



**Aerospace
Systems Division**

RSST

Failure Mode, Effects, and
Criticality Analysis

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ATM 878	
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DATE	5/28/70

This ATM 878, releases the Failure Mode, Effects, and Criticality Analysis for the Resettable Solid State Timer (RSST) into the Bendix documentation system. The major change between this document and corresponding documents as released by Gulston is the basic failure rate used in this ATM for the RCA CD4000 family of COS/MOS Fets. Bendix Reliability arrived at a more realistic failure rate in view of test data received from RCA from two separate tests. The major effect that this change has upon all related documentation is that the COS/MOS counters now have the highest probability of failure of any part used in the RSST. This changes the criticality rankings of the parts covered by this document. The COS/MOS counters now have the highest criticality ranking of any part used in the RSST.

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FAILURE MODE, EFFECTS, AND CRITICALITY ANALYSIS WORKSHEET

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE INITIAL 9/22/69 REVISION 11/10/69	SUBSYSTEM NAME	ASSEMBLY NAME	
	0.996	Gulton DSD		CK 13877-001A	Rel			RSST	
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE (α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY × 10 ⁵ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) × (E) × (Q) × 10 ⁵	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
A2 E0078 COS MOS MSI Counter	Fixed Output Stops Counting Fails to Reset	Fails High (Pin 4)	Loss of Clock	1.000	0.00480	Redundant 16 KHz to 1 sec Counters	0024	1	
		Fails Low (Pin 4)	Counter Stops	1.000	0.00480				
A3 E0078 COS MOS MSI Counter	Fixed Output Stops Counting Fails to Reset	Fails High (Pin 4)	Loss of Clock	1.000	0.00480	Redundant 16 KHz to 1 sec counters. 1 Hz signal could be used to run counter externally	0024	1	
		Fails Low (Pin 4)	Counter Stops	1.000	0.00480				
A4 E0078 COS MOS MSI Counter	Fixed Output Stops Counting Fails to Reset	Fails High (Pin 4)	Loss of 3 month/output, and 18 hour output	1.000	0.00480	Use quad output relay drivers with four 1 sec to 3 month counters. Add redundant one minute and 18 hour outputs	0024	1	
		Fails Low (Pin 4)	If counter stops one minute output will also be lost	1.000	0.00480				
A5 E0078 COS MOS MSI Counter	Fixed output Stops counting Fails to Reset	Fails High (Pin 4)	Loss of 3 month output, and 18 hour output	1.000	0.00480	Use quad output relay drivers with four 1 sec to 3 month counters Add redundant de- coder for 18 hour output	0024	1	
		Fails Low (Pin 4)	loss of 3 month output and 18 hour output	1.000	0.00480				

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	0.996	Gulton DSD		CK 13877-001A	Rel	INITIAL 9/22/69 REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
A6 E0078 COS MOS MSI Counter	Fixed output Stops Counting Fails to Reset	Fails High (Pin 4)	0.50	Loss of 3 month output and 18 hour output if counter stops.	1.00	0.0480	Use quad output relay drivers with four 1 sec to 3 month counters. Add redundant decoder for 18 hour output	0.024	1	
		Fails Low (Pin 4)	0.50	"	1.00	0.0480		0.024	1	
A7 E0078 COS MOS MSI Counter	Fixed output Stops counting Fails to reset	Fails High (Pin 7)	0.50	No effect. Redundant counter will cause 3 month output to occur	0.00	0.0480	None	0.000	35	
		Fails Low	0.50	Loss of 3 month output	1.00	0.0480	Use quad output relay drivers with four 1 sec to 3 month counters.	0.024	1	
A8 E0078 A9 E0078 A10 E0078 COS MOS MSI Counter	Fixed output Stops counting Fails to Reset	Fails High (Pin 4)	0.50	Loss of 3 month output	1.00	0.0480	Use quad redundant counter and relay drivers	0.024	1	
		Fails Low (Pin 4)	0.50	"	1.00	0.0480	Use quad redundant counter and relay drivers	0.024	1	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL 0.996	SUPPLIER NAME Gulton DSD	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE CK 13877-001A	ORIGINATOR Rel	DATE INITIAL 9/22/69 REVISION 11/10/69	SUBSYSTEM NAME	ASSEMBLY NAME RSST
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PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE (α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY × 10 ⁵ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) × (E) × (Q) × 10 ⁵	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
All E0078 COS MOS MSI Counter	Fixed output Stops Counting Fails to Reset	Fails High (Pin 7)	0.50 No effect redundant counter will cause 3 month output to occur	000	.00480	None	00000	35	
		Fails Low (Pin 7)	0.50 Loss of 3 month counter	100	.00480	Use quad redundant counter and relay drivers	.0024	1	
CR 26 CR 27 CR 28 CR 29 CR 30 CR 31 IN 3595 Diodes	Shorts and Opens	Short	0.80 1 min. output will occur at intervals up to 1 sec. A4 counter may speed up or stop. 18 hour output will occur early at a higher PRF	100	.00005	Use quad redundant diodes	.00004	8	
		Open	0.20 1 min. and 18 hour outputs will occur early	050	.00005	"	.00001	14	

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	0.996	Gulton DSD		CK 13877-001A	Rel	INITIAL 9/22/69 REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
CR 32 CR 33 CR 34 CR 35 CR 36 CR 37 CR 38 CR 39 CR 40 CR 41 IN 3595	Shorts and Opens	Short	0.80	18 hour output will occur early at a higher PRF or counter may stop	10:0	000005	Use quad redundant diodes	000004	8	
		Open	0.20	18 hour output will occur early	02:5	000005	"	000001	14	
VR 4 VR 5 IN 4572A RBR Diodes	Shorts and Opens	Short	0.80	Loss of system osc. Loss of all outputs	10:0	000004	Use redundant oscillators	000032	2	
		Open	0.20	No effect Redundant Zener used	00:0	000004	None	000000	35	

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	0.996	Gulton DSD		CK 13877-001A	Rel	INITIAL 9/22/69 REVISION 11/10/69		RSST	
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT $(\alpha) \times (E) \times (Q) \times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
CR 18 CR 19 IN914	Shorts and Opens	Short	OSC may slow down. Three month output will be extended	010	000005	Eliminate current source Q16. But input current spec may be exceeded or oscillator use tol may exceed $\pm 5\%$	000004	22	
		Open	Q16 current source will not operate. Input current will increase	010	000005		000001	26	
Q16 2N2907A	Shorts and Opens	C-E Short	Loss of current limit. Excess current may be drawn.	010	000009	Eliminate current source	000007	16	
		C-E Open	Loss of OSC and all outputs.	100	000009	"	000009	15	
		B-E Open	Loss of OSC and all outputs	100	000009	"	000009	15	
R65 RCR07	Shorts and Opens	Short	Loss of reverse volt protection	010	000005	Add input diode	000005	34	
		Open	During check-out	010	000005	"	000004	29	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel	INITIAL 9/22/69 REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
R44 RCR07	Shorts and Opens	Short	0.10	Loss of current limit by Q16	0.10	0.000005	Quad Resistors	0.000005	34	
		Open	0.90	Loss of OSC and all outputs	1.00	0.000005	"	0.000045	21	
R49 RCR07	Shorts and Opens	Short	0.10	No effect	0.00	0.000005	Eliminate Resistor	0.000000	35	
		Open	0.90	Loss of OSC and all outputs	1.00	0.000005	Parallel Resistors	0.000045	21	
R47 R48 RCR07	Shorts and Opens	Short	0.10	Slight current increase from supply	0.00	0.000005	Redundant series resistors used	0.000000	35	
		Open	0.90	Loss of OSC and all outputs	1.00	0.000005	Use quad resistors	0.000045	21	
R42 R43 RCR07	Shorts and Opens	Short	0.10	Slight Curr. increase from supply	0.00	0.000005	Redundant series resistor used	0.000000	35	
		Open	0.90	Loss of 16 KhZ Osc. Loss of all outputs	1.00	0.000005	Use quad resistors	0.000045	21	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME	RELIABILITY MODEL CODE IDENTIFICATION	
	0.996	Gulton DSD		CK 13877-001A	Rel	INITIAL 9/22/69 REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	
Q15 U 2154	Shorts and Opens	D-S Short	0.80	Loss of 16 KHz clock and all outputs	1.00	.00029	Redundant Oscillators	.000232	4	
		D-S Open	0.10	"	1.00	.00029		.000029	8	
		G-D Open	0.10	"	1.00	.00029		.000029	8	
R62 RCR07	Shorts and Opens	Short	0.10	Loss of 50 KHz Test Signal	0.00	.000005	None	.00000	35	
		Open	0.90	"	0.00	.000005	"	.00000	35	
R59 RCR07	Shorts and Opens	Short	0.10	Will increase current from OSC and may load oscillator	0.10	.000005	Quad Resistors	.00000005	34	
		Open	0.90	Loss of 16KHz Osc and all outputs	1.00	.000005	"	.0000045	21	

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SUBSYSTEM NAME	ASSEMBLY NAME
	RSST

ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel	INITIAL 9/22/69 REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
R57 RCR07	Shorts and Opens	Short	0.10	No effect	0.00	.000005	Quad Resistors	.00000	35	
		Open	0.90	Loss of one second clock and all outputs	1.00	.000005	Or eliminate it	.0000045	21	
Q17 2N2222A	Shorts and Opens	C-E Short	0.80	Loss of 16 MHz osc and all outputs	1.00	.000009	Redundant oscillators	.000072	7	
		C-E Open	0.10	"	1.00	.000009		.000009	15	
		B-E Open	0.10	"	1.00	.000009		.000009	15	
R60 RCR07	Shorts and Opens	Short	0.10	Loss of 16 MHz osc and all outputs	1.00	.000005	Quad Resistors	.0000005	28	
		Open	0.90	"	1.00	.000005	"	.0000045	21	
Q19, Q21 2N914	Shorts and Opens	C-E Short	0.80	Loss of osc Loss of all outputs	1.00	.000009	Redundant Oscillators	.000072	7	
		C-E Open	0.10	"	1.00	.000009	"	.000009	14	
		B-E Open	0.10	"	1.00	.000009	"	.000009	14	

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	0.996	Gulton DSD		CK 13877-001A	Rel			RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
Q18, Q20 2N914	Shorts and Opens	C-E Short	0.80	Loss of some temp stability.	0.10	.00009	Eliminate Transistors	.0000072	16	
		C-E Open	0.10	Loss of OSC and all outputs.	1.00	.00009	"	.000009	15	
		B-E Open	0.10	"	1.00	.00009	"	.000009	15	
CR20, CR03 1N914	Shorts and Opens	Short	0.80	Slight chg in freq. to lower valve	0.10	.00005	Eliminate diodes	.000004	22	
		Open	0.20	Loss of OSC and all outputs.	1.00	.00005		.00001	14	
CR21, CR22 1N914	Shorts and Opens	Short	0.80	OSC may stop or just chg. freq.	1.00	.00005	Eliminate Diodes. Used only to insure starting.	.00004	8	
		Open	0.20	OSC will stop and all outputs will be lost.	1.00	.00005		.00001	14	
C7, C8 Hrdm Cap	Shorts and Opens	Short	0.80	Loss of OSC and all outputs.	1.00	.000023	Redundant Oscillator	.0000184	13	
		Open	0.20	"	1.00	.000023		.0000046	20	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel	9/22/69 INITIAL REVISION 11/10.69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
R51, R58, R52, R54 RNR55C	Shorts and Opens	Short	0.10	Increase in OSC freq. early outputs.	1.00	.000008	Redundant Resistors	.0000008	27	
		Open	0.90	Loss of OSC and all outputs.	1.00	.000008	"	.0000072	16	
R53, R55 RCR07	Shorts and Opens	Short	0.10	Slight chg in osc. freq.	0.10	.000005	None	.00000005	34	
		Open	0.90	"	0.10	.000005	"	.00000045	29	
Q2, Q4, Q3, Q1 2N2222A	Shorts and Opens	C-E Short	0.80	No effect redundant transistor.	0.00	.000009	None	.00000	35	
		C-E Open	0.10	Loss of 3 month output.	1.00	.000009	Use Quad Relay Drivers.	.000009	15	
		B-E Open	0.10	"	1.00	.000009	"	.000009	15	
VR2, VR3 1N4572A	Shorts and Opens	Short	0.80	No effect redundant switch will keep relay off during low voltage input condition.	0.00	.0004	None	.00000	35	
		Open	0.20	Loss of 3 month output.	1.00	.0004	Use Quad Relay Drivers.	.00008	6	

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PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE		FAILURE MODE (α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION	
C3, C4 CSR13	Shorts and Opens		Short	0.80	Loss of 3 month output.	1.00	.000008	Quad Output Driver	.0000064	17	
			Open	0.20	Output 3 month relay driver will be susceptible to noise.	0.10	.000008	"	.0000016	32	
R2, R4, R3, R5 RCR 07	Shorts and Opens		Short	0.10	Loss of 3 month output.	1.00	.000005	Eliminate Resistor	.0000005	28	
			Open	0.90	Possible turn on of output 3 month relay driver.	1.00	.000005	"	.0000045	21	
R13, R15 RCR 07	Shorts and Opens		Short	0.10	Loss of some noise immun. on relay driver lines reset may not work.	1.00	.000005	Redundant Resistor	.0000005	28	
			Open	0.90	Loss of 3 month output.	1.00	.000005	"	.0000045	21	
R14, R16 RCR 07	Shorts and Opens		Short	0.10	Possible loss of 3 month output.	1.00	.000005	Redundant Relay Drivers	.0000005	28	
			Open	0.90	Loss of 3 month output.	1.00	.000005		.0000045	21	

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K1 Relay 421-12	Fails to Close or Shorts	Fails Open	0.90	Loss of 3 month output.	1.00	.0002	Redundant Relays	.00018	5	
		Fails Short	0.10	Early 3 month output.	1.00	.0002	"	.00002	12	
CR17 1N914	Shorts and Opens	Short	0.80	Loss of reset of relay.	0.00	.00005	None	.00000	35	
		Open	0.20	Noise spike generated on reset coil.	0.00	.00005	"	.00000	35	
CR16 1N914	Shorts and Opens	Short	0.80	3 month relay may not pull in.	1.00	.00005	None	.00004	8	
		Open	0.20	Noise pulse on set coil during checkout.	0.00	.00005		.00000	35	
A1 CD4003	Fails to Toggle Fixed Output	Fails to set	0.50	Loss of 18 hr Telemetry signal.	0.10	.0024	None	.00024	3	
		Fixed Output	Fails to reset	0.50	"	0.10	.0024	.00024	3	
R38, R39 RCR 07	Shorts and Opens	Short	0.10	Increase in 18 hr telemetry output	0.00	.000005	None	.00000	35	
		Open	0.90	Loss of 18 hr tele signal	0.10	.000005		.00000045	29	

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PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE		FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
R40, R41 RCR07	Shorts and Opens		Short	0.10	Loss or 18 hr telem signal Increase in 18 hr telem output	010	.000005	None	.00000005	34	
			Open	0.90		000	.000005		.000000	35	
Q12 2N2222A	Shorts and Opens		C-13 Short	0.80	18 Hr. switch on all the time (Q13) Loss of 18 hr closure "	050	.00009	Redundant Switches	.000036	9	
			C-13 Open	0.10		050	.00009		.0000045	21	
			B-13 Open	0.10		050	.00009		.0000045	21	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME	
	0.996	Gulton DSD		CK 13877-001A	Rel	INITIAL 9/22/69 REVISION 11/10/69		RSST	
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT $(\alpha) \times (E) \times (Q) \times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
Q13 2N222A	Shorts and Opens	C-13 Short	0.80	18 Hr sw closed continuously	050	.00009	Redundant Switches	.000036	9
		C-13 Open	0.10	Loss of 18 hr sw	050	.00009	"	.0000045	21
		B-13 Open	0.10	"	050	.00009	"	.0000045	21
R33, R34 RCR07	Shorts and Opens	Short	0.10	Probably load power supply unless Q12, Q13 and Q11, open probable loss of all outputs	100	.000005	Add Series Resistors	.0000005	28
		Open	0.90	Loss of 18 hr output	050	.000005	Quad Resistors	.00000225	24
R35 RCR07	Shorts and Opens	Short	0.10	Loss of 18 hr closure but tel-em would look like it has occurred	050	.000005	Series Resistor	.00000025	30
		Open	0.90	Possible turn on of 18 hr switch	050	.000005	Quad Resistors	.00000225	24

FAILURE MODE, EFFECTS, AND CRITICALITY ANALYSIS WORKSHEET

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL 0.996	SUPPLIER NAME Gulton DSD	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE CK 13877-001A	ORIGINATOR Rel.	DATE INITIAL 9/22/69 REVISION 11/10/69	SUBSYSTEM NAME	ASSEMBLY NAME RSST
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PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)		FAILURE PROBABILITY $\times 10^5$ (Q)		DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT $(\alpha) \times (E) \times (Q) \times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
					0	1	0	5				
R31, R32 RCR07	Shorts and Opens	Short	0.10	Loss of counter tele signal.	0	1	0	5	None	.000001005	34	
		Open	0.90	Increase in tele signal output counter.	0	1	0	5		.000001005	29	
R29, R30 RCR07	Shorts and Opens	Short	0.10	Increase in tele output, counter	0	1	0	5	None	.000001005	34	
		Open	0.90	Loss of tele. Counter output looks always low	0	1	0	5		.000001005	29	
CR12 IN914	Shorts and Opens	Short	0.10	1 min. pulses will be fed to each counter stage. May lose 18 hour pulses or come early.	0	5	0	5	Redundant Diodes	.00000225	23	
		Open	0.90	18 hour pulses will be 1 min. wide.	0	5	0	5		.00000225	24	
Q11 2N222A	Shorts and Opens	C-E Short	0.80	Loss of 1 min. and 18 hour outputs.	0	5	0	9	Redundant Transistors	.0000036	9	
		C-E Open	0.10	18 hour signal will be 1 min. wide.	0	5	0	9		.0000045	21	
		B-E Open	0.10	18 hour signal will be 1 min. wide.	0	5	0	9		.0000045	21	

FAILURE MODE, EFFECTS, AND CRITICALITY ANALYSIS WORKSHEET

ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A		INITIAL 9/22/69 REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
R27 RCR07	Shorts and Opens	Short	0.10	Probable loading of +12V input supply with loss of all outputs.	1 0 0	0 0 0 0 0 0 5	Series Resistors	0 0 0 0 0 0 5	28	
		Open	0.90	18 hr. signal will be 1 min. wide.	0 5 0	0 0 0 0 0 0 5	Quad Resistors	0 0 0 0 0 2 5	24	
R28 RCR07	Shorts and Opens	Short	0.10	Q11 will not turn on 18 hr. pulse will be 1 min. wide.	0 5 0	0 0 0 0 0 0 5	Redundant Resistors	0 0 0 0 0 0 5	30	
		Open	0.90	Possible loss of 18 hr. signal.	0 5 0	0 0 0 0 0 0 5		0 0 0 0 0 2 5	24	
Q10 2N2222A	Shorts and Opens	C-E Short	0.80	1 min switch on continuous.	0 5 0	0 0 0 0 0 9	Quad Output Switches	0 0 0 0 0 3 6	9	
		C-E Open	0.10	Loss of 1 min. closure.	0 5 0	0 0 0 0 0 9		0 0 0 0 0 4 5	21	
		B-E Open	0.10	Loss of 1 min. closure.	0 5 0	0 0 0 0 0 9		0 0 0 0 0 4 5	21	
Q9 2N2222A	Shorts and Opens	C-E Short	0.80	1 min. SW on continuously.	0 5 0	0 0 0 0 0 9	Quad Transistors	0 0 0 0 0 3 6	9	
		C-E Open	0.10	Loss of 1 min. output.	0 5 0	0 0 0 0 0 9		0 0 0 0 0 4 5	21	
		B-E Open	0.10	Loss of 1 min. output.	0 5 0	0 0 0 0 0 9		0 0 0 0 0 4 5	21	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	REL	INITIAL 9/22/69 REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
CR10, CR11 IN914	Shorts and Opens	Short	0.80	Q11 may not turn off, loss of 18 hr pulse. Q11 will not turn on and the 18 hr pulse will be one min long	050	.00005	Redundant Diodes	.00002	12	
		Open	0.20		050	.00005		.000005	19	
R26 RCR07	Short and Opens	Short	0.10	Loss of 1 min output pulse 1 min pulse switch may turn on	050	.000005	Quad Resistors	.00000025	30	
		Open	0.90		050	.000005		.00000225	24	
R24, R25, RCR07	Shorts and Opens	Short	0.10	Probably load power supply unless Q9, 10, 11, open. Loss of all outputs. Loss of 1 min output and 18 hr pulse will be 1 min wide	100	.000005	Redundant Resistors	.0000005	28	
		Open	0.90		050	.000005		.00000225	24	

FAILURE MODE, EFFECTS, AND CRITICALITY ANALYSIS WORKSHEET

ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel	INITIAL 9/22/69 REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
C1, C2, CSR13	Shorts and Opens	Short	0.80	Loss of all outputs	100	.000008	Quad Caps	.0000064	17	
		Open	0.20	Loss of Power off operation time	010	.000008		.0000006	32	
CR1 IN3595	Shorts and Opens	Short	0.80	Reduction in power off operation	050	.00005	Quad Diodes	.00002	12	
		Open	0.20	Logic counters will only get 6 volts, marginal	100	.00005		.00001	14	
R6 RCR07	Shorts and Opens	Short	0.10	Increase in current as power comes up. Probably no effect	010	.000005	Parallel Resistors	.00000005	34	
		Open	0.90	Logic counters, will only get 5 volts, marginal	100	.000005		.0000045	21	
R1 RER60F	Shorts and Opens	Short	0.10	Loss of 250 ma current limit with internal failure	010	.000007	Parallel Resistors	.00000007	33	
		Open	0.90	Loss of all outputs	100	.000007		.0000063	18	

FAILURE MODE, EFFECTS, AND CRITICALITY ANALYSIS WORKSHEET

ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE INITIAL REVISION	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton - DSD		CK13877-001A	Rel	9/22/69 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
VR1 IN4572A	Shorts and Opens	Short	0.80	Loss of Ref voltage for re-set. Will lose initial reset and timer may go early	1.00	.0004	Redundant Zeners	.00032	2	
		Open	0.20	Reset will occur on power interrupt. Loss of power off capability	0.50	.0004		.00004	8	
CR2, CR3 IN914	Shorts and Opens	Short	0.80	No effect slight change Ref voltage for re-set	0.10	.00005		.000004	22	
		Open	0.20	Loss of power off capability	0.50	.00005	Quad Diodes	.000005	19	
R7 RCR07	Shorts and Opens	Open	0.90	Possible loss of initial reset three month output may be early	1.00	.000005	Quad Resistors	.0000045	21	
CR4 IN3595	Shorts and Opens	Short	0.10	Excess current drawn from supply loading it down. Loss off all outputs	1.00	.000005	Quad Resistors	.0000005	28	
		Short	0.80	Loss of Q5 and loss of initial reset output may go early	1.00	.00005	Quad Diodes	.00004	8	
		Open	0.20	"	1.00	.00005	"	.00001	14	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel.	9/22/69 INITIAL REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
R9, R10 RCR07	Shorts and Opens	Short	0.10	Increase in output telelevel for counter.	010	.00000	None	.00000005	34	
		Open	0.90	Next to last 3 month counter stage looks like it is always low.	050	.000005	Quad Resistors	.00000225	24	
R11, R12 RCR07	Shorts and Opens	Short	0.10	Next to last 3 month counter stage looks like it is low always.	050	.000005	Quad Resistors	.00000025	30	
		Open	0.90	Increase in output tele level for counter	010	.000005		.00000045	29	
CR5 IN3595	Shorts and Opens	Short	0.80	Counter will be loaded. Loss of power off. Hold on time. Counter may stop.	100	.00005	Quad Diodes	.00004	28	
		Open	0.20	Next to last counter stage looks high all the time.	050	.00005		.000005	19	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE 9/22/69 INITIAL REVISION 11/10/69	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel.			RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
Q5 2N2907A	Shorts and Opens	C-E Short	0.80	Reset will be on all the time. Loss of all outputs.	100	.00009	Redundant Transistors	.000072	7	
		C-E Open	0.10	Loss of initial	100	.00009		.000009	15	
		B-E Open	0.10	Reset counter may go early	100	.00009		.000009	15	
R17 RCR07	Shorts and Opens	Short	0.10	Loss of initial Reset counter may go early and 3 month signal will be early	100	.000005	Quad Resistors	.0000005	28	
		Open	0.90	Q6 may turn on and cause reset loss of outputs	100	.000005		.0000045	21	
Q6 2N2222A	Short and Opens	C-E Short	0.80	Reset is present at all times. Loss of all outputs.	100	.00009	Redundant Transistors	.000072	7	
		C-E Open	0.10	Loss of reset 3 month output	100	.00009		.000009	15	
		B-E Open	0.10	may come early	100	.00009		.000009	15	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE 9/22/69 INITIAL REVISION 11/10/69	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel.			RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
R18, R19 RCR07	Shorts and Opens	Short	0.10	No effect Redundant Resistor	000	.000005	None	.00000	35	
		Open	0.90	Reset will be present all the time. Loss of all outputs.	100	.000005	Qual Resistors	.0000045	21	
CR6 IN914	Shorts and Opens	Short	0.80	Probably no effect	000	.00005	None	.00000	35	
		Open	0.20	Loss of manual reset	100	.00005	Quad Diodes	.00001	14	
Q7 2N2222A	Shorts and Opens	C-E Short	0.80	Loss of initial reset. Counter may go early.	100	.00009	Redundant Transistors	.000072	7	
		C-E Open	0.10	Reset on all the time	100	.00009		.000009	15	
		B-E Open		Loss of all outputs	100	.00009		.000009	15	
R20, R21 RCR07	Shorts and Opens	Short	0.10	Load down power supply with loss of all outputs	100	.000005	Redundant Quad Resistors	.0000005	28	
		Open	0.90	No effect Redundant Resistor	000	.000005	None	.00000	35	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE 9/22/69 INITIAL REVISION 11/10/69	SUBSYSTEM NAME	ASSEMBLY NAME			
	0.996	Gulton DSD		CK13877-001A	Rel.			RSST			
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION	
CR8 1N914	Short and Opens	Short	0.80	Manual reset may not work.	100	.00005	Redundant Diodes	.00004	8		
		Open	0.20	Reset will be on all the time. Loss of all outputs.	100	.00005		.00001	14		
Q8 J-FET Q22 U2154 2N2222A	Shorts and Opens	D-S Short	0.80	Loss of reset possible early output of 3 month counter	100	.00029	Redundant FGTS and transistors	.000232	4		
		C-E Short									
		D-S Open C-E Open	0.10	No effect Redundant transistors	000	.00029		.00000	35		
R22, R23 RCR07	Shorts and Opens	G-D Open B-E Open	0.10	Loss of reset possible early output of 3 month counter	100	.00029		.000029	10		
		Short	0.10	No effect, Redundant Resistor	000	.000005	None	.00000	35		
		Open	0.90	Loss of reset, 3 month counter may go early	100	.000005	Qual Resistors	.0000045	21		

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel.	9/22/69 INITIAL REVISION 11/10/69		RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
C5 HRDM CAP	Shorts and Opens	Short	0.90	Loss of reset 3 month counter may go early	100	.000023	Eliminate Part or Series Caps	.0000207	11	
		Open	0.10	Loss of some noise immunity for reset	010	.000023	Eliminate Part	.0000023	31	
C9 CAP CKR06	Shorts and Opens	Short	0.90	Loss of reset 3 month counter may go early	100	.000005	Redundant CAPS	.0000045	21	
		Open	0.10	Loss of some noise immunity on reset line	010	.000005		.00000005	34	
CR42 IN3595	Shorts and Opens	Short	0.80	Loss of counter supply voltage loss of all outputs	100	.00005	Quad Diodes	.00004	8	
		Open	0.20	Reset line can exceed VDD supply possible damage to counter, but not likely	010	.00005	Eliminate Clamp Diode	.000001	26	

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE INITIAL REVISION	SUBSYSTEM NAME	ASSEMBLY NAME					
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE		FAILURE MODE (α)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY $\times 10^5$ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (α) \times (E) \times (Q) $\times 10^5$	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION			
C10 CKR12	Shorts and Opens		Short	0.80	Loss of 1 min. pulse 18 hr. outputs	050	.000005	Redundant CAPS	.000002	25			
			Open	0.20	Early outputs of the 1 min. and 18 hr. pulses may occur.	050	.000005					.0000005	28
C11 CKR12	Shorts and Opens		Short	0.80	Loss of 18 hr. output	050	.000005	Redundant CAPS	.000002	25			
			Open	0.20	Early output of the 18 hr. pulse may occur	050	.000005					.0000005	28
CR51 1N3595	Shorts and Opens		Short	0.80	Loss of some power off hold count time	050	.000005	Redundant Diodes	.000002	12			
			Open	0.20	Loss of tele Counter stage would always look high	050	.000005					.0000005	19
Q23 2N2907A	Shorts and Opens		C-E Short	0.80	Loss of reset on slow rise time power application. Possible early output of 3 mo. output.	100	.000009	Redundant Transistors	.000072	7			
			C-E Open	0.10	Reset will occur when voltage dips.	050	.000009					.0000045	21
			B-E Open	0.10	Loss of power off count hold.	050	.000009					.0000045	21

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ASSY FAILURE DESCRIPTION	RELIABILITY GOAL	SUPPLIER NAME	MISSION PHASE(S)	ASSY DWG OR SK REFERENCE	ORIGINATOR	DATE 9/22/69 INITIAL REVISION 11/10/69	SUBSYSTEM NAME	ASSEMBLY NAME		
	0.996	Gulton DSD		CK 13877-001A	Rel.			RSST		
PART, COMPONENT, UNIT, CIRCUIT ITEM, SET OR BOX DESCRIPTION	STATEMENT OF THE ASSUMED FAILURE	FAILURE MODE	(a)	EFFECT ON ASSEMBLY	SYSTEM EFFECT NUMBER (E)	FAILURE PROBABILITY x 10 ⁵ (Q)	DESIGN COMPENSATION TO ELIMINATE THE FAILURE MODE	PROBABILITY CRITICALITY PRODUCT (a) x (E) x (Q) x 10 ⁵	RANK FOR ASSY	RELIABILITY MODEL CODE IDENTIFICATION
R63 RCR07	Shorts and Opens	Short	0.10	Increase of current from supply. Possible loading and loss of output.	100	.000005	Redundant Resistors	.0000005	28	
		Open	0.90	Reset will occur when voltage drops. Loss of power off count hold.	050	.000005		.00000225	24	
CR50 1N914	Shorts and Opens	Short	0.80	Loss of some reset margin voltage.	050	.00005	Redundant Diodes	.00002	12	
		Open	0.20	Loss of initial reset capability 3 mo. output could go early.	100	.00005	Parallel Diodes	.00001	14	
C12 CKR12	Shorts and Opens	Short	0.80	No effect unless power is low on input this would cause cap to discharge and lose power off hold count.	050	.000005	Quad CAPS	.000002	25	
		Open	0.20	Loss of clock, loss of all outputs.	100	.000005		.000001	26	
R61 RCR07	Shorts and Opens	Short	0.10	Loss of clock signal loss of all outputs.	100	.000005	Redundant Resistors	.0000005	28	
		Open	0.90	Loss of power of hold count capability.	050	.000005		.00000225	24	