PREA PREA PREA PREA PART OF A PART O			T		33.1 HOWEHCTVIOKE: WE	ASS'Y P/N: 51155F160-5 SHEET:
PALLURE DESCRIPTIONS OF FAILURE DETECTOR OF FAILURE			DRAWING RÉF.	AND	ON	2/1R
DETECTOR OFF. OFF. OFF. OFF. OFF. OFF. OFF. OF	[END LIEM	CRITICALITY SCREENS: A-PASS, B-PASS, C-PASS
[] [J) dEi (130h tio]	<u> </u>	 	FAILURE DETECTOR QTY. 1. SCHEMATIC	CAUSE MODE: AUTOBRAKES AND MCIU FAILURE WARNING CLEARING CIRCUIT FAILS LOW CAUSE(S): 1) BRAKE LEVEL CONVERSION CIRCUIT OUTPUT FAILS TO "BRAKES ON" 2) CLEARING CIRCUIT DUTPUT FAILS LOW	IF MCIU FAILURE WARNING AND/OR BRAKES ARE SET THEY CANNOT BE CLEARED BY BRAKES SWITCH. FOR CAUSE 1): IF BRAKES ARE OFF AT TIME OF FAILURE AUTOBRAKES WILL BE APPLIED DUE TO M/W WATCHDOG TIMER BITE VERIFICATION TEST OME SECOND AFTER FAILURE. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL WHEN BRAKE SWITCH IS ITANSITIONED FROM ON TO OFF. WORST CASE LUMBLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE	CRETICALITY SCREENS: A-PASS, B-PASS, C-PASS DESIGN FEATURES THE DAG BRAKE SWITCH CONTROLS THE OPERATION OF THE BRAKE DRIVER THROUGH AN OP?O-ISOLATOR WHICH ACTS AS A SOLID-STATE RELAY. OPTO-ISOLATORS (DEODE AND TRANSISTOR) MEET THE SAME QUALITY AND APPLICATION CRITERIA THAT HAVE BEEN APPLIED TO DISCRETE SENICONDUCTORS. ALL RESISTORS AND CAPACITORS USED IN THE DESIGN ARE SELECTED FROM ESTABLISHED RELIABILITY (ER) TYPES. LIFE EMPECTANCY IS INCREASED BY ENSURING THAT ALL ALLOWABLE STRESS LEVELS ARE DERATED IN ACCORDANCE WITH SPAR-RHS-PA.003. ALL CERAMIC AND ELECTROLYTIC CAPACITORS ARE ROUTINELY SUBJECTED TO RADIOGRAPHIC INSPECTION. THE DESIGN UTILIZES PROVEN CIRCUIT TECHNIQUES AND IS IMPLEMENTED USING CMOS LOGIC DEVICES. CMOS DEVICES OPERATE AT LOW POWER AND HENCE DO NOT EXPERIENCE SIGNIFICANT OPERATING STRESSES. THE TECHNOLOGY IS MATURE, AND DEVICE RELIABILITY HISTORY IS WELL DOCUMENTED. ALL STRESSES ARE ADDITIONALLY REDUCED BY DERATING THE APPROPRIATE PARAMETERS IN ACCORDANCE WITH SPAR-RMS-PA.003. SPECIAL HANDLING PRECAUTIONS ARE USED AT ALL STRESSES.
	1			· •		
PREPARED 8Y: MENG SUPERCEDING DATE: NONE DATE: 11 JUL 91 CIL RE	PREPARED BY:	. Mf		SUPERCEDING DATE	: NONE	DAIE: 11 JUL 91 CIL REV: 0

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PROJECT: SRMS (-5 MC1U INSTALLED)
ASS'Y HOMENCLATURE: MC1U SYSTEM: ELECTRICAL SUBSYSTEM ASS'Y P/N: 51155F160-5 SHEET: 2 FMEA FMEA NAME, QTY, & FAILURE MODE FAILURE EFFECT HOUR / FUNC

REF.	REV.	DESEGNATION	AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. 2/1R CRIFICALLTY	RATIONALE FOR ACCEPTANCE	
2215	0			IF MCIU FAILURE WARNING AND/OR ORAKES ARE SET THEY CANNOT BE CLEARED BY BRAKES SWITCH. FOR CAUSE 1): IF BRAKES ARE OFF AT TIME OF FAILURE AUTOBRAKES WILL BE APPLIED DUE TO H/W WATCHOOG TIMER BITE VERIFICATION TEST ONE SECOND AFTER FAILURE. BRAKE TRUTH TABLE WILL FAIL FOR OME SECOND AFTER FAILURE. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSE 2): BRAKE TRUTH	CRITICALITY ACCEPTANCE TE THE NCTU IS SENVIRONMENTAL O VIBRATION: O THERMAL: QUALIFICATION: THE NCTU IS SENVIRONMENTS: O VIBRATION: O SHOCK: O THERMAL: O HUMIDITY: O ENC: COLIFE:	SCREENS: A-PASS, B-PASS, C-PASS SISS SUBJECTED TO THE FOLLOWING ACCEPTANCE TESTING AS AN LRU. LEVEL AND DURATION - REFERENCE TABLE 3.2 +40 DEGREES C TO -16 DEGREES C (2 CYCLES) TESTS UBJECTED TO THE FOLLOWING LRU QUALIFICATION LEVEL AND DURATION - REFERENCE TABLE 3.2 BY SIMILARITY TO -3 MCIU +51 DEGREES C TO -27 DEGREES C (10 CYCLES) BY SIMILARITY TO -3 MCIU MIL-STD-461 AS MODIFIED BY SL-E-0002 (TESTS CE01, CE03, CS01, CS02, CS06, RE02 (N/B), RS01, RS02 630 OPERATING HOURS 1000 POWER ON/OFF CYCLES	
				TABLE MILL FAIL WHEN BRAKE SWITCH IS TRANSITIONED FROM ON TO OFF. MORST CASE UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (TO SECURE CRBITER)	PDRS OPS CHECK	(LIST (ALL VEHICLES) JSC 16987	

S040237A ATTACHMENT -PAGE 388 OF 471

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PREPARED BY:

MFWG

SUPERCEDING DATE: MONE

DATE: 11 JUL 91

CIL REV: _0

FMEA REF.	HAME, OTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END LTEM	HDWR / FINC. RATIONALE FOR ACCEPTANCE 2/IR CRITICALITY SCREENS: A-PASS, B-PASS, C-PASS
2215	FAILURE DETECTOR GIY. 1. SCHEMATIC B12797.	MODE: AUTOBRAKES AND MCIW FAILURE WARNING CLEARING CIRCUIT FAILS LOW CAUSE(S): 1) BRAKE LEVEL CONVERSION CIRCUIT OUTPUT FAILS TO "BRAKES ON" 2) CLEARING CIRCUIT OUTPUT FAILS LOW	IF MCIU FAILURE WARNING AND/OR BRAKES ARE SET THEY CANNOT BE CLEARED BY BRAKES SWITCH. FOR CAUSE 1): IF BRAKES ARE OFF AT TIME OF FAILURE AUTOBRAKES WILL BE APPLIED DUE TO H/W MATCHDOG TIMER BITE VERIFICATION TEST ONE SECOND AFTER FAILURE. BRAKE TRUTH TABLE WILL FAIL FOR ONE SECOND AFTER FAILURE. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL WHEN BRAKE SWITCH IS TRANSITIONED FROM ON TO OFF. WORST CASE UMABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING TO CONTINUE OPERATIONS: 1) BACK-UP ORIVE 3) JETTISON (10 SECURE ORBITER)	DOCUMENTED OUALITY CONTROLS ARE EXERCISED THROUGHOUT DESIGN PROCUREMENT, PLANNING, RECEIVING, PROCESSING FABRICATION, ASSEMBLY, TESTING AND SHIPPING OF THE NCIU. GOVERNMENT SOURCE INSPECTION IS INVOKED AT VARIOUS LEVELS OF COMPONENT ASSEMBLY AND TEST OPERATIONS. MANDATORY INSPECTION POINTS ARE EMPLOYED AT VARIOUS LEVELS OF COMPONENT ASSEMBLY AND TEST. EEE PARTS INSPECTION IS PERFORMED AS REQUIRED BY SPAR.RMS-PA.003. EACH EEE PART IS QUALIFIED AT THE PART LEVEL TO THE REQUIREMENTS OF THE APPLICABLE SPECIFICATION. AL EEE-PARTS ARE 100X SCREENED AND BURNED IN, AS A MINIMUM, AS REQUIRED BY SPAR.RMS-PA.003. EACH EEE PART IS QUALIFIED AT THE PART LEVEL TO THE REQUIREMENTS OF THE APPLICABLE SPECIFICATION. ALS ENDITIONALLY, EEE PARTS ARE 100X SCREENED AND BURNED IN, AS A MINIMUM, AS REQUIRED BY PARTS ARE 100X SCREENED IN ACCORDANCE WITH REQUIREMENTS, BY AN INDEPENDENT SPAR APPROVED IESTING FACILITY. OPA IS PERFORMED AS REQUIRED BY PA.003 ON A RANDOMLY SELECTED 3X OF PARTS, MAXIMUM 5 PIECES, MINIMUM 3 PIECES FOR EACH LOT NUMBER/DATE CODE OF PARTS RECEIVED. WIRE IS PROCURED, INSPECTED, AND TESTED TO SPAR-RMS-PA.003. RECEIVING INSPECTION VERIFIES THAT ALL PARTS RECEIVED ARE AS IDENTIFIED IN THE PROCURENENT DOCUMENTS, THAT NO PHYSICAL OWNER HAS COURTED TO PARTS DURING SHIPMENT, THAT THE RECEIVED BOTH THE PARTS PROVIDE ADEQUATE TRACEBELLY IN INFORMATION AND SCREENING DOCUMENTS PROVIDE ADEQUATE TRACEBELLY IN INFORMATION AND SCREENING DATA CLEARLY IDENTIFIES ACCEPTABLE PARTS. PARTS ARE INSPECTED THROUGHOUT MANUFACTURE AND ASSEMBLY AS APPROPRIATE TO THE MANUFACTURING STAGE COMPLETED. THESE INSPECTIONS INCLUDE, PRINTED CIRCUIT BOARD INSPECTION FOR TRACK SEPARATION, DAMAGE AND ADEQUACY OF PLATED THROUGH HOLES, COMPONENT MOUNTING INSPECTION FOR CORRECT SOLDERING, WIRE LOOPING, STRAPPING, ETC. OPERATORS AND INSPECTION POINT) P.C. BD. INSTALLATION INSPECTION, CHECK FOR CORRECT BOARD INSTALLATION, ALIGNMENT OF BOARDS, PROPER CONNECTOR CONTACT MATING, WIRE ROLLINGS SERVIEW (TRR) MINIMAL FICHINGUES. PRE-CLOSURE INSPECTION, MOR

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PROJECT: SRMS (-5 MCLU INSTALLED)

ASS'Y HOMENCLATURE: MCTU

SYSTEM: ELECTRICAL SUBSYSTEM

ASS'Y P/N: 51755F180-5

SHEET: 4

FMEA REF.	FMEA REV.	MAME, GTY, & DRAWING REF. DESIGNATION	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	HDWR / FUNC. RATIONALE FOR ACCEPTANCE 2/1R CRITICALITY SCREENS: A-PASS, B-PASS, C-PASS	
2215	0	FAILURE DETECTOR QTY 1 SCHENATIC ### ### #############################	MODE: AUTOBRAKES AND MCIU FAILURE MARNING CLEARING CIRCUIT FAILS LOW CAUSE(S): 1) BRAKE LEVEL CONVERSION CIRCUIT OUTPUT FAILS TO "BRAKES ON" 2) CLEARING CIRCUIT OUTPUT FAILS LOW	IF MCIU FAILURE WARNING AND/OR BRAKES ARE SET THEY CAMMOT BE CLEARED BY BRAKES SWITCH. FOR CAUSE 1): IF BRAKES ARE OFF AT TIME OF FAILURE AUTOBRAKES WILL BE APPLIED DUE TO M/W WATCHODOG TIMER BITE VERIFICATION TEST ONE SECOND AFTER FAILURE. BRAKE TRUTH TABLE WILL FAIL FOR OME SECOND AFTER FAILURE. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING EMD EFFECTOR CAPTURE.	QUALITY ASSURANCE IN CONJUNCTION WITH EMGINEERING, RELIABILITY, CONFIGURATION CONTROL, SUPPLIER AS APPLICABLE, AND THE GOVERNMENT REPRESENTATIVE, PRIOR TO THE START OF ANY FORMAL TESTING (ACCEPTANCE OR QUALIFICATION). ACCEPTANCE TESTING (ATP) INCLUDES AMBIENT, VIBRATION, AND THERMAL TESTING (SPAR/GOVERNMENT REP MANDITORY INSPECTION POINT).	
		5 5 6 7 8		FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL WHEN BRAKE SWITCH IS TRANSITIONED FROM ON TO OFF. WORST CASE UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING	•	S040237A ATTACHMENT - PAGE 390 OF 471
		100		TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (TO SECURE ORBITER)		
PREPARED BY	: <u>Mt</u>	WG	SUPERCEDING DATE		DATE: 11. JUL 91 CIL REV: 0	

RMS/ELEC - 149

	. DRAWING RÉF. DESIGNATION	AHD CAUSE	ON END ITE M	HDWR / FUNC. RATIONALE FOR ACCEPTANCE 2/1R CRITICALITY SCREENS: A PASS, B PASS, C PASS
2215 0	FAILURE DEVECTOR QTY. 1. SCHENATIC B12797.	MODE: AUTOBRAKES AND MCIU FAILURE WARNING CLEARING CIRCUIT FAILS LOW CAUSE(S): 1) BRAKE LEVEL CONVERSION CIRCUIT OUTPUT FAILS TO "BRAKES ON" 2) CLEARING CIRCUIT OUTPUT FAILS LOW	IF MCIU FAILURE WARNING AND/OR BRAKES ARE SET THEY CANNOT BE CLEARED BY BRAKES SWITCH. FOR CAUSE 1): IF BRAKES ARE OFF AT TIME OF FAILURE BE APPLIED DUE TO H/W WATCHDOG TIMER BITE VERIFICATION TEST ONE SECOND AFTER FAILURE. BRAKE TRUTH TABLE WILL FAIL FOR ONE SECOND AFTER FAILURE. ONE SECOND AFTER FAILURE. BRAKE TRUTH TABLE WILL FAIL FOR ONE SECOND AFTER FAILURE. BRAKE TRUTH TABLE WILL FAIL FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL WHEN BRAKE SWITCH IS TRANSITIONED FROM OM TO OFF. WORST CASE UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING	FAILURE HISTORY THERE HAVE BEEN ND FAILURES ASSOCIATED WITH THIS FAILURE MODE ON THE SRMS PROGRAM.
			TO CONTINUE OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (10	į į

SD40237A ATTACHMENT -PAGE 391 OF 471

FHEA

REF.

2215

PROJECT: SRMS (-5 NCIU INSTALLED)
ASS'Y NOMENCLATURE: NCIU SYSTEM: ELECTRICAL SUBSYSTEM ASS'Y P/R: 511557160-5 SHEET: HAME QTY & DRAWING REF. FNEA FAILURE MODE FAILURE EFFECT HDWR / FUNC. 2/1R **RATIONALE FOR ACCEPTANCE** REV. AND **DESIGNATION** CAUSE END ITEM CRETICALITY SCREENS: A-PASS, B-PASS, C-PASS Ð IF MCIU FAILURE WARHING AND/OR FALLURE MODE: OPERATIONAL EFFECT DETECTOR **AUTOBRAKES** OTY. 1. AND HCIU BRAKES ARE SET SCHEMATIC FAILURE THEY CANNOT BE AUTOBRAKES. DIRECT DRIVE AND BACKUP AVAILABLE. LOSS OF 812797. WARNING CLEARED BY LINPING. LOSS OF COMPUTER SUPPORTED MODES. CLEARING BRAKES SWITCH. CIRCUIT CREW ACTION FOR CAUSE 1): IF BRAKES ARE FAILS LOW OFF AT TIME OF SELECT DIRECT DRIVE. SINGLE/DIRECT DRIVE SWITCH SHOULD BE CAUSE(S): FAILURE PULSED TO MAINTAIN PROPER RATES. 1) BRAKE AUTOBRAKES WILL LEVEL BE APPLIED CREW TRAINING CONVERSION DUE TO H/W CIRCUIT **VATCHDOG TIMER** CREW IS TRAINED TO ALWAYS DOSERVE WHETHER THE ARM IS **OUTPUT FAILS** RESPONDING PROPERLY TO COMMANDS. BITE TO "BRAKES VERTFICATION TEST ONE SECOND MISSION CONSTRAINT AFTER FAILURE. 2) CLEARING BRAKE TRUTH CIRCUIT TABLE WILL FAIL NONE FOR ONE SECOND AFTER FAILURE. OUTPUT FAILS LOW ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL WHEN BRAKE SWITCH IS S040237A ATTACHMENT -PAGE 392 OF TRANSITIONED FROM ON TO OFF. WORST CASE UNABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMAINING apenne. TO CONTINUE **OPERATIONS:** 1) DIRECT DRIVE 2) BACK-UP DAIVE 3) JETTISON (TC SECURE ORBITER)

PREPARED BY:

MFWG

SUPERCEDING DATE: NONE

DATE: 11 JUL 91

CIŁ MEV: 0

PRIVE DEPLIES OF CASCEPTANCE PRIVE DEPLIES OF CASCEPTANCE PRIVE DEFECTION OF CASCEPTANCE PR	HEA FHEA	HAME, QTY, &		SS'Y NOMENCLATURE: M		ASS'Y P/N: 51155F160-5	SHEET:
DETECTOR OTT. I. SCHEMATIC AND RELIUE STATUTE AND RELIUE AND RELIUE CIRCUIT FAILS LOW CLEARING CIRCUIT FAILS LOW CHANGES SWITCH CONTROL FAILS TO "BRAKES SWITCH CIRCUIT OUTPUT FAILS TO "BRAKES SWITCH EVER FAILURE BRAKE TRUIN FAIL STORM AND COMES TO COMPUTER BRAKE TRUIN FAIL STORM AND COMES TO COMPUTER BRAKE TRUIN FAIL FAIL STORM AND COMES TO COMPUTER END FAIL WHEN BRAKE TRUIN BRAKE TRUIN BRAKE TRUIN THE BRAKE TRUIN BRAKE TR		DRAUÌNG RÈF.					
	2215 0	DETECTOR GTY. 1. SCHEMATIC	AUTOBRAKES AND NCIU FAILURE WARNING CLEARING CIRCUIT FAILS LOW CAUSE(S): 1) BRAKE LEVEL CONVERSION CIRCUIT OUTPUT FAILS TO "BRAKES ON" 2) CLEARING CIRCUIT OUTPUT FAILS TO "BRAKES ON"	IF MCIU FAILURE WARNING AND/OR BRAKES ARE SET THEY CANNOT BE CLEARED BY BRAKES SWITCH. FOR CAUSE 1): IF BRAKES ARE OFF AT TIME OF FAILURE AUTOBRAKES WILL BE APPLIED DUE TO H/W WAITCHDOG TIMER BITE VERIFICATION TEST ONE SECOND AFTER FAILURE. BRAKE TRUTH TABLE WILL FAIL FOR ONE SECOND AFTER FAILURE. ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED MODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL WHEN BRAKE SWITCH IS TRANSITIONED FRON ON TO OFF. WORST CASE UMABLE TO RELEASE BRAKES. LOSS OF ARM DRIVE CAPABILITY. REDUNDANT PATHS REMATHING TO CONTINUE OPERATIONS: 1) DIRECT ORIVE 2) BACK-UP DRIVE 3) JETTISON (TO	SCREEN FAILURES		!

PREPARED BY:

MFUG

SUPERCEDING DATE: NONE

PROJECT:	SRMS	(-5 NCI	U ENSTALLED)
ASS'Y NO	ENCLX	TURE: NO	U INSTALLED)

SYSTEM: <u>ELECTRICAL SUBSYSTEM</u> ASS'Y P/N: <u>51155F160-5</u> SHEET: 8 FMEA NAME GTY & DRAWING REF. FAILURE MODE FAILURE EFFECT HOWR / FUNC. REF. RATIONALE FOR ACCEPTANCE AND ON 2/1R DESIGNATION CAUSE END ITEM CRITICALITY SCREENS: A-PASS, B-PASS, C-PASS 2215 0 IF NCIU FAILURE WARNING AND/OR FAILURE MODE: AUTOBRAKES OMRSD OFFLINE DETECTOR GIY. 1. SCHEMATIC AND MC1U BRAKES ARE SET SET MCIU FAILURE WARNING AND AUTOBRAKES. CYCLE BRAKE COMMAND LINE AND VERIFY MCIU FAILURE WARNING AND AUTOBRAKES ARE FALLURE THEY CANNOT BE CLEARED BY 812797. WARNING CLEARING CLEARED. BRAKES SWITCH. CIRCULT OHRSD ONLINE INSTALLATION FOR CAUSE 1): IF BRAKES ARE FAILS LOW NONE OFF AT TIME OF CAUSE(S): 1) BRAKE AUTOBRAKES WILL BE APPLIED CHRSD ONLINE TURNAROUND LÉVEL CONVERSION DUE TO H/W SET MCIU FAILURE WARNING AND AUTOBRAKES. CYCLE BRAKE SWITCH ON DAC PAREL AND VERIFY MCIU FAILURE WARNING AND AUTOBRAKES CIRCUIT WATCHOOG TIMER OUTPUT FAILS TO "BRAKES VERIFICATION TEST ONE SECOND AFTER FAILURE. 2) CLEARING BRAKE TRUTH CIRCULT OUTPUT FAILS TABLE WILL FAIL FOR ONE SECOND AFTER FAILURE. LOW ARM COMES TO REST. LOSS OF COMPUTER SUPPORTED HODES. LOSS OF LIMPING DURING END EFFECTOR CAPTURE. FOR CAUSE 2): BRAKE TRUTH TABLE WILL FAIL WHEN BRAKE SWITCH IS TRANSITIONED FROM ON TO OFF. PAGE 394 WORST CASE UNABLE TO RELEASE BRAKES. LOSS OF ARM 읶 DRIVE CAPABILITY. REDUNDANT PATHS REMAINING TO CONTINUE DITE. OPERATIONS: 1) DIRECT DRIVE 2) BACK-UP DRIVE 3) JETTISON (10 SECURE ORBITER)

DATE: 11 JUL 91 CIL REV: 0