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PARTS APPLICATION ANALYSIS

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RESISTORS

PROJECT: LSG

Inst Housing Temp. Control/

DATE: 8/20/71

ASSEMBLY: Board #6

SUB ASSEMBLY Mass Changing Servo

SCHEMATIC NO: 2362176

(Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (REL or MFR)	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	BULK AIR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (1000 HRS) - A - SOURCE (SEE BELOW)	SPECIAL ENVIRONMENTS (NOTES)	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE (1000 HRS)	TOTAL FAILURE COUNT PER TYPE	TOTAL FAILURE RATE (1000 HRS)	
R21	RCR32G470JS		47				1	50			A					.00018	
R22	"		47													.00018	
R28	RNR55E															.00018	
R30	RNR55E															11	
R15	RNR55E															11	
R32	RLR206684GR		680K													.0027	
R23	RLR07C363GR		36K													11	
R31	"		"													11	
R34	RLR07C272GR		2.7K	+5	1/4	7.5	3%									.0027	
R35	RLR07C273GR		27K	+5	1/4	7.5	3%									.0027	
R43	"		"	+5	1/4	75	3%									.0027	
R45	RLR7C333GR		33K													11	
R46	"		"													11	
R33	RLR07C392GR		3.9K	+2	1/4	1.0	1%									.0027	
R36	"		"													.0027	
R44	RLR07C472GR		4.7K	+2	1/4	4.7	2%									.0027	
R25	RLR07C302GR		3.0K													.0027	
R17	RLR07C470GR		47	+2	1/2	.012	1%	1	50							.0027	

19 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 605A B _____

C _____ D _____

20 CALCULATED MTBF _____ HRS

21 TOTAL FAILURE RATE .0360 %/1000 HRS

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RESISTORS

PROJECT: LSG

INST. Housing Temp. Control/

DATE: 8/20/71

ASSEMBLY: Board #6

SUB ASSEMBLY: Mass Changing Servo

SCHEMATIC NO: 2362176

(Resistor)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CIRCUIT SYMBOL NUMBER	TYPE DESCRIPTION (MFR. AND CONSTRUCTION)	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	WILE AIR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (%/1000 HRS) AT SOURCE (SEE BELOW)	SPECIAL ENVIRONMENTS (DEFINE)	FAILURE RATE MULTIPLIER	TOTAL FAILURE RATE (%/1000 HRS)	TOTAL RESISTOR COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)	
R29	RCR07C100GR		10	+5	1/4	7.5	3%	1	50		1A					.0027	
R27	"	"	"	+5	1/4	7.5	3%									.0027	
R3	RLR07C202GR		2K	+2	1/2	5.0	1%									.0027	
R4	↓		↓	↓	↓	↓	↓									↓	
R6	↓		↓	↓	↓	↓	↓									↓	
R8	↓		↓	↓	↓	↓	↓									↓	
R1	RLR07C102GR		1K	+2	1/4	9.0	4%									.0027	
R16	↓		↓	↓	↓	↓	↓									↓	
R48	↓		↓	↓	↓	↓	↓									↓	
R2	RLR07C103GR		10K	+2	1/4	2.5	1%									.0027	
R9																	
R7																	
R5																	
R18																	
R20																	
R19																	
R26																	
R24	↓		↓	↓	↓	↓	↓									↓	
19						20					21						
FAILURE RATE SOURCES (FOR COLUMN #14)						CALCULATED MTBF _____ HRS					TOTAL FAILURE RATE .0486 %/1000 HRS						
A ATM 605A B _____																	
C _____ D _____																	

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PARTS APPLICATION ANALYSIS

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RESISTORS

PROJECT: LSG
ASSEMBLY: Board #6

INST. Housing Temp Control/ **DATE:** 8/20/71

SUB ASSEMBLY: Mass Changing Servo

SCHEMATIC NO: 2362176

(Resistors)

[illegible]

PARTS APPLICATION ANALYSIS

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RESISTORSPROJECT: LSG
ASSEMBLY: Board #7SUB ASSEMBLY: Free Modes Filter/
Seismic Ampl & FilterDATE: 8/20/71
SCHEMATIC NO: 2362187

(Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (MIL or MFR) CONSTRUCTION	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	MILIE AIR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (S/1000 HRS) - A - 20°C (SEE BELOW)	SPECIAL ENVIRONMENTS (DEFENSE)	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE (S/1000 HRS)	TOTAL FAILURE COUNT PER TYPE	TOTAL FAILURE RATE (S/1000 HRS)	
R7	RNR55E		+ 5	1/10			1	50			A					.00018	
R8																	
R11																	
R12																	
R24	RNR55E		+ 5	1/10													
R25																	
R31																	
R32																	
R1	2340353-21		6.8M +2	1/4	10	2.5%										.00018	
R2																	
R3																	
R5																	
R10																	
R9	2340353-18		5.1M +2	1/4	20	5%											
R34	"		"	"	20	5%											
R21	2340353-8		2M	"	25	10%											
R23	"		"	"	25	10%											
R22	2340353-1		1M	"	25	10%		✓	✓								

19 FAILURE RATE SOURCES (FOR COLUMN #14)

A ATM 605A B _____

C _____ D _____

20 CALCULATED MTBF _____ HRS

21 TOTAL FAILURE RATE .00324 %/1000 HRS

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PARTS APPLICATION ANALYSIS

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RESISTORSPROJECT: LSG
ASSEMBLY: Board No. 7SUB ASSEMBLY: Free Modes Filter 1
Seismic Ampl & FilterDATE: 8/20/71
SCHEMATIC NO: 2362187

(Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (ALL OR MFR) AND CONSTRUCTION	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	WIDE AIR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (%/1000 HRS) - AT SOURCE (SEE BELOW)	SPECIAL ENVIRONMENTAL (define)	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE (%/1000 HRS)	TOTAL RESISTOR COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)			
R35	RCR05G473JS		47K	+5	1/8	6	5%	1	50		1A					.000022			
R36	"		"	"	"	"	"									.000022			
R26	RCR05G102JS		1K	"	"	2.97	4.2%									.000022			
R13	RCR05G471JS		470	"	"	12.5	10%									.000022			
R14	"		"	"	"	"	"									.000022			
R33	RCR05G101JS		100	"	"	6	5%									.000022			
R4	RNR55E2003FR		200K	+1	1/10	.35	1%									.0018			
R30	RNR55E1213FR		121K	"	"	2.25	2.25%									.0018			
R15	RNR55E7502FS		75K	"	"	1.0	10%									.00018			
R18	RNR55E5902FS		59K	"	"	2	2%												
R27	RNR55E2672FS		26.7K	"	"	4	4%												
R19	RNR55E1652FS		165K	"	"	3.3	3%												
R20	RNR55E1002FS		10	"	"	5	5%												
R38	"		"	"	"	6	6%												
R16	RNR55E9531FS		9.53K	"	"	2	2%												
R17	RNR55E7501FS		7.5K	"	"	3.5	3.5%												
R37	RNR55E4991FS		4.99	"	"	4.5	4.5%												
R29	RNR55E4751FS		4.75K	"	"	7	7%	↓	↓		↓					↓			
19										20									
FAILURE RATE SOURCES (FOR COLUMN #14)										CALCULATED MTBF _____ HRS									
A. ATM 605A B. _____										TOTAL FAILURE RATE .0055 %/1000 HRS									
C. _____ D. _____																			

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PROJECT: LSG

Free Modes Filter/

DATE: 8/20/71

ASSEMBLY: Board #7

SUB ASSEMBLY: Seismic Ampl. & Filter

SCHEMATIC NO: 2362187

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RESISTORS

PROJECT: LSG

OSC/Demod/Int/Post

DATE: 8/20/71

ASSEMBLY: Board #8

SUB ASSEMBLY: Ampl.

SCHEMATIC NO: 2362188

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
CIRCUIT SYMBOL NUMBER	TYPE DESIGNATION (MIL OR MFR) CONSTRUCTION	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	RULE 118 TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (%/1000 HRS) - 27°C (SEE BELOW)	SPECIAL ENVIRONMENTS (DEFINITE)	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE (%/1000 HRS)	TOTAL RESISTOR COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)			
R8	RCRD7G512JS		5.1K	+5	1/4	3.41	1.5%	1	50		A					.000022			
R9	"		"	"	"	"	"												
R10	"		"	"	"	"	"												
R11	"		"	"	"	"	"												
R1	RCR07G105JS		1M	+5	1/4	0.23	1%									.000022			
R5	RNR55E1051FS		1.05K	+1	1/10	14	14%									.00018			
R4	RNR55E2151FS		2.15K	+1	1/10	11.3	11%												
R3	RNR55E4531FS		4.53K	+1	1/10	4.5	4.5%												
R7	RCR07G203JS		20K	+5	1/4	2.5	1%									.000022			
R6	RNR55E4992FS		49.9K	+1	1/10	.5	.5%									.00018			
R23	RCR07G472JS		4.7K	+5	1/4	4.7	2%									.000022			
R21	RCR07G224JS		220K	+5	1/4	1.08	.2%									.000022			
R24	RNR55E1022FS		10.2K	+1	1/10	10	10%									.00018			
R25	RNR55E1022FS		10.2K	+1	1/10	10	10%									.00018			
R37	RNR55E1002FS		10K	+1	1/10	10	10%									.00018			
R2	RNR55E1002FS		10K	+1	1/10	10	10%									.00018			
R16	RCR05G103JS		10K	+5	1/4	10	2.5%									.000022			
R15	RCR05G334JS		330K	+5	1/8	.83	1%	✓	✓		✓					.000022			
19											20							21	
FAILURE RATE SOURCES (FOR COLUMN #14)											CALCULATED MTBF _____ HRS							TOTAL FAILURE RATE .00166 %/1000 HRS	
A ATM 605 A B _____																			
C _____ D _____																			

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PROJECT: LSG

DATE: 8/20/71

ASSEMBLY : Board #8

SUB ASSEMBLY: Demodulator

SCHEMATIC NO: 2362188

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PROJECT: LSG
ASSEMBLY: Board #8

SUB ASSEMBLY: Demod/Int/Post Ampl/
Stabilized Oscillator

DATE: 8/20/71
SCHEMATIC NO: 2362188

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PROJECT: LSG
ASSEMBLY: Board #9

SUB ASSEMBLY: A/D Converter

DATE: 8/20/71

SCHEMATIC NO: 2362179

[illegible]

PARTS APPLICATION ANALYSIS

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RESISTORSPROJECT: LGS
ASSEMBLY: Board #9

SUB ASSEMBLY: A/D Converter

DATE: 8/20/71
SCHEMATIC NO: 2362179

(Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CIRCUIT SYMBOL NUMBER	TYPE DESCRIPTION (REL. OR MFR) CONSTRUCTION	MANUFACTURER	RESISTANCE VALUE (OHMS)	TOLERANCE (%)	POWER RATING (WATTS)	MAXIMUM OPERATING POWER (WATTS)	POWER RATIO OPERATING/ RATED	MAXIMUM DUTY CYCLE	BULK AIR TEMPERATURE °C	CIRCUIT FUNCTION OR APPLICATION	BASIC FAILURE RATE (%/1000 HRS) - 27° C (SEE BELOW)	SPECIAL ENVIRONMENTAL DATA	FAILURE RATE MULTIPLIER	FINAL FAILURE RATE (%/1000 HRS)	TOTAL RESISTOR COUNT PER TYPE	TOTAL FAILURE RATE (%/1000 HRS)	
R1	RCR05G103JS	A. Bradley	10k	±1	1/8	2.5	5%	1	50		.022	A				.00022	
R2					1/8	2.5	5%										
R3					1/8	2.5	5%										
R4					1/8	2.5	5%										
R5					1/8	2.5	5%										
R6					1/8	2.5	5%										
R7					1/8	2.5	5%										
R8					1/8	2.5	5%										
R9					1/8	2.5	5%										
R10					1/8	2.5	5%										
R21	2346289-10	VISHAY	50k	±.05		2.5		1	50	Res. Network		B				.00178	
R24	2346289-7	VISHAY	29.9k	±.05		1.16		1	50	" "		B				.00178	
R22	2346289-8	VISHAY	30k	±.05		1.04		1	50	" "		B				.00178	

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PROJECT: LSG
ASSEMBLY: Board #10

SUB ASSEMBLY: Power Converter

DATE: 8/20/71
SCHEMATIC NO: 2362180

(Karnataka)

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PROJECT: LSG

ASSEMBLY : Board #13

SUB ASSEMBLY: Fixed Gain PRE-AMP

DATE: 8/20/71

SCHEMATIC NO: 2362182

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PROJECT: LSG
ASSEMBLY: Board #14 AI

DATE: 8/20/71
SCHEMATIC NO: 2362184

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(Kochin)

SCHEMATIC NO: 2362189

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(Resistors)

DATE: 8/20/71
SCHEMATIC NO: 2362185

FORM 0201

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(Resistors)

DATE: 8/20/71
SCHEMATIC NO: 236218

[illegible]

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(Resistors)

ASSEMBLY: Board #17

SUB ASSEMBLY: Caging Motor Filter

SCHEMATIC NO: 2369014

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