

Dague, Bryan

From: Douglas, Charles
Sent: Tuesday, December 15, 1998 2:22 PM
To: Dague, Bryan
Subject: FW: Potential modes of failure for leakage

Charlie

Charlie Douglas
(908) 238-3687 (P)
(908) 238-1886 (P)
c-douglas2@ti.com

From: Ha, Qi
Sent: Thursday, October 29, 1998 11:25 AM
To: Douglas, Charles
Subject: Potential modes of failure for leakage

CONFIDENTIAL

Charlie,
Here's the list you requested for potential causes of switch leakage:

System:

- Device not screwed in properly
 - Improper sealing due to mating port damage
 - Device exposed to excessive pressure
 - Device exposed to excessive temperature
 - Device exposed to excessive number of cycles
 - Water (or other contaminants) in system degrades Kapton diaphragm
 - Water (or other contaminants) ingresses switch through base and causes Kapton degradation
- Leakage at thread area
Leakage at thread area
Burst device
Gasket seal impaired
Diaphragm leakage
Diaphragm leakage
Diaphragm leakage

Manufacturing:

- Misplaced/missing gasket
- Misplaced/missing Kapton
- Improper gasket material (Incompatible with brake fluid)
- Incorrect # of Kapton (switches require 3 diaphragms because brake fluid is more aggressive)
- Incorrect sensor crimp
- Incorrect device crimp (fluid works its way in from the crimp to the base cavity into the sensor assy)

**Note: Items in red would be associated with infant mortality

FYI, we have had a car fire occurrence involving our switch in the past. See PS/98/34 in which a SZPS device was analyzed after a car fire. Diagnosis showed that the switch leakage occurred after the fire due to the high temps, and not the other way around.

Please let me know if you need anything further.

Regards,
Qi

Part/Process Name: 7792-2, 12-1, 13-1
 System Responsibility: CYBER UNIT, UNIT, UNIT, UNIT
 Shop Name: Lockheed Martin, QUALITY ENGINEERING

Systems and Plants Affected: FORD (MAXI CAB, LIGHT TRUCK, LIGHT TRUCK F-BUSSES)
 Model Designation(s): 80192, 80193
 Engineering Release Date:
 Prepared by: TONY HESTER, INC.
 Date: 8/23/92
 Rev: 1.0

Failure Description/Event	Parental Failure Mode	Parental Effects of Failure	S.C.F.E.	Parental Category of Failure	Q.C.L.	Control Controls	S.C.F.E.	Proposed Action	Responsible Party	ACTION REQUIRED	REMARKS	DATE	BY
PUSHER AVAILABLE: PUSHER AVAILABLE TO THE UNIT	ONE OR MORE	NO SENSITIVE SIGNALS AVAILABLE VEHICLE LOSS	5	PUSHER ERROR	1	PREVENTIVE MAINT. LIMIT PRESENCE CHECK VERIFY OPERATION OF CYCLE FRAME	1 5						
	DOES NOT MEET SPECIFICATIONS	NO SENSITIVE SIGNALS AVAILABLE	5	DEFECT IN PART; PUSHING ERROR	1	PREVENTIVE MAINT. LIMIT PRESENCE CHECK	1 5						
	LOOSE MULTIPLE PARTS	NO SENSITIVE SIGNALS AVAILABLE	5	PUSHING ERROR	1	PREVENTIVE MAINT. LIMIT PRESENCE CHECK	1 5						
PUSHER CHECK TO REMOVE	REPLACED CHECK	LOSS	9	PUSHING ERROR	1	LIMIT FUNCTION TEST CONFIRMITY FRAME CYCLING RIGHTS	1 9			SEE THE CYCLE FRAME DESCRIPTION BELOW			
	NO CHECK	LOSS	9	PUSHING ERROR	1	LIMIT FUNCTION TEST CONFIRMITY FRAME CYCLING RIGHTS	1 9						
	MULTIPLE CHECK	LOSS ... LO LOSS	9	FUNCTION OPERATOR INTERFERENCE	1	LIMIT FUNCTION TEST	1 9						
PUT AND PLACE 2 PIECES OF WIPON IN CYBER UNIT/UNIT	ONE 1 OR 2 PIECES	REMOVED DANGEROUS LIFE	9	OPERATOR ERROR NOT TURN ON JOE POSITION	1	PREVENTIVE MAINT. REWORK SET-UP PREVENTIVE MAINT.	1 9						
	NO WIPON	LOSS	9	PUSHING ERROR	1	LIMIT FUNCTION TEST CONFIRMITY FRAME	1 9						
	IMPROPER USE WIPON	LOSS DANGEROUS LIFE FOLLOWING PUSHING DANGEROUSLY AVAILABLE FIELD LOSS	5	PUSHING ERROR	1	LIMIT FUNCTION TEST CONFIRMITY FRAME CYCLING RIGHTS PREVENTIVE MAINT.	1 5						
	ONE PLACED WIPON	LOSS DANGEROUS LIFE	5	PUSHING ERROR OR STATIC	1	LIMIT FUNCTION TEST CONFIRMITY FRAME WELL-STATIC STATION PREVENTIVE MAINT. CYCLING RIGHTS	1 5						
REWORKS COMPLETE TO WIPON	REWORK COMPLETE	REWORKING DEVICE	5	PUSHING ERROR	1	LIMIT FUNCTION TEST CONFIRMITY FRAME	1 5						
	REWORK UNDER	REWORKING DEVICE LOSS	5	PUSHING ERROR	1	LIMIT FUNCTION TEST CONFIRMITY FRAME	1 5						
	REWORK WITH WIPON	SAFETY IN REWORK USE POWER REMOVED WIPON LIFE	9	PUSHING ERROR REWORKING DEVICE	1	POWER WIPON LIFE, TEST LIMIT FUNCTION TEST CYCLING RIGHTS	1 9				REWORK ON WIPON LIFE REWORKING DEVICE TO BE REWORKING ON PAGE.		
REWORKS UNDER/COMPLETE AND TO CYBER UNIT/UNIT	REWORKING OF CYBER UNIT	REWORKING DEVICE	5	WIPON CHECK AND PLACE WIPON	1	OPERATOR SET-UP LIMIT FUNCTION TEST LIMIT PRESENCE CHECK PREVENTIVE MAINT. CYCLING RIGHTS	1 5						

CONFIDENTIAL

TI-NHTSA 019168

Equipment Name/Part	Particular Failure Mode	Potential Effects of Failure	S.C.E.	Potential Cause(s) of Failure	S.C.E.	Current Controls	D.P.F.	Recommended Actions	Responsible/Responsible	ACTION PLAN	DATE	STATUS
SPRING-GUARD ARM COVERED	NO COINCIDENT PLACEMENT	NO-PLATE IMPACT RECORD IMPACT LIFE NO-PLATE BRIC EXCESSIVE BRACK	9	NO PLATE AND BRACK ALIGNMENT ERROR	1	OPERATOR SET-UP VIB. FUNCTION TEST VIB. PRESENCE CHECK PRELIMINE PNEU. CYCLING LIMITS	1					
	FAIL TO LOAD CORRECTLY	NO BRICK/NO BRICK PLATE LIFE	5	FADING ERROR	1	PRELIMINE PNEU. VIB. PRESENCE CHECK EMPTY OPERATION OF CHECK FRAME	1					
	LOCK OF FRAME PLATE LIFE	NO BRICK/NO BRICK PLATE LIFE	6	FADING ERROR	1	PRELIMINE PNEU. VIB. PRESENCE CHECK	1					
	NO IMPACT FORCE AND HOLDING TO BRACK OR BRICK	BRICKED BRIC LIFE CONTINUITY FAILURE LOSS OF CALIBRATION EMPTY BRIC LIFE	7	FADING ERROR	1	VIB. FUNCTION TEST CONTINUITY PROBE CYCLING LIMITS EMPTY BRIC PROBE	1					
	NO SPACE	BRICKED BRIC LIFE LOSS OF CALIBRATION EMPTY BRIC LIFE	7	FADING ERROR TOOL DULL, BRICK OR OVERWISE TUFF.	1	VIB. FUNCTION TEST CONTINUITY PROBE CYCLING LIMITS PRELIMINE PNEU.	1					
	OVERFULLY CUT SPACE, TOO BRACK	BRICKED BRIC LIFE LOSS OF CALIBRATION EMPTY BRIC LIFE	7	FADING ERROR TOOL DULL, BRICK OR OVERWISE TUFF.	1	VIB. FUNCTION TEST CONTINUITY PROBE CYCLING LIMITS PRELIMINE PNEU.	1					
	OVERFULLY CUT SPACE, TOO BRACK	BRICKED BRIC LIFE LOSS OF CALIBRATION EMPTY BRIC LIFE	7	FADING ERROR TOOL DULL, BRICK OR OVERWISE TUFF.	1		1					
	2 OR MORE BRICK LARGER	CONTINUITY FAILURE LOSS OF CALIBRATION EMPTY BRIC LIFE	7	STATIC BUILD-UP	1		1					
PUSHABLE BRIC TO BRICK AND BRICK	MISPLACED BRIC COVERED	CONTINUITY FAILURE	5	FADING ERROR	2	OVERLAP PNEU. EMPTY BRIC PROBE VIB. FUNCTION TEST	1					
	MISDE BRIC BRIC	CONTINUITY FAILURE	5	FADING ERROR	1	VIB. BRIC PROBE EMPTY BRIC PROBE VIB. FUNCTION TEST	1					
	MISPLACED BRIC	CONTINUITY FAILURE INCLUSION FAILURE	5	FADING ERROR	1	VIB. BRIC PROBE EMPTY BRIC PROBE	1					
	MISPLACED BRIC	LOSS OF CALIBRATION	5	BRICK	1	VIB. FUNCTION TEST BRIC BRICK	1					
	MISPLACED BRIC	CONTINUITY FAILURE	5	FADING ERROR	1	VIB. BRIC PROBE	1					
	PUSHABLE BRIC AND BRICK AND BRICK	NO BRICK OPERATION	5	FADING ERROR BRICK	1	VIB. PRESENCE CHECK VIB. FUNCTION CHECK	1					
	ONE-LEADER OF MULTIPLE CAPACITY	WARRANTY BRICK LIFE	7	NO-BLIND AND PICK AND BRACK	1	EMPTY BRIC PROBE VIB. FUNCTION TEST CYCLING LIMITS	1					

CONFIDENTIAL

TI-NHTSA 019166

FILE NAME: 019167

Printed on 06/14/84 at 08:22:10

Process Failure No. 019167

Efficient Analysis

Page 3 of 4

For more information: TTI-2-1, 12-3, 12-3
 Design Responsibility: JOHN GIBLIN / PAUL BELLEF
 Chief Design Engineer: JOHN GIBLIN, GIBLIN ENGINEERING

Location and Plant: 10000 10000 10000 10000 10000 10000
 Project Name/Reference: 10000 10000 10000 10000 10000 10000
 Engineering Release Date: 10000 10000 10000 10000 10000 10000

Prepared by: JOHN GIBLIN
 Date: 10000 10000 10000 10000 10000 10000
 Rev. Description Code: 10000 10000 10000 10000 10000 10000

Process Description/Reason	Potential Failure Mode	Potential Effect(s) of Failure	Q	C	Potential Cause(s) of Failure	O	C	Current Controls	D	P.	Precedence Action	Item/Individual Responsible	ACTION #	Q	C	P.	
PRE-CHOP CHOP MACHINE	MULTIPLE CHOP LATCH	NO SUBSEQUENT FEEDABLE POSSIBILITY	5	1	PRE-CHOP LATCH - INCORRECT OPERATOR INTERVENTION	1	1	PRE-CHOP CHECK	1	5							
PRE-CHOP CHOP MACHINE	CHOP CHOP	RELEASEMENT OF CHOP CHOP CONSEQUENCE: CHOP CHOP NO FEED CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	JOHN GIBLIN					
	CHOP CHOP	CHOP CHOP CHOP CHOP NO FEED CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
PRE-CHOP CHOP MACHINE	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
PRE-CHOP CHOP MACHINE	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
PRE-CHOP CHOP MACHINE	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
PRE-CHOP CHOP MACHINE	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							
	CHOP CHOP	CHOP CHOP CHOP CHOP	5	1	CHOP CHOP CHOP CHOP	1	15	CHOP CHOP CHOP CHOP	1	15							

CONFIDENTIAL

TI-NHTSA 019167

Case Number: 79924, 12-1, 12-3
 System/Job: STEAM CYCLING / PWT1 KILLER
 Other Areas Involved: JET UNIT, QUALITY ENGINEERING

Supplier and Part Number: 79924, 79150, 79151
 Engineering Release Date:

Product by: TEND, DMTR
 Part Date: 04/12, 04/09/1
 Job Production Date: 1992

Posting Description	Potential Failure Mode	Potential Effects of Failure	S.C.I.C.	Potential Causes of Failure	D.C.F.	Current Controls	D.P.C.M.	Inspected Features	Item/Defect Responsible	ACTION #	P	S	M	C	D	E	T
ALL BLANK TO BEFIND BRICKLE	INOPERATIVE AIB PNEUMATIC	UN-RELEASE PNEUMATIC AIB GAITS BY SET POINT WHEN LIVE	9	PNEUMATIC TOO LOW	1	LEAK: PNEUMATIC SECTION LEAK: PNEUMATIC TEST CYCLING AIB	1	7									
BLANK AND CRACKED	BRICKLE CONTAMINANT BLENDED INTO LINE	REDUCED SERVICE LIFE CORROSIVE WEAR/TEAR	5	EXCESSIVE HEATING/COOLING	4	LEAK: IMPROPERION O.C. VERIFICATION LEAK: PNEUMATIC TEST CYCLING AIB	1	5									
CRACK BEING REPAIRS AND BLENDED INTO CRACK PNEUMATIC	INOPERATIVE AIB	LOSS OF AIB CONTROL ON OVERHEAT PNEUMATIC	7	INOPERATIVE SET-UP	1	O.C. SAMPLE	1	25									
	INOPERATIVE AIB	LOSS OF AIB CONTROL ON OVERHEAT PNEUMATIC	7	WIRING ERROR	2	PNEUMATIC VERIFY O.C. SAMPLE	1	25									
	CRACK BEING REPAIRS	WILL NOT REPAIR CRACK AND TEST	5	INOPERATIVE CORRECT PNEUMATIC	5	OPERATOR VERIFY	1	75	PREPARE CRACK SYSTEM SET-UP REPAIRS	REPAIR/REVISION							
	NO BLENDED	LOSS OF AIB CONTROL ON OVERHEAT PNEUMATIC	5	INOPERATIVE SET-UP	4	O.C. SAMPLE OPERATOR VERIFY	1	5									
CRACK BEING REPAIRS AND BLENDED INTO CRACK PNEUMATIC	CRACK NOT CORRECTED	WILL NOT SEAL INTO CRACK THERMAL FLUCTUATION OUT OF SPEC.	5	PNEUMATIC BLENDED AND BLENDED CRACK	1	LEAK - PILOT FROM SENSOR THERMAL FLUCTUATION	1	5									
	CRACK NOT FULLY CORRECTED INTO BLENDED	THERMAL FLUCTUATION OUT OF SPEC. FAILURE AT OIL-DRAWN	5	TOOL WEAR ON CUT-OFF BOIL INSURANCE ON CUT-OFF EXHAUSTION FROM LINE EXHAUSTION FROM MOUNTING	1	THERMAL HEAT/COOL LEAK: FLAKE FROM CONICAL PRESERVING PART WIRE: DETECTION DISTANCE SENSOR	1	15									
LEAK BEHAVIOR/ REPAIRS	INOPERATIVE CRACK	LOSS THERMAL	7	WIRING ERROR INOPERATIVE PNEUMATIC	1	PNEUMATIC PNEUMATIC PNEUMATIC THERMAL SET-UP INSPECTION	1	9	NON-RESTRICTIVE AND TEST FROM FOR THERMAL PNEUMATIC RELEASE/	PWT1 CRACK							
	CRACKING TOOL CORRECTED INTERNALLY POSITIONING	THERMAL FLUCTUATION OUT OF SPEC	5	INOPERATIVE TOOL SET-UP TOOL WEAR/TEAR	1	THERMAL FLUCTUATION SET-UP INSPECTION	1	15									
CRACK AND TOOL WEAR	WIRE LOCATION CHANGE/REPAIRS	WILL NOT SEAL CORROSIVE OPERATION	5	TOOL WEAR/TEAR	1	WIRE: INSPECTION WIRE: O.C.	1	5									
	WIRE LOCATION CHANGE/REPAIRS	WILL NOT SEAL CORROSIVE OPERATION	5	TOOL WEAR/TEAR SET-UP ERROR	1	WIRE: INSPECTION WIRE: O.C. SET-UP INSPECTION	1	5									
	CRACKING PNEUMATIC/CRACKING/CRACKING	WIRING ERROR WIRING ERROR	5	TOOL WEAR/TEAR SET-UP ERROR	1	WIRE: INSPECTION WIRE: O.C. SET-UP INSPECTION SET-UP INSPECTION	1	9									
CRACK BEING REPAIRS AND BLENDED INTO CRACK PNEUMATIC	INOPERATIVE PNEUMATIC	LOSS SPARK	7	WIRING ERROR WIRING ERROR INOPERATIVE SET-UP	1	WIRING ERROR WIRING ERROR SET-UP INSPECTION PRESERVING PART	1	25									

CONFIDENTIAL

TI-NHTSA 019168

Job Name: 7902-1 12-3 12-3
 In responsibility: BLEN MULLER / PONT CELLER
 Shop Area Level: JEM 0011 QUALITY IMPROVING

Supplier and Plant: BIRCO PUMP OIL LINE TRACK, LINE OVEN F-00113
 Model Number: 7902-1
 Machine No: 989897
 Equipment No: 989897

Project by: ERIC HENRIK
 P.M. Date: 05/27/92
 Rev Product: 01/01/92

Process Description/ Failure	Potential Failure Mode	Potential Effect(s) of Failure	S.C.P.C.	Potential Cause(s) of Failure	Current Controls	D.P.C.	Recommended Actions	How/Individuals Responsible	ACTION SCHEDULE	ACTION NO.	P.F.	
											S	C	P	C
	EXCESSIVE ALIGNING	LOOSE SPRING BROKEN SPRING	7	INCORRECT SET-UP POSITION	SPRING FORCE SPEC PREDICTIVE VALUE PUMP ALIGN SPEC SET-UP INSTRUCTION	1						
	WREN HOLDING	NO SPRING SPRING WILL NOT OPERATE	3	WREN	WREN POSITION CHECK WREN FORCE CHECK	1	WREN RE-WREN POSITIONING	McMILLAN				
DECREASED WORKING CONTACT	INSUFFICIENT WEL	LOOSE CONTACT	7	WREN HOLD WREN HOLD INCORRECT SET-UP POSITION	ROLL BATTERY ON SPEC SET-UP INSTRUCTION PREDICTIVE VALUE	1						
	DECREASED WEL	WREN CONTACT LOOSE CONTACT	7	INCORRECT SET-UP WREN	ROLL BATTERY ON SPEC PREDICTIVE VALUE SET-UP INSTRUCTION	1						
PUMP SPRING STROKE	CONTACT WEARING	CONTACT DISTANCE INCREASES OVER LIFE	7	WREN	WREN POSITION CHECK	1						
	WREN TOO HIGH	WREN SPRING LIFE REDUCED WREN LIFE SHIFT IN SET-POINT OVER LIFE SERVICE IN-OP	7	WREN/WREN TOOL INCORRECT SET-UP	WREN SPEC SET-UP INSTRUCTION PREDICTIVE VALUE WREN POSITION CHECK	1						CRITICALITY OF PUMP TOOL DISTANCE INCREASED LIFE/IN PROCESS CORRELATION AND DOCUMENTED
PUMP SPRING STROKE	WREN TOO LOW	LOW CONTACT ON WREN FAILURE SHORTER CYCLE	7	WREN TOOL INCORRECT SET-UP	WREN SPEC SET-UP INSTRUCTION PREDICTIVE VALUE WREN POSITION CHECK	1						
	SET-UP POSITION THROUGH AND WREN TOO HIGH	OK NOT CHANGED	5	WRENING WREN AIR LINE WREN	WREN POSITION SPEC WREN POSITION SPEC WREN POSITION SPEC	1						
PUMP SPRING STROKE	WRENING NOT FULLY DONE WREN	WRENING ALIGN OUT OF SPEC FAILURE IN CALIBRATION	5	WRENING WREN WREN WREN	WRENING WREN WREN WREN WRENING WREN WREN WREN WRENING WREN WREN WREN	1						
	WRENING WREN WREN WREN	WRENING WREN WREN WREN	5	WRENING WREN WREN WREN	WRENING WREN WREN WREN WRENING WREN WREN WREN WRENING WREN WREN WREN	1						
CALIBRATION WREN WREN	WRENING WREN WREN WREN	WRENING WREN WREN WREN	5	WRENING WREN WREN WREN	WRENING WREN WREN WREN WRENING WREN WREN WREN WRENING WREN WREN WREN	1						
	WRENING WREN WREN WREN	WRENING WREN WREN WREN	5	WRENING WREN WREN WREN	WRENING WREN WREN WREN WRENING WREN WREN WREN WRENING WREN WREN WREN	1						
CALIBRATION WREN WREN	WRENING WREN WREN WREN	WRENING WREN WREN WREN	7	WRENING WREN WREN WREN	WRENING WREN WREN WREN WRENING WREN WREN WREN WRENING WREN WREN WREN	1						
	WRENING WREN WREN WREN	WRENING WREN WREN WREN	7	WRENING WREN WREN WREN	WRENING WREN WREN WREN WRENING WREN WREN WREN WRENING WREN WREN WREN	1						
	WRENING WREN WREN WREN	WRENING WREN WREN WREN	7	WRENING WREN WREN WREN	WRENING WREN WREN WREN WRENING WREN WREN WREN WRENING WREN WREN WREN	1						

CONFIDENTIAL

TI-NHTSA 019189

Primary Description/Requirement	Potential Failure Mode	Potential Effect(s) of Failure	F	C	D	Potential Consequence of Failure	D	C	E	D	P	F	Environmental Occurrence	Area/Individual Responsible	ACTION Required Taken	S	C	D	F	N
CHAIN BRUSH ASSEMBLY OPERATION	CHAIN BRUSH DRIVE LINK MISFUNCTION	LOSS OF BRUSH CALIBRATION FAILURE RESULTS AS CHAIN	7			STATION HEAD SWH/SOFTWARE ERROR STATION HEAD INCORRECT LAMP SET-UP	1			1	1	1								
FUEL METER	NOT FUEL METER WORKS CORRECTLY	DIFFICULT MAINTENANCE OPERATIONS	4			MACHINE ERROR	2			1	2	1	1	1	SEE "LAMP RING ADJUSTED" IN PAGE 5					
ROCKWELL BRUSHING HEAD TO 1/4" CLAMP	MISALIGNED SEAL	INTERNAL CORROSION OVER LIFE CHANGED BRUSH DURING CLAMPING	7			MACHINE ERROR	5			1	2	1	1	1						
	REPLACED SEAL	INTERNAL CORROSION OVER LIFE CHANGED BRUSH DURING CLAMPING	7			MACHINE ERROR	5			1	2	1	1	1						
	MULTIPLE SEALS	LOSS OF CALIBRATION CHANGED BRUSH DURING CLAMPING	5			MACHINE ERROR	1			1	5	1	1	1						
MACHINE OPERATOR FOR INTER CLAMP CLAMP	WRONG SIZE PIN SELECTED	WRONG OPERATOR REDUCES CYCLE LIFE SHIFT IN CALIBRATION	5			OPERATOR ERROR	1			1	1	1	1	1						
	WRONG PLACED PIN	NO BRUSH OPERATION	1			MACHINE ERROR	1			1	1	1	1	1						
ROCKWELL BRUSHING HEAD TO 1/4" CLAMP	WRONG BRUSH POSITION	LOSS OF LAM CONTROL BRUSH MISFUNCTION	5			OPERATOR ERROR	1			1	1	1	1	1						
	MISALIGNMENT OF FILM	BRUSH WILL NOT CLAMP	5			OPERATOR ERROR	1			1	1	1	1	1						
	MISALIGNMENT OF SEAL	CHANGED BRUSH CHANGED BRUSH FOR OVER LIFE	7			OPERATOR ERROR	1			1	2	1	1	1						
BRUSH FOR CLAMP	WRONG OPERATOR FOR CLAMP	MISALIGNMENT OF OPERATOR BRUSHING INTERNAL CORROSION	7			INTERNAL BRUSH FAILURE	1			1	7	1	1	1						
	WRONG BRUSH FOR CLAMP	MISALIGNMENT OF OPERATOR BRUSHING INTERNAL CORROSION	7			INTERNAL BRUSH FAILURE	1			1	7	1	1	1						
	CHANGED BRUSH	INTERNAL CORROSION	7			INTERNAL BRUSH FAILURE	1			1	7	1	1	1						

CONFIDENTIAL

CONFIDENTIAL

TI-NHTSA 019170

File No: 15877

Project #: 15-14 to 15-21-1972

Process Failure #: 1 Failure Analysis

Page 2 of 4

Case Number: 15877-1, 15-2, 15-3
 Responsibility: STEVE BOSTER, JIM COLLIER
 Case Agency Director: JIM BART, Quality Engineering

Equipment and Plant: Model Year-Subclass: 1972, 1973
 Location: 1972 (1972) 1/28/72
 Employee Name: Date:

Prepared by: EDNA TAYLOR
 1972 (1972) 1/28/72
 No. Produced from Data: 15-91

Class: C

15877-1

Process Step/Step Name	Potential Failure Mode	Potential Effects of Failure	S.P.C.	Potential Control of Failure	O.C.C.	Current Controls	S.P.C.	Recommended Action	Action/Responsible	ACTION			S	U	D
										M	S	D			
PROCESS STEP: (Must sign/initial chart)	CONTAMINATION OF MOTOR OIL/SLUDGE	OILY RESIDUE FROM MOTOR OIL SLUDGE	P	CONTAMINATED OIL BY CONTAMINATION OILY RESIDUE FROM FAILED MICROPHONE MOTOR OIL FINE HYDROGEN OIL-UP MOTOR	S	CONTAMINATION FILTERS ON OIL S & H PERFORMANCE PERFORMANCE FULL-OIL FILTER ANALYSIS	L	P							

CONFIDENTIAL

TI-NHTSA 019171

Primary Description/ Purpose	Potential Failure Mode	Potential Effects of Failure	C C I C	Potential Cause(s) of Failure	C C I C	Current Controls	S P L L L	R P L L	Recommended Action	Item/Individual Responsible	ACTION R Actions Taken	V V V V	P P P P	C C C C	A A A A	
																1	2	3	4	5	6	7	8
REPLACE CRACK TO REPORT OUT AND PLACE 2 PIECES OF BUTYON ON REPAIR-CRACK POSSIBLE	REPLACES CRACK	LOW	7	POORER BRICK	1	SEE FUNCTION TEST COMPACTY FROM BETWEEN LIFE CYCLING BRICKS PRE-DRY	1	9								
	NO CRACK	SLIGHT	7	POORER BRICK	1	SEE FUNCTION TEST COMPACTY FROM BETWEEN LIFE CYCLING BRICKS PRE-DRY	1	7								
	ONLY 1 OR 2 PIECES	REDUCE BETWEEN LIFE	7	OVERDRY BRICK NOT PART OF 3 TO SECTION	1	POORER BRICK POORER BRICK POORER BRICK POORER BRICK	1	9								
	NO BUTYON	LOW	7	POORER BRICK	2	SEE FUNCTION TEST COMPACTY FROM BETWEEN LIFE CYCLING BRICKS	1	27								
	INSUFFICIENTLY CUT BUTYON	LOW	7	POORER BRICK	3	SEE FUNCTION TEST COMPACTY FROM BETWEEN LIFE CYCLING BRICKS	1	27								
	REPLACE MORTAR AND CONCRETE TO REMOVE CRACKS	UPSIDE FROM MORTAR	LIFE OF CONCRETE HIGH REINFORCEMENT	7	POORER BRICK	1	SEE FUNCTION TEST SEE FUNCTION TEST	1	24							
		UPSIDE FROM MORTAR	LIFE OF CONCRETE REDUCE LIFE	7	POORER BRICK	1	SEE FUNCTION TEST SEE FUNCTION TEST	1	27							
		NO CONCRETE	NO REINFORCEMENT	7	POORER BRICK	1	SEE FUNCTION TEST SEE FUNCTION TEST	1	27							
		NO MORTAR	NO REINFORCEMENT	7	POORER BRICK	1	SEE FUNCTION TEST SEE FUNCTION TEST	1	27							

TI-NHTSA 019172

Failure Description/Function	Potential Failure Mode	Potential Effect(s) of Failure	S/N	Criticality	Proposed Category of Failure	D	C	Current Controls	R	P	Recommended Actions	New/Existing Requirements	ACTION	DATE	BY	PAGE	
																	1	2	3	4	5	6	7	8	9	10	11	12
OUT HATCH SPACER AND ASSEMBLY TO REMOVE SPACERS	REMOVED SPACER	REDUCED DISC LIFE	9	PROB	PROB	6	126	SEE FUNCTION TEST CONTINUITY TEST DISPERSE LIFE CYCLIC BIRTH	1	126							
	REMOVED SPACER	CONTINUITY FAILURE	9	PROB	PROB	5	125	TRIPED DISC FROM	1	125							
	REMOVED SPACER	LOSS OF ORIENTATION	9	PROB	PROB	7	125	SEE FUNCTION TEST CONTINUITY TEST DISPERSE LIFE CYCLIC BIRTH	3	125							
	NO SPACER	REMOVED DISC LIFE	9	PROB	PROB	6	125	SEE FUNCTION TEST CONTINUITY TEST DISPERSE LIFE CYCLIC BIRTH	3	125							
	NO SPACER	LOSS OF ORIENTATION	9	PROB	PROB	5	125	SEE FUNCTION TEST CONTINUITY TEST DISPERSE LIFE CYCLIC BIRTH	3	125							
	INDEFINITE CUT SPACER	REMOVED DISC LIFE	9	PROB	PROB	6	126	SEE FUNCTION TEST CONTINUITY TEST DISPERSE LIFE CYCLIC BIRTH	2	126							
	INDEFINITE CUT SPACER	LOSS OF ORIENTATION	9	PROB	PROB	8	126	SEE FUNCTION TEST CONTINUITY TEST DISPERSE LIFE CYCLIC BIRTH FINGERPRINT MARKS	1	126							
	POSSIBLE DTC	REMOVED DISC (TRIPED)	CONTINUITY FAILURE	9	PROB	PROB	2	27	FINGERPRINT MARKS TRIPED DISC FROM LUB = FUNCTION TEST	1	27						
		TRIPED DISC	CONTINUITY FAILURE	9	PROB	PROB	3	27	DISC = DISC FROM TRIPED DISC FROM LUB = FUNCTION TEST	1	27						
		MULTIPLE DISC	CONTINUITY FAILURE	9	PROB	PROB	3	27	DISC = DISC FROM TRIPED DISC FROM DISC = FUNCTION TEST	1	27						
MULTIPLE DISC		ACCUSION FAILURE	9	PROB	PROB	3	27	DISC = DISC FROM DISC = FUNCTION TEST	1	27							
TRIPED DISC		LOSS OF ORIENTATION	9	PROB	PROB	3	27	DISC = FUNCTION TEST DISC MARKS	1	27							

TI-NHTSA 018173

Function Description/ Purpose	Potential Failure Mode	Potential Effects of Failure	S C L	C T L	Potential Cause(s) of Failure	C C	Control Controls	D C L	P C L	Engineering Action	Area/Individual Responsible	ACTION			
												Before Take	PREP	PROG	TEST
REVERSE OF BUSH HEIGHT ACCIDENT	WELDED CAP	NO BRACE OPERATION	1		MACHINE DASH BOARD	1	BAR = FUNCTION CHECK BAR = FUNCTION TEST	1	Y						
	DIVIDED CAP	LOSS OF DELIMITION	1		TRACK JAW	1	BAR = FUNCTION TEST	1	Y						
	DISPLACEMENT OF CAPS BY BUSHING, DISPLACEMENT	NO BRACE OPERATION	1		MACHINE DASH BOARD	1	TRAYED PING PONG BAR = FUNCTION TEST	1	Y						
THE CRIMP BUSH ASSEMBLY	IN-SPECTORY CRIMP	DISPLACEMENT OF INTERNAL COMPONENTS DURING THERMAL	1		WORK ON HIGH TOOLS	1	PERMANENTLY MADE	1	IM						
	CRIMP ENCLOSURE	CONTAMINANT FAILURE	1		WORK SET-UP	1	BAR = FUNCTION TEST	1	Y						
	DISPLACEMENT OF INTERNAL COMPONENTS	LOSS OF ORIENTATION	1		PERMANENTLY MADE AND SET-UP (FUNCTION)	1	SET-UP INSPECTION BAR = FUNCTION TEST PERMANENTLY MADE.	1	IM						
TRANSFER THE CRIMPED ASSEMBLY TO PUCK CRACKER	DISPLACEMENT OF INTERNAL COMPONENTS	LOSS OF ORIENTATION	1		INSPECTING PICK-UP	1	SET-UP INSPECTION BAR = FUNCTION TEST PERMANENTLY MADE.	1	IM						
PICK STAGE FINAL CRIMP	INSPECTORY CRIMP	WORK NECESSARY DEFERRED	1		TOOL USE	1	DIAMETER SPC MIDLINE SPC PERMANENTLY MADE.	1	Y						
	CRIMP CRIMP	WORK NECESSARY DEFERRED SPECIFICALLY PICKING INTO CRIMP SPC	1		TOOL DEFECTS DIAMETER SET-UP LOSS OF AIR PRESSURE	1	DIAMETER SPC MIDLINE SPC PERMANENTLY MADE.	1	Y						
	CRIMP CRIMP	WORK NECESSARY DEFERRED SPECIFICALLY PICKING INTO CRIMP SPC	1		PERMANENTLY MADE PERMANENTLY MADE	1	DIAMETER SPC MIDLINE SPC SET-UP PROCEDURE	1	Y						
CRIMP PART NUMBER AND DATE CODE ON CRIMP SPC	IN-CORRECT DATA	LOSS OF LOT CONTROL OF CUSTOMER PICKING	1		INCORRECT SET-UP	1	Q.C. SAMPLE CUSTOMER VERIFY	1	Y						
	EXCESSIVE DATA	LOSS OF LOT CONTROL OF CUSTOMER PICKING	1		WRONG CRIMP	1	Q.C. SAMPLE CUSTOMER VERIFY	1	Y						
	CRIMP SPC DISTURBED	WILL NOT IDENTIFY THE NEXT	1		INCORRECT SET-UP CRIMPING CRIMP PERMANENTLY MADE	1	Q.C. SAMPLE CUSTOMER VERIFY	1	Y						
PICK RECORDS - PICK-UP OPERATION TERMINAL AND INSPECTION TOOL USE	CRIMP NOT CRIMPED	WILL NOT TEST INTO NEXT TERMINAL POSITION OUT OF SPC.	1		MACHINE PARTS AIR CHECK TOOL	1	BAR = PLOW TOOL BAR = PLOW TOOL	1	Y						
	CRIMP NOT CRIMPED	WILL NOT TEST INTO NEXT TERMINAL POSITION OUT OF SPC.	1		MACHINE PARTS AIR	1	BAR = PLOW TOOL	1	Y						

TI-NHTSA 018174

Existing Design/Part/Component	Potential Failure Mode	Existing Effects of Failure	R.N.	Criticality	Potential Cause(s) of Failure	O.C.	Current Controls	R.P.	EL.	Proposed Solution	Proposed/Existing Responsibility	ACTION NUMBER	STATUS	DATE	BY	CHK'D	
STAGE SEPARATION TOWER	TOWER NOT FULLY RETRACTED INTO BAY	TOWER MOVES OUT OF SPEC TOWER AT DELIVERY	7	C	DOWN BUSH	3	DOWN BUSH	1	25								
					TOWER LOCKS ON DOWN BUSH	3	TOWER POSITION SPEC	1									
STAGE SEPARATION TOWER	INSUFFICIENT STROKE	LOCKE TOWER	9	C	DOWN BUSH	3	DOWN BUSH	1	27								
					INSUFFICIENT HEAD PRESSURE	3	TOWER POSITION SPEC	1									
STAGE SEPARATION TOWER	TOWER CHANNEL MISALIGNMENT	TOWER POSITION OUT OF SPEC.	5	C	DOWN BUSH	3	DOWN BUSH	1	15								
					TOWER LOCKS ON BUSH	3	TOWER POSITION SPEC	1									
STAGE SEPARATION TOWER	MOUNT LOCKING INCOMPLETE	WILL NOT ALLOW NORMAL OPERATION	7	C	DOWN BUSH	3	DOWN BUSH	1	7								
					SET-UP BUSH	3	DOWN BUSH	1									
STAGE SEPARATION TOWER	MOUNT LOCKING INCOMPLETE	WILL NOT ALLOW NORMAL OPERATION	7	C	DOWN BUSH	3	DOWN BUSH	1	7								
					SET-UP BUSH	3	DOWN BUSH	1									
STAGE SEPARATION TOWER	TOWER FOR BAY DOCKING INCOMPLETE	TOWER STROKE LIFE	9	C	DOWN BUSH	3	DOWN BUSH	1	9								
					SET-UP BUSH	3	DOWN BUSH	1									
STAGE SEPARATION TOWER	TOWER FOR BAY DOCKING INCOMPLETE	TOWER STROKE LIFE	9	C	DOWN BUSH	3	DOWN BUSH	1	9								
					SET-UP BUSH	3	DOWN BUSH	1									
STAGE SEPARATION TOWER	INSUFFICIENT STROKE	LOCKE BUSH	9	C	DOWN BUSH	3	DOWN BUSH	1	27								
					DOWN BUSH	3	DOWN BUSH	1									
STAGE SEPARATION TOWER	TOO HIGH RESET	LOCKE BUSH	7	C	DOWN BUSH	3	DOWN BUSH	1	27								
					DOWN BUSH	3	DOWN BUSH	1									
STAGE SEPARATION TOWER	BUSH MISSING	LOSS OF BUSH DEVICE NOT OPERATIVE	9	C	DOWN BUSH	3	DOWN BUSH	1	27								
					DOWN BUSH	3	DOWN BUSH	1									
STAGE SEPARATION TOWER	INSUFFICIENT BUSH	LOCKE BUSH	9	C	DOWN BUSH	3	DOWN BUSH	1	27								
					DOWN BUSH	3	DOWN BUSH	1									

TI-NHTSA 019175

Primary Description/ Failure	Potential Failure Mode	Functional Requirement of Failure	R C P L C	Potential Consequences of Failure	O C C	Current Controls	R C P L C	Residual Action	Design/Individual Responsible	ACTION Action Taken	W E B C C C	W E B C C C	W E B C C C	W E B C C C
FROM FLYING WHEEL	TOO MUCH FORCE	CRANK CONTACT	5	DISCONNECT SET-UP PERIOD	1	WELL BARRIER ON EPC SET-UP INSPECTION FRESHWATER PUMP.	1 28							
	CRANK CONTACT	CONTACT RESISTANCE DECREASES WREN LIFE	7	WREN FEED	3	WREN x FRESHWATER CRANK FRESHWATER PUMP.	1 29							
	WHEEL TOO HIGH	HIGH CONTACT FORCE	5	WREN FEED	3	WREN EPC SET-UP INSPECTION FRESHWATER PUMP.	1 25							
	WHEEL TOO LOW	LOW CONTACT FORCE	5	WREN FEED	3	WREN EPC SET-UP INSPECTION FRESHWATER PUMP.	1 25							
OUT-OFF WREN/CRANK TERMINAL AND INSERT INTO EPC	CRANK NOT CONNECTED	WELL NOT FEED TWO EPC	5	WRENING WREN AIR TAKER EPC	5	WREN x FRESH WREN EPC	1 26							
		WRENING POSITION OUT OF SPEC.		WRENING WREN AIR TAKER EPC		WREN x FRESH WREN EPC TYPING POSITION EPC								
	TERMINAL NOT PLUG INSERTED INTO EPC	TERMINAL MIDDLE HOLE OF EPC	5	OUT-OFF WREN	1	WREN x TERMINAL SALVAGE EPC	1 22							
		WRENING AT CALIBRATION		OUT-OFF WREN INSERTION FROM WREN POSITION FROM EPC		FRESHWATER PUMP. TERMINAL FEEDING EPC WREN x FRESH WREN EPC								
CRANK MOUNTING TERMINAL WREN/CRANK	INSERTION WREN	LOWER TERMINAL	5	WREN FEED	3	SET-UP INSPECTION FRESHWATER PUMP. FRESHWATER PUMP.	1 27							
				INSERTION WREN POSITION		FRESHWATER PUMP. FRESHWATER PUMP.								
	TERMINAL CRANK WREN/CRANK	TERMINAL POSITION OUT OF SPEC.	5	DISCONNECT SET-UP	1	TERMINAL POSITION EPC	1 25							
				LOW WRENING		SET-UP INSPECTION								
CRANKING WREN TARGET WREN EPC	CRANKING WREN TARGET WREN EPC	CRANKING CYCLE LIFE	5	CRANKING SET-UP	3	WREN x WREN AT CRANK EPC WREN x POSITION WREN CYCLING WREN FRESHWATER	1 27							
		CRANK ACTUATION		CRANKING WREN POSITION		WREN x WREN AT CRANK EPC WREN x POSITION WREN CYCLING WREN FRESHWATER								
				CRANKING CRANKING EPC		WREN x WREN AT CRANK EPC WREN x POSITION WREN CYCLING WREN FRESHWATER								
	CRANKING WREN TARGET WREN EPC	CRANK RELEASE	5	CRANKING SET-UP	3	WREN x WREN AT CRANK EPC WREN x POSITION WREN CYCLING WREN FRESHWATER	1 28							

TI-NHTSA 019176

Process Description	Potential Failure Mode	Potential Effects of Failure	C. N. E.	Potential Causes of Failure	C. N. E.	Control Controls	C. N. E.	Recommended Actions	Item/Technical Description	ACTION Y	F. W. C.	DATE	BY	CHK
CRANK SHAFT ASSEMBLY CALIBRATION	CRANK SHAFT NOT CALIBRATED	CRANK WEAR	7	CRANK NOT SET-UP	7	SEE X PART OF CHECK LIST SEE X FUNCTION TEST CYCLING RUNS FEELING	1 25							
	CRANK STATION DRIFT	HIGH BORE ASSEMBLY TOLERANCE	5	STATION MARK	1	OFF LINE IPC CHECK	1 5							
	CRANK MALFUNCTION	LOW BORE ASSEMBLY TOLERANCE	5	STATION MARK DIMENSION SET-UP	1	SEE X FUNCTION TEST CYCLING RUNS FEELING FUNCTIONAL TEST.	1 5							
PISTON ASSEMBLY														
ASSEMBLY CRANK ASSEMBLY TO CRANK SHAFT	WRONG CRANK RING CODE	LOSS OF TORQUE CONTROL INCORRECT SERVICE	7	WRONG CRANK SERVICE	3	WRONG CRANK S.L.C. SERVICE SET-UP INSTRUCTION	1 25							
ASSEMBLY CRANKSHAFT, BORE TO CRANK	WRONG BORE	INTERNAL CORROSION OVER LIFE	9	WRONG BORE	5	SEE X BORE AIR LINE IPC BANK TORQUE IPC	1 125							
	WRONG PLACE BORE	INTERNAL CORROSION OVER LIFE	9	WRONG BORE	5	SEE X BORE AIR LINE IPC BANK TORQUE IPC	1 125							
	WRONG PLACE BORE	INTERNAL CORROSION OVER LIFE	9	WRONG BORE	5	SEE X BORE AIR LINE IPC BANK TORQUE IPC	1 125							
ASSEMBLY CRANKSHAFT PIN BORE CRANK PIN GUIDE	WRONG SIZE PIN	LOSS OF CALIBRATION	9	WRONG CRANK CRANK	1	SEE X BORE FUNCTIONAL TEST	1 9							
	WRONG SIZE PIN	CRANK DIMENSION	9	WRONG CRANK SERVICE	1	WRONG CRANK FUNCTIONAL TEST	1 9							
	WRONG PLACE PIN	NO SERVICE OPERATION	9	WRONG CRANK SERVICE	1	WRONG CRANK FUNCTIONAL TEST	1 9							
ASSEMBLY CRANK ASSEMBLY TO CRANK SHAFT	WRONG BORE ASSEMBLY	LOSS OF TORQUE CONTROL WRONG CALIBRATION	9	WRONG CRANK SERVICE	1	WRONG CRANK FUNCTIONAL TEST S.L.C. SERVICE SEE X FUNCTIONAL TEST	1 9							
	WRONG BORE ASSEMBLY	LOSS OF TORQUE CONTROL WRONG CALIBRATION	9	WRONG CRANK SERVICE	1	WRONG CRANK FUNCTIONAL TEST S.L.C. SERVICE SEE X FUNCTIONAL TEST	1 9							
	DISLOCATION OF PIN	INTERNAL CORROSION OVER LIFE	9	PIN AND PLACE BORE	1	SEE X FUNCTIONAL TEST FUNCTIONAL TEST.	1 9							
	DISLOCATION OF BORE	INTERNAL CORROSION OVER LIFE	9	PIN AND PLACE BORE	1	SEE X FUNCTIONAL TEST FUNCTIONAL TEST. BANK TORQUE IPC AIR LINE IPC	1 9							
END STAGE FINAL CRANK	CRANK DIMENSION OUT OF SPEC.	VARIATION OF CRANK DIMENSION INTERNAL CORROSION	9	WRONG CRANK SERVICE	1	WRONG CRANK FUNCTIONAL TEST BANK TORQUE IPC AIR LINE IPC	1 9							

TI-NHTSA 019177

Process Description/Steps	Potential Failure Mode	Potential Effects of Failure	S.N.C.	Potential Causes of Failure	D.A.C.	Control Controls	S.P.A.	Standard Action	App/Individual Responsible	ACTION TAKEN	C.C.	P.P.	T.C.
FUNCTION TEST FURNACE SERVICE	CRACKED BOND	VIOLATION OF CRACKER BONDING INTERNAL CORROSION	1	POORLY MIXED CONCRETE WORN CRACK DIE WORN CRACK DIE	1	CRACK TO A STOP FROM SOME FUNCTION SECTION FRAGMENTATION FLOOR. SEE LINE SERVICE TIEBAR ETC CRACK BONDING ETC CRACK TO A STOP FROM SOME FUNCTION SECTION FRAGMENTATION FLOOR.	1	1P					
	CRACKED BOND	INTERNAL CORROSION	1	WORN CRACK DIE WORN CRACK DIE WORN CRACK DIE	1	CRACK TO A STOP FROM SOME FUNCTION SECTION FRAGMENTATION FLOOR. SEE LINE SERVICE TIEBAR ETC CRACK TO A STOP FROM SOME FUNCTION SECTION FRAGMENTATION FLOOR.	1	1P					
	CRACKED BOND	INTERNAL CORROSION	1	WORN CRACK DIE WORN CRACK DIE WORN CRACK DIE	1	CRACK TO A STOP FROM SOME FUNCTION SECTION FRAGMENTATION FLOOR. SEE LINE SERVICE TIEBAR ETC CRACK TO A STOP FROM SOME FUNCTION SECTION FRAGMENTATION FLOOR.	1	1P					
FUNCTION TEST FURNACE SERVICE	CRACKED BOND	INTERNAL CORROSION	1	WORN CRACK DIE WORN CRACK DIE WORN CRACK DIE	1	CRACK TO A STOP FROM SOME FUNCTION SECTION FRAGMENTATION FLOOR. SEE LINE SERVICE TIEBAR ETC CRACK TO A STOP FROM SOME FUNCTION SECTION FRAGMENTATION FLOOR.	1	1P					

TI-NHTSA 019178

Subject/Model: Sound Control Electronics Products Search
 System Responsibility: Stephen R. Duffler
 Other Name: [Blank]

Supplier and Plant Affinity:
 Model Part/Specification:
 Engineering Release Date:

Approved for Issues Management by:
 FMEA Date: 02/09/82 (Date)

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	S C I L	Potential Causes of Failure	D C C	System Identification	S C I L	Recommended Actions	Date/Individual Responsible & Completion Date	ACTION RES					
										W C I L	W C I L	W C I L	W C I L	W C I L	
SP BIAS (2777) A capacitor base assembly 1 screw assembly adds a surface for part maintenance code met environmental require- ment and conducted as device	Fails to hold base to screw assembly	Breaks with rotation Cracked base Shifts to negative low base torque withstand	7	Copper assembly of screw base not specified Improper assembly on screw base Insufficient material specified	3	Supply, Thermal Cycle, Base Holder, and Insulation Repair Code	1	21							
	SP capacitor si- milar	Improperly identified parts on BBA	5	Geometry/Flammability not properly specified Wrong material spec- ification	3	Cellar code Environmental tests	1	15	Potential problems on fully tested and analyzed were not noted during over- or under-testing						
	Inhibits to with- stand environment	Corrosion causes electrical migration, loss of electrical protection, which eventually falls off screw illegible coding	7	Wrong material spec- ification for plating in application	3	Environmental tests	3	7							

TI-NHTSA 019179

Reference: Special General Inspection Procedure Letter
Design Engineer: Mr. Stephen R. Gifford
Other Design Engineer:

Supplier and Plant Reference:
Material Specification:
Inspection Reference:

Prepared by: [Name]
Date: 10-19-77

Part Name, Number & Identification	Proposed Failure Mode	Functional Effects of Failure	R C P I C	Severity	Probability of Failure	D C E	Design Work Item	D P C	Inspection Point	Design/Technical Responsibility & Completion Date	ACTION	RES	RE S U L T	TE C H N I C A L
SR (SR46) system a system of aluminum rods, levers, and pivots which function as an actuator of electrical relays. The electrical elements of the system are mounted on a common support structure. The electrical elements of the system are mounted on a common support structure. The electrical elements of the system are mounted on a common support structure. The electrical elements of the system are mounted on a common support structure. The electrical elements of the system are mounted on a common support structure. The electrical elements of the system are mounted on a common support structure. The electrical elements of the system are mounted on a common support structure. The electrical elements of the system are mounted on a common support structure. The electrical elements of the system are mounted on a common support structure.	Fails to properly locate electrical contacts	Contacts out of position	1	1	Insufficient clearance between electrical contacts and electrical contacts	1	Comparison with drawings of similar SVE product	1	25	Review alternate design concepts				
	Fails to properly locate electrical contacts	Contacts will not operate properly when lever is moved	5	1	Insufficient lead-in clearance between electrical contacts and lever	1	Review with assembly department designers to determine correct dimensions and lead-in	1	5					
	Fails to properly support the electrical contacts	Contacts may vibrate or be loose (causing electrical contact loss)	7	1	Insufficient material specified	1	Comparison with design of similar SVE product	1	7					
	Insufficient material in lead-in	Leads vibrate	7	5	Incomplete understanding of nature of vibrating structure	5	Comparison with design of similar SVE product	5	178	Stability evaluation which may lead to redesign of design modifications				
	Excessive leakage between electrical contacts	Clutch of speed control system not disengage	7	1	Low production resistance (insufficient material specified)	1	Comparison with design of similar SVE product	1	1	Stability evaluation				
	Fails to properly locate electrical contacts	High current leakage High voltage drop Arcing or inoperative contact action	9	1	Insufficient material specified Poor solder joint design i.e. will cause loss of contact	1	Comparison with design of similar SVE product	1	1	Stability evaluation				
	Fails to properly locate electrical contacts	Shift in actuation Erratic or inoperative switch	7	1	Design of the reference surface Insufficient of outer design dimension from the plane of the reference surface Insufficient clearance specified between contact surfaces	1	Comparison of flatness on print Analyze this surface to provide location of other elements Interference check analysis	1	23					
	Excessive compression of electrical contact	Insufficient compression may lead to loss of contact Excessive compression may prevent switch from resetting correctly to operate assembly	5	1	Insufficient material specified	1	Review of material used in design Comparison to similar products Flattening specified on print	1	27					
	Fails to properly locate electrical contacts	Too large and causes difficulty in assembly, both cranking, or prevent switch from resetting in service Too small provides no effective pressure against contact surfaces	5	1	Design of lever force may be insufficient	1	Calculation and comparison to determine limits of size Interference check analysis	1	18					
	Fails to provide adequate clearance for wiring	Runs loose or insufficient contact alignment Not spaced	7	1	Insufficient design of frame for wiring	1	Comparison with design of similar SVE product	1	7	Review with design department				
Wiring electrical connector does not fit properly	Connector difficult to install Connector falls off	7	1	Connector geometry improperly specified	1	Review of dimensions relative to mating connector parts	1	7						
Wiring electrical connector does not fit properly	Ignored of mating lead which causes connector difficult to install and/or falls off	5	1	Connector geometry improperly specified Insufficient material specified	1	Review of dimensions relative to mating connector parts Material evaluation	1	23						

TI-NHTSA 019180

Subcomponent: Speed Control Switchable Pressure Switch
 Design Responsibility: Stanley R. Miller
 Date: 02-07-1972

Supplier and Plant Offsets:
 Ford Motor Company
 Dearborn, Michigan 48116

Prepared by: Texas Instruments Inc.
 P.O. Box 000001 75000

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	S.C.F.C.	Potential Causes of Failure	Failure Mechanism	D.P.C.	Proposed Action	Assign Individual Responsibility & Completion Date	ACTION REQUIRED				
									W	O	C	F	
SWITCH FOR CHARGE transfers disc action to new air stream/old contact switch electrical compo- nent from which trouble	Failure to properly transfer disc action	Contacts stuck open Contacts stuck closed Breaks operation	5	Discrimination, insufficient Contact fragments allow air to leak	1 Tolerances standing between pins and contacts in use Check with supplier for material specifications re. clips	1							
	Failure to transfer	Continuity between switches terminal and leading to ground	5	Wrong material specified	1 Check with supplier for material specifications Check with customer for electrical layout of assembly terminal	1	Check with Ford to find out manufacturing process of mounting such on ground from available terminal						

TI-NHTSA 019181

Department: **Speed Control Technology** **Freeman Curtis**
 Design Responsibility: **William R. Miller**
 Date: **June 1953**

Location and Flight Mission:
 Type: **Propeller**
 Designing Engineer: **Miller**

Prepared by: **Tommy [unclear]**
 Date: **June 1953**

Part Name, Number & Description	Proposed Failure Mode	Potential Consequences of Failure	C. P. No.	Criticality	Potential Cause(s) of Failure	D. C. No.	Design Verification	D. P. No.	Recommended Action	Person/Initials Responsible & Completion Date	ACTION TAKEN				
											When	How	By Whom	When	
REVERSE. ENG. (7407) Speed increase of motor to disk carrier causes friction to aid in mounting tape carriage	Compression under screw heads	High moment loads High stall-wait time Erosion or incomplete finish operation	1		Sizing thickness to specified tolerance Lubricate or grease not specified Inspect material	1									
	Sizing screws too small	Purchased as indicated by S & A, service personnel		1		Sizing thickness to properly specified	1								
							Review of standard practices for screw design Check with paint manufacturer Comparison of design with similar product								
							Review of standard practices for screw design Compare to vendor listing Comparison of design with similar product								

TI-NHTSA 018182

Form 700P

Rev. 12-15-73

Under Review Only - No Analysis

Page 1 of 1

Substation/Device: Speed Control Switchgear Pressure Switch
 System Description: Station A 400V
 Date Issue: 10/1/73

Supplier and Plant Affected:
 Plant Name: [Redacted]
 Equipment Name: [Redacted]

Prepared by: [Redacted] (sa)
 Date: 10/1/73

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	FMEA	C	Potential Cause(s) of Failure	S	Effect Description	S	P	Recommended Action	Area/Individual Responsible & Completion Date	ACTION			RESULTS		
												Priority	Severity	Occurrence	Completion	Test	Pass	Fail
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Alarm and audible warning	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Comparison of design with similar product	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								
7 02001 and 22012 valve assemblies which are pressure sensitive	Failure to provide a suitable pressure for drive	Loss of pressure Reduced drive motor life	9	1	Valve will chime when pressure is insufficient	1	Intermittent electrical specification	1	7								

TI-NHTSA 019183

Submitted to: Ford General Motors Vehicle Division
 Design Responsibility: Stephen E. Miller
 Other Names Involved:

Analysis and Planning: MTC/DBL
 Initial Design/Analysis:
 Engineering Release Dates:

Prepared by: James Cunningham, L.
 (208) 226-0720 (208) 226-0720

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	Severity	Potential Causes of Failure	Occurrence	Design Alternative	D.C.	P.F.	Functional Section	Part/Individual Responsibility & Completion Date	ACIDA Score	SEV	DET	OC	PL
EC (2400) Vehicle suspension and steering mechanism of front left to right frame Component is defective and service life of device	Failure to activate control valve at the proper point in assembly	WV. void loss	5	WV material improperly specified Dbr's and sp's improperly specified	1	Change material specification Change design with similar problem	1	5							
	WV activation and/or release sequence change adversely over life	Shift in device operation over life	7	WV material improperly specified WV hardware improperly specified	5	WV material specification WV and hardware specification	5	25							
	Service life shorter than customer requirements	WV shift in operation over life WV operation - not correct	7	WV material improperly specified WV hardware improperly specified	5	WV material specification WV and hardware specification	5	25							

TI-NHTSA 019184

Recommendations: Speed Control Switchman Features Added
 Safety Switches for Switch B. GVWiler
 Other Items Reviewed:

Equipment and Plans Affected:
 Part: 200-101 (200-1)
 Subcontract Release Date:

Designed by: James H. [unclear]
 Part Name: [unclear]

Ref. Item, Feature & Description	Potential Failure Mode	Potential Effects of Failure	Priority	Potential Causes of Failure	Control Description	Preventive Action	Operator Instruction or Caution Note	ACTION REQUIRED	REMARKS	DATE	BY
20 (200-101) Safety switches and relays on assembly of switch lanes in applied frame - prevent in defining safe service life of device	Failure to operate under voltage in the proper sequence or assembly	Safe - shield loss	5	Not specified properly specified Wiring and test's not properly specified	1. Interconnection 2. Comparison of design with similar product						
	Short protection and/or voltage exceeding design requirements under life	Safe to device operation over life	7	Not specified properly specified Not test-test specified Wiring not specified properly specified	3. Insulation testing 4. Wire and post-connection test						
	Service life shorter than expected re-assembly	Service life in compliance with life Wiring temperature - non-adequate	7	Not specified properly specified Not test-test specified Wiring not specified properly specified	5. Insulation testing 6. Wire and post-connection test						

Handwritten note: 200-101 (200-1)

CONFIDENTIAL

TI-NHTSA 018186

Subcontractor: Sand Control Damppage Pressure Switch
 Design Responsibility: Charles B. Miller
 Date: 08/14/72

Supplier and Plant Affected:
 Model: 2000-1000-1000
 Instrumentation Division

Prepared By: Tomo Tsubokawa
 PWS Date: 08/17/72 (Sheet)

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	C o n s e q u e n c e	P o t e n t i a l C o n s e q u e n c e	D e t e r m i n e d C o n s e q u e n c e	S e v e r i t y	R e s t r i c t e d S e c t i o n	How/Individual Responsible Completion Date	A C T I O N I T e m s T a k e n	C o m p l e t e	C o m p l e t e	C o m p l e t e	C o m p l e t e	
														1	2	3	4	5	6	7	8	9
WHEAT (2125) is flexible element of a pressure switch where pressure from fluid compressive element	Fracture on contact plate	Break fluid element	7	<p>Complete rupture will lead due to in- crease damage of negative element</p> <p>Complete rupture will lead due to com- paction element</p> <p>Complete rupture will lead due to in- crease damage of negative element</p> <p>Complete rupture will lead due to in- crease damage of negative element</p> <p>Complete rupture will lead due to in- crease damage of negative element</p>	1	1	<p>Have, replace, and inspect. Check tests</p> <p>Inspect w/1. re- production</p> <p>Correction of de- sign with similar products</p>	9	Make sure the "Oc- currence of 1 is based on a large amount of fluid pressure in a single product, rather than pressure in separate re- production					
	Change in size of pressure transfer plate	Change in pressure transfer plate	7	<p>Excessively tight discharge valve</p> <p>Excessively loose discharge valve</p>	1	1	<p>Life span of discharge valve is shortened</p>							
	Excessive change of pressure transfer plate	Excessively high pressure transfer plate, with sign of expansion that in compressibility of lower pressure	7	<p>Excessively tight discharge valve</p> <p>Excessively loose discharge valve</p>	1	1	<p>Form and pressure transfer deflection testing is cal- culation effective area</p>							

TI-NHTSA 019186

Subcontractor: General American Process Switch
 Design Responsibility: Stephen E. Miller
 Other Design Involvement:

Analysts and Design Affected:
 Daniel K. Hinkle
 Engineering Release Name:

Prepared by: Team Engineering Inc.
 PCH Data Center 10/17/72 (Rev. 1)

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	C C L P	O C C	Potential Causes of Failure	D C C	S C C	S C C	Recommended Actions	Responsible Person & Completion Date	ACTION				
											1	2	3	4	5
<p>WASHER (2000)</p> <p>severe pressure from fluid in discharge) in a force on surrounding disc</p> <p>could alternate and correct disc</p> <p>within a portion of the outer surface for discharge</p> <p>within disc surface during pressure (over/under)</p> <p>at its maximum pressure when loading from effect of rotation</p>	<p>Falls to correctly position fluid pressure in disc</p>	<p>Shift in supports</p>	7		<p>Material S.D. improperly specified relative to washer I.D.</p> <p>Geometry under S.D. improperly specified relative to washer I.D.</p> <p>Geometry thickness improperly specified</p> <p>Improper material specified</p>	1	1	1	<p>Failure modes analysis</p> <p>Stress/strain analysis to determine strength and resistance to elastic deformation</p> <p>Dist. tension and Thermal Cycle tests</p>						
	<p>Falls to properly align and correct disc</p>	<p>Lesser tolerances allow misalignment which may cause shift in supports or create stresses</p> <p>Disc out-of-plane relative to support may cause stresses on disc or impeller (axial, which over/under)</p>	6		<p>Material S.D. improperly specified relative to washer I.D.</p> <p>Geometry under S.D. improperly specified relative to washer I.D.</p> <p>Disc supports have improper alignment</p> <p>Disc supports will improperly align</p>	3	1	1	<p>Failure modes analysis</p> <p>Comparison of design with similar product</p>						
	<p>Falls to properly correct diameter</p>	<p>Reduced diameter life results in leakage</p>	7	C L P	<p>Contents of support in support with diameter are specified incorrectly</p> <p>Condition of support in support with diameter are specified incorrectly</p> <p>Clearance between support ring and washer I.D. are specified too wide</p>	3	1	2	<p>Dist. tension and Thermal Cycle tests</p> <p>Comparison of design with similar product</p>						
	<p>Falls to properly correct disc during operation</p>	<p>Disc deformation results in shift in support</p> <p>Reduced disc life</p> <p>Reduced disc travel if disc center is restricted progressively</p>	7		<p>Support which control disc motion during compression are improperly specified</p>	1	1	2	<p>Dist. and over/under characteristics</p> <p>Pressure-deflection characteristics of disc motion</p>						
	<p>Disc not used properly</p>	<p>Shift in supports over time</p> <p>Reduced disc travel</p>	7		<p>Disc hole improperly specified</p>	1	1	1	<p>Comparison of design with similar product</p> <p>Improper design characteristics</p>						

TI-NHTSA 019187

LA 50007 7/27/62

Vol. 10-58 On 02-07-1962

Subject: Small Speed Control Mechanism Pressure Switch
 Design Engineer: Stephen R. Givler
 Chief Design Engineer:

Design Failure Mode and Effect Analysis
 Summary and Flange 888... of
 Model 1000-100000000
 Engineering Release Form

Prepared by Yvonne Longmire
 IBM Date 02/07/1962

Part Name, Number & Description	Functional Failure Mode	Functional Effect(s) of Failure	S. N. O.	C. P. C.	Functional Category of Failure	O. V. O.	Design Use Conditions	D. F. N.	Recommended Action	Person/Individual Responsible & Completion Date	ACTION REQUIRED				
											Failure Taken	A	S	C	P
PRESS CYLINDER Model 1000-100000000 Allow transfer of pressure caused by disc and annular	Failure to permit disc to rotate freely	Disc's life shortened over life Reduced disc life	7		Insufficient material specified Insufficient clearance specified	1	Design and Thermal Cycle tests Pre- and Post-life characterization Laboratory checks conducted	1	7						
	Failure to allow rotation	Disc's life shortened over comp. Reduced disc wear action	7		Disc hole insufficiently specified	1	Comparison of design with similar models Engineering check conducted	1	7						

TI-NHTSA 018188

Advantage/Item: Speed Control Switchgear Pressure Switch
 Failure Mode/Effect: Pressure Switch Failure
 Cause/Effect: Pressure Switch Failure

Detail Failure Mode and Effect Analysis

Function and Purpose: Switchgear Pressure Switch
 Failure Mode/Effect: Pressure Switch Failure
 Engineering Release Date:

Prepared by: Team Instruments Inc.
 RSH Date: 06/80 (Rev. 0)

Part Name, Number & Description	Functional Failure Mode	Potential Effects of Failure	S.F.	P.F.	D.F.	Failure Mode/Function	Frequency	Consequences	Preventive/Protective Measures	Actions	Failure Rate	R	P	D	E	C	S	W
Pressure Switch	Fails to operate	Delayed discharge life expectancy	3	3	3	Operator of discharge system must manually operate	1	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate							
Pressure Switch	Fails to allow discharge	Loss of pressure	3	3	3	Operator of discharge system must manually operate	1	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate							
Pressure Switch	Operates on non-pressure	Loss of pressure	3	3	3	Operator of discharge system must manually operate	1	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate							
Pressure Switch	Operates on non-pressure	Loss of pressure	3	3	3	Operator of discharge system must manually operate	1	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate							
Pressure Switch	Fails to interface correctly with	Loss of pressure	3	3	3	Operator of discharge system must manually operate	1	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate							
Pressure Switch	Fails to allow	Loss of pressure	3	3	3	Operator of discharge system must manually operate	1	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate	Operator of discharge system must manually operate							

TI-NHTSA 019189

Subsystem/Device: Speed Control Switchgear Pressure Switch
 Design Responsibility: Stephen E. O'Neil
 Other: Speed Switchgear

Signature and Title Affected:
 Fred Egan/Systems/Dept
 Continuing Release Sheet

Prepared by: Texas Instruments Inc.
 P.O. Box 649701 DALLAS TEXAS 75264

Part Name, Number & Description	Functional Failure Mode	Functional Effect(s) of Failure	FMEA No.	Functional Category of Failure	D.C.C. No.	Failure Description	D.P.C. No.	Environmental Conditions	Apparent/Logical Reasonable & Duplicate Mode	ACTION	REMARKS	DATE	BY	
SP SWITCH Speed Switch total pressure out and diaphragm	Weld in pinhole through fluid seal	Welds Fluid leakage	1	Loss of speed control operation May contribute to pressure regulation leading to displacement from orbit Loss of speed control leading to displacement from orbit Loss of speed control when speed up Loss of speed control when speed down Loss of speed control when speed up Loss of speed control when speed down	3	Failure of speed control design principles Manufacturer's recommendations Part, material, and thermal cycle cases Comparison with history of similar systems	2	22						

TI-NHTSA 019190

Subcontractor: Ford Central Engineering Services, Detroit
 Project: Douglas S. Offiler
 Motor Drive Location:

Location and Quantity Affected:
 Motor Drive Location
 Engineering Release Date:

Prepared For: Ford Instrument Dept.
 Part Name: 6840-2000
 Drawn:

Part Name, Number & Description	Functional Failure Mode	Potential Impact of Failure	Criticality	Potential Causes of Failure	Failure Mechanism	S. N. C. P.	S. N. C. P.	Preventive Action	Appropriate Inspection & Control Plan	ACTION REQUIRED	P. I. C. P.	P. I. C. P.	P. I. C. P.
WIRE HARNESS (2000) with electrical assembly approx. with distributor cable	Walls on assembly increase electrical resistance	System appears open-circuited Intermittent operation High millivolt drop	3	Control material specified for this assembly cannot tolerate electrical contact Contamination Assembly material specifications not specified	Splice off of preliminary and general assembly design info Reference notes for purpose of material location	1	20						
wires electrical path from system to wiring													
wires cover of electrical cabinet in system													
wires routing to engine cooling and therefore ice collection over time													
wires & cables to engine in engine bay in a similar area													
	Walls to ground of engine compartment	High resistance about or high millivolt drop	3	Insulating material specified	Splice with common Ford manufacturer practice	1	4						
	Insulators attached to wiring	Shift in impedance over life Abrasive operation Open circuit	3	Insulating material specified Insulating material specified	Manufacture recommendations Comparison with design of similar products	1	20	Check about distributor cover area when for potential deterioration	None Offiler from 7-2-9				
	Calculation shift	Shift in impedance	3	Insulating material specified Insulating material specified	Manufacture recommendations Comparison with design of similar products	1	7						
	Insulating force concentration	High millivolt drop	3	Insulating material specified Insulating material specified	Manufacture recommendations Comparison with design of similar products	1	15						
	Insulating force concentration	Shift in impedance over life	3	Insulating material specified Insulating material specified	Manufacture recommendations Comparison with design of similar products	1	20						

Subcommittee on General Control, Transportation Finance Branch
 Senate Committee on Finance
 U.S. Senate Building

Bridge Safety Study and Report
 Highway and Street Closures
 State Department
 Highway Safety Bureau

Prepared by: James [unclear] Inc.
 2225 [unclear] [unclear] [unclear]

Part Name, Number & Description	Functional Failure Mode	Potential Effects of Failure	C	I	P	Potential Causes of Failure	D	S	System Modification	C	I	P	Recommended Action	Approximate Completion Date	ACTION		
															W	H	T
22 0670 sign warning to vehicle when after a heavy impact the structural and spring of support structure maintain correct fit.	Falls to adequately support spring or possible vertical	Driver reaction about state of road Driver falls off vehicle inverted	C	I	P	Insufficient shock absorber for given axle mass Insufficient shock absorber for given material characteristics Insufficient load axle Insufficient vehicle frame Insufficient material	C	S	Shock absorbers non-functional Comparison with similar systems Testing to determine impact to retain spring	C	I	P					
	Insufficient force between spring and vehicle chassis	High resistance or an open circuit in connection of spring and vehicle chassis				Insufficient shock absorber for given axle mass Insufficient shock absorber for given material characteristics Insufficient load axle Insufficient vehicle frame Insufficient material			Shock absorbers non-functional Comparison with similar products Testing to determine impact to retain spring								

TI-NHTSA 018192

Subcontractor: Ford Control Instruments Pressure Switch
 Model Number: 11111111111111111111
 Part Name: Pressure Switch

Supplier and Stock Number:
 Part Name: Pressure Switch
 Part Number: 11111111111111111111

Prepared by: [Name]
 Date: [Date]

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	Failure Mode	Failure Mechanism	Severity	Occurrence	Detection	Preventive Action	From/Individual Responsible & Completion Date	ACTED	W	C	D	T	S
11111111111111111111 within electrical path from side contact to movable contact within battery to battery & circuit pin when movable contact when jumper for assembly is movable contact in die overtravel when force is open contact	Low electrical force	High electrical drag across movement	5	Insufficient geometry specified Insufficient material specified	3	3	None detection or action Form/Deflection testing								
	High electrical force	Shift in assembly Die marking over life	7	Insufficient geometry specified Insufficient material specified	2	2	None detection or action Form/Deflection testing								
	Failure to provide electrical conductivity	High resistance shown as high electrical drag	5	Insufficient material specified Insufficient cross-section area	1	1	Calculation of electrical resistance using $R = \rho L / A$ Testing								
	Failure to separate assembly with transfer pin	Binding failure over life Shift in assembly over life Cracking cracks pin contact intermittent operation	7	Insufficient height of feature specified Inadequate shape of feature specified Improper position of feature specified	3	3	Comparison of design with similar product Dimension and tolerance analysis Special measurements Testing								
	Failure to provide adequate clearance for movable contact	Interference or erratic operation Open circuit	7	Wide tolerances (imprecise specification) Flattened components	1	1	Short qty. recovery failures Comparison of design with similar product Testing								
	Failure to adequately locate movable contact relative to stationary contact	High electrical drag over life Excessive contact pressure over life	7	Wrong geometry (imprecise specification)	3	3	Dimension and tolerance analysis Testing								
	Failure to properly attach to movable terminal	Breaks or intermittent operation Shift in assembly Open or short circuit	7	Wrong hole alignment (imprecise specification) Flattened components Change of feature while in process	7	7	Short qty. recovery failures Comparison of design with similar product Testing	Specify alternate mounting options, such as welding technique	Part failure, Qty. Exp. supplier						
	Failure to allow overtravel	Shift in assembly Die marking Surface deterioration of assembly Pin alignment	7	Insufficient geometry specified Improper material specified	3	3	None detection or action Form/Deflection testing								
	Insufficient force on wire contacts	Insufficient pressure on mechanical contacts Short circuit	1	Insufficient geometry specified Insufficient material specified	3	3	None detection or action Form/Deflection testing								
Insufficient force to open contacts	Shift in assembly Die marking Surface deterioration of assembly Pin alignment	7	Insufficient geometry specified Insufficient material specified	3	3	None detection or action Form/Deflection testing									

TI-NHTSA 019193

Administrative: Ford General Dynamics Systems Subcontract
 (Under Support) (Type) (Status) (Date)
 (Other Name) (Number)

Revision and Change History
 (Initial) (Date) (Description)
 (Engineer) (Design) (Status)

Prepared by: (Name) (Organization)
 (Title) (Date) (Version)

Part Name, System & Description	Potential Failure Mode	Potential Effects of Failure	Severity (S)	Occurrence (O)	Detectability (D)	Design Verification	Preventive Action	Responsible Person	Completion Date	REVISION	DATE	BY	CHK	
(Title) (Type) (Status) (Other Name) (Number) (Other Name) (Number) (Other Name) (Number) (Other Name) (Number) (Other Name) (Number) (Other Name) (Number)	Four interconnections	Welds fracture near circuitry or nearby connector (overload)	5	1	1	Outline/Manufacturing of brass blades Material specified too thin	Review design and dimensions of solder connector to ensure proper interconnection and solder action							
	Single connection in wrong location	DIFFICULT to install wiring harness	5	1	1	Location of connection on harness not clearly defined Material specified too thin	Review design and dimensions of wiring harness Coordinate with design of similar DFR product							
	Failure to provide adequate electrical contact	Welds fracture near circuitry or nearby connector (overload)	5	1	1	Welder lacks experience Insufficient electrical specification Coordination	Review all TI primary and secondary contact design data Establish code for location of contact location							
	Excessive loss of contact surface (on connector)	Shifts in sequence over life	3	1	1	Welder lacks experience Welder location specified too soft	Review all TI primary and secondary contact design data Life testing							
	Welds in sequence over life	Shifts in sequence over life (intermittent or no connection)	3	1	1	Insufficient electrical specification for wire Change electrical loading	Review all TI primary and secondary contact design data Design and testing with electrical characteristics							
	Welds in sequence over life	Welds in sequence over life	5	1	1	Design is over-stress Design has excessive temperature Material problems in (overstress) operation Design has temperature strength in (overstress) operation over life Pre-matured particles in weld area cause diffusion and an increase	Thermal analysis/ FEM analysis Pre-qualification/ accelerated testing Testing with actual production material over sequence							
	Welds in sequence over life	Welds in sequence over life	5	1	1	Insufficient understanding of design of stacking features	Comparison of design with similar SWS product Stacking evaluation							
	Welds in sequence over life	Welds in sequence over life	5	1	1	Improper dimensions and tolerances specifying between plate and terminals Improper plating design process	Comparison of design with similar SWS product							
	Welds in sequence over life	Welds in sequence over life	5	1	1	Insufficient electrical specification Insufficient over-stress test	Comparison of design with similar SWS product Testing							

TI-NHTSA 019194

Administrative and Control Systems Primary School
 School Name:
 School Address:
 School City:

Operator and Plant Operator
 Plant Name:
 Plant Address:

Prepared by:
 Date:

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	C	O	E	Potential Causes of Failure	S	F	D	M. E. C.	Recommended Actions	Responsible Person/Completion Date	ACTION						
													Initiated	Detected	Reported	Corrected	Prevented		
PIPE COUPLER - Max 1.5 inches in wall Face per 200 2110	Walls to seal	Leakage of brake fluid	1	1	1	Improper material selection Leakage material specification Improperly specified material property Incorrect structure	1	1	1	1	1								
Walls prevent leakage for installation from existing part Walls may fracture for 1" or less Walls fluid passage in pipe system otherwise Walls used for internal part Walls flange which determine with other components in a pressure-retaining structure																			
	Walls or structure failed in existing part	Damage done to existing part during installation Does not allow installation	7	7	7	Threads specified incorrectly Threads not good per 200 200's Flaking hidden	7	7	7	7	7								
	Approach, install, but fails to engage by some red seal	Brake fluid leakage	7	7	7	Threads specified incorrectly Threads not good per 200 200's Flaking hidden	7	7	7	7	7								
	Approach too tight	Damage to hot face during approach 6.25" approach does not fit	5	5	5	Hot flange interference resulting in insufficient clearance	5	5	5	5	5								
	Flange engages in too small	Blindfold signal from motor is delayed or, pressure signal essentially or very low Failure to machine to foreign matter	7	7	7	Improper size of fluid passage specified Improper grade of fluid threaded over this	7	7	7	7	7								
	Flange engages in too large	Function this will cause common leakage - during installation - during operation	7	7	7	Flange engaged incorrectly Leakage	7	7	7	7	7								
	Flange to seal internal under properly	Leakage of brake fluid	7	7	7	Flange dimension improperly specified Flange dimension improperly specified Flange property not properly obtained	7	7	7	7	7								
	Flange fails to mate properly with other components of pressure vessel	Max. gap large results in assembly difficulties Min. gap small results in hot impingement alignment Flange too thick results in poor mating Flange too thin results in reduced burst capacity Leakage edge chamfer results in pipe assembly which leaks under stress	7	7	7	Improper or incomplete specification of dimensions and tolerances	7	7	7	7	7								
	Flange not safe to use	Leakage of brake fluid Damage done during installation or subsequent service Threads prove to be weak, leads to assembly difficulties	7	7	7	Improper material selection	7	7	7	7	7								
	Flange not safe	Leakage of brake fluid to tank	7	7	7	Improper material selection	7	7	7	7	7								
	Flange not safe	Leakage	7	7	7	Improper material selection	7	7	7	7	7								
	Insufficient maintenance or inspection	Long term creep stress Failure of any area which leads to leakage or fracture Corrosion problems	7	7	7	Improper or insufficient material specification	7	7	7	7	7								

TI-NHTSA 019195

Part Name, Number & Description	Functional Failure Mode	Potential Effects of Failure	SEV	CAUSE	Potential Original Cause of Failure	D C E	P C E	D C E	E C E	Recommendation	Responsibility	Completion Date	ACTION			
													Steps Taken	R	C	P
With... with... with... with...	Power transmission Mechanical Electrical	... ... ... ...	5 5 5 5	C C C C	... ... ... ...	3 3 3 3	1 1 1 1	15 5 5 5								
with electrical path from...	Short or open ground connection	... ... ...	9	C T C	... ... ... ... ... ... ...	9		90		Identify alternate...	John... ...					
...	Loss of... ... ...	... ... ...	7	C	... ... ... ... ...	7		70		... ... ...					
... ... ... ...	... ... ... ... ...	... ... ... ... ... ... ...	5 5 5 5 5	C C C C C	... ... ... ... ... ... ...	1 1 1 1 1		5 5 5 5 5		... ... ... ... ... ... ...					

TJ-NHTSA 019198

File No: W0000

of 15-27 to 02-07-1952

Subject: **United States Government**
United States Government
United States Government

Project: **United States**
United States
United States

Form: **Form 100-100**
Form 100-100

Item No., Name & Description	Material	Quantity	Unit	Remarks	Spec. No.	U. S. No.	Classification	Item/Location	Remarks	U. S. No.	U. S. No.	U. S. No.	U. S. No.
<p>Provide a copy of the...</p> <p>Provide a copy of the...</p> <p>Provide a copy of the...</p> <p>Provide a copy of the...</p> <p>Provide a copy of the...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>
<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>
<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>
<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>
<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>	<p>...</p>

TI-NHTSA 019197

CONFIDENTIAL

File No: 70-100

and on 11/13/68 at 02:00 PM

Subject: James Earl Ray

Source: Special Agent [Name] Bureau [City]
 Date: [Date] [Time] [Location]

Report made by [Name]
 Title: [Title]
 Reference: [Reference]

Report No: [Number]
 Date: [Date]

Part No. and Description	Material	Quantity	Unit	Material	Unit	Material	Unit	Material	Material	Material	ACTION						
											Material	Material	Material	Material			
...
...

CONFIDENTIAL

TI-NHTSA 0181988

Generalized Load Control Structure Process Failure
 Failure Mode: (1) Design & Analysis
 (2) Design & Analysis

Number and Place of Occurrence:
 Total: 11
 Distribution: 11

Formed by: Great Industries Inc.
 Form No. 6000-1 (Rev. 1-64)

Part Name, Number & Description	Functional Failure Mode	Potential Methods of Failure	FMEA No.	Potential Causes of Failure	FMEA No.	Design Modification	FMEA No.	Recommended Action	Responsible Department	Completion Date	ACTION						
											Assign Action	P	S	D	R		
Control Valve Provides a hydraulic seal between the two shafts	Leaks on seal	Leakage of brake fluid	1	Incorrect seal Friction seal Incorrect seal Improperly applied of seal Seal groove	1	Check each of dimensions on seal material	1										
Provides pressure relief for hydraulic lines and hose port	Leaks on pressure relief in working position	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
Provides fluid passage to provide hydraulic circuit	Leaks on pressure relief in working position	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
Provides large shaft diameter with other components to form pressure-transmitting structure	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										
	Seal groove is under load during installation Does not allow installation	Seal groove is under load during installation Does not allow installation	2	Seal groove not correct Seal not seated in seal groove Flaking seal	2	Check each of dimensions on seal material	2										

CONFIDENTIAL

TI-NHTSA 018189

Laboratory of Naval Control Structures Process Report
Swamp Construction of Common B. 2010
John Army (unclassified)

Landing and Marine Operations
2nd Marine Division
Marine Corps Base Camp Pendleton

Prepared by: Louis (unclassified)
John Army (unclassified) (unclassified)

Part No., Name & Description	Typical Failure Mode	Proposed Alternatives of Failure	Criticality	Proposed Control of Failure	Design Considerations	Frequency	Measurement System	Approved/Inspected/Contractor Date	ACTION	RES	CFR	ST
71-NHTSA 019200	Failure of ...	Failure ...	6	Failure ...	Failure ...	1						
	Failure of ...	Failure ...	5	Failure ...	Failure ...	1						
	Failure of ...	Failure ...	6	Failure ...	Failure ...	1						
	Failure of ...	Failure ...	6	Failure ...	Failure ...	1						
	Failure of ...	Failure ...	7	Failure ...	Failure ...	1						
	Failure of ...	Failure ...	5	Failure ...	Failure ...	3						
	Failure of ...	Failure ...	7	Failure ...	Failure ...	1						
	Failure of ...	Failure ...	5	Failure ...	Failure ...	3						
	Failure of ...	Failure ...	7	Failure ...	Failure ...	3						
	Failure of ...	Failure ...	7	Failure ...	Failure ...	3						
	Failure of ...	Failure ...	7	Failure ...	Failure ...	3						
	Failure of ...	Failure ...	7	Failure ...	Failure ...	3						

CONFIDENTIAL

Page 2
Sheet 4

United States Government
Federal Aviation Administration
Washington, D. C. 20515

Engineers and Flight Crew
Federal Aviation Administration
Washington, D. C. 20515

Form No. 1 (Rev. 7-20-67)

Part Name, Number & Identification	Potential Failure Mode	Potential Effects of Failure	Potential Causes of Failure	Failure Mechanism	R. F. No.	Severity Rating	Recommended Action	Responsible Agency & Completion Date	ACTION			P. C. No.
									W	C	A	
<p>WHEEL (Main) (PART)</p> <p>Provides a means for supporting the aircraft on the ground.</p> <p>Provides a means for supporting the aircraft on the ground.</p> <p>Provides a means for supporting the aircraft on the ground.</p> <p>Provides a means for supporting the aircraft on the ground.</p> <p>Provides a means for supporting the aircraft on the ground.</p> <p>Provides a means for supporting the aircraft on the ground.</p> <p>Provides a means for supporting the aircraft on the ground.</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	1	15						
	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	1	15						
	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	1	15						
	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	1	15						
	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	1	15						
	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	1	15						
	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	1	15						
<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	<p>Failure to rotate wheel for takeoff and landing</p>	1	15							

TI-NHTSA 019201

CONFIDENTIAL

Subcontractor: Royal General Engineering Process Detail
 Design Responsible: Gordon K. Miller
 Date: 08/18/92

Location and Plant: Milwaukee
 Part Number: 019202
 Subcontract: Design Detail

Prepared by: Tomasz J. Jankowski, Inc.
 P.O. Box 60, West 92880

Part Name, Number & Description	Functional Failure Mode	Potential Effects of Failure	Potential Causes of Failure	Design Work Order	Severity	Occurrence	Detection	Recommended Actions	Responsibility	Completion Date	ACCOMPLISHED	DATE	BY	INITIALS	
019202 (019202) Propeller Control Valve Provides electrical path for variable control to variable control Provides feature to determine when transfer pin location variable control Provides feature for adjustment to variable control Allows shaft overtravel Provides feature to open overtravel	Low constant force	High shaft/shaft drop across shaft/shaft	Insufficient assembly specification Insufficient material specification	1. Shaft deflection or rupture Propeller/shaft coupling	1	10	1								
	High constant force	Shaft in operation May weaken over life	Insufficient assembly specification Insufficient material specification	1. Shaft deflection or rupture Propeller/shaft coupling	1	10	1								
	Fails to provide adjustment to variable control	High shaft/shaft drop at high shaft/shaft drop	Insufficient assembly specification Insufficient material specification	1. Collapsing of re- sistance spring in - shaft/shaft coupling	1	10	1								
	Fails to transfer variable control over life	Spring failure over life Shaft in operation over life Shaft/shaft transfer pin causes shaft/shaft separation	Insufficient height of shaft/shaft Insufficient strength of shaft/shaft Insufficient position of shaft/shaft	1. Collapsing of shaft- shaft transfer coupling Separation and mis- alignment shaft/shaft shaft/shaft shaft/shaft	1	10	1								
	Fails to provide sufficient strength for variable control	Insufficient or variable operation Shaft/shaft	Shaft elongation insufficiently specified Flawed materials	1. Shaft slip, rupture, failure Separation of shaft- shaft transfer coupling	1	10	1								
	Fails to absorb torque variable control	High shaft/shaft drop over life Shaft/shaft transfer pin causes shaft/shaft separation	Spring assembly in- complete, specified	1. Separation and col- lapsing shaft- shaft transfer coupling	1	10	1								
	Fails to transfer variable control over life	Shaft in operation Shaft/shaft transfer pin causes shaft/shaft separation	Shaft shaft dimension- ally insufficiently specified Flawed materials Height of shaft- shaft transfer coupling incorrect	1. Shaft slip, rupture, failure Separation of shaft- shaft transfer coupling	1	10	1								
	Fails to allow overtravel	Shaft in operation Shaft/shaft transfer pin causes shaft/shaft separation	Insufficient assembly specification Insufficient material specification	1. Shaft deflection or rupture Propeller/shaft coupling	1	10	1								
	Insufficient force to open overtravel	Insufficient position to maintain shaft/shaft Shaft/shaft	Insufficient assembly specification Insufficient material specification	1. Shaft deflection or rupture Propeller/shaft coupling	1	10	1								
	Insufficient force to open overtravel	Shaft in operation Shaft/shaft transfer pin causes shaft/shaft separation	Insufficient assembly specification Insufficient material specification	1. Shaft deflection or rupture Propeller/shaft coupling	1	10	1								

TI-NHTSA 019202

CONFIDENTIAL

Subject: James Earl Ray, General, American Professor, British
 Long Term Resident, Douglas E. Smith
 (See also Exhibit)

Subject: James Earl Ray, General, American Professor, British
 Long Term Resident, Douglas E. Smith
 (See also Exhibit)

Prepared by: James E. Smith
 File No. 44-1586-1022

Part, Name, Number & Description	Estimated Volume	Estimated Number of Pages	Estimated Cost of Reproduction	Estimated Number of Copies	Special Handling	Priority	Retention	Disposition	Responsible Agency	Start/Completion Date	ACRIS #	Other	Notes
1. James Earl Ray, General, American Professor, British Long Term Resident, Douglas E. Smith (See also Exhibit)	100	100	100	100	100	100	100	100	100	100	100	100	100
2. James Earl Ray, General, American Professor, British Long Term Resident, Douglas E. Smith (See also Exhibit)	100	100	100	100	100	100	100	100	100	100	100	100	100

CONFIDENTIAL

TI-NHTSA 019203

Investigation of the Central Intelligence Agency -
 State Department -
 State Department -
 State Department -

State Police File # 1 - 100-10000
 State Police File # 1 - 100-10000
 State Police File # 1 - 100-10000

Prepared by: [Name]
 Date: [Date]

Item No., Date & Description	Personnel Involved	Location of Activity	Type of Activity	Description of Activity	Status	Priority	Remarks	Disposition	ACTION				
									Completed	Assigned	Open	Other	
1. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					
2. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					
3. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					
4. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					
5. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					
6. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					
7. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					
8. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					
9. [Description]	[Name]	[Location]	[Type]	[Description]	[Status]	[Priority]	[Remarks]	[Disposition]					

CONFIDENTIAL

TI-NHTSA 019204

Product: [illegible]
 Part: [illegible]
 Rev: [illegible]

Location and Name of Component: [illegible]
 Drawing Number: [illegible]

Prepared by: [illegible]
 Date: [illegible]

Part Name	Part Number	Part Description	FMEA ID	Failure Mode	Effect	Cause	Severity	Occurrence	Detection	Control Action	ACTION PLAN					
											Who	When	How	Cost		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

CONFIDENTIAL

Subcontract/Order: SA Form 7700-2
 Order Responsibility: Douglas S. Miller
 Order Name: SA Form 7700-2

Location and Flight Effector:
 SA Form 7700-2
 Regulatory Agency Data:

Formed by: SA Form 7700-2
 PDS Date: SA Form 7700-2

Rev. Item, Order & Description	Technical Failure Mode	Functional Effect of Failure	SA Form 7700-2	Potential Cause of Failure	SA Form 7700-2	System Identification	SA Form 7700-2	Documented System	Weight/Volume & Configuration Data	ACTION & Response Table	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2
<p>SA Form 7700-2</p> <p>Failure of SA Form 7700-2</p> <p>Failure of SA Form 7700-2</p> <p>Failure of SA Form 7700-2</p> <p>Failure of SA Form 7700-2</p> <p>Failure of SA Form 7700-2</p> <p>Failure of SA Form 7700-2</p>	Failure of SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2
	Failure of SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2
	Failure of SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2
	Failure of SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2
	Failure of SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2
	Failure of SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	Failure of SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2	SA Form 7700-2

TI-NHTSA 019206

CONFIDENTIAL

Subcomponent: Fuel Control System Governor Solenoid
 Design Responsibility: Stephen R. Miller
 Design Agency: [unclear]

Supplier and Part: [unclear]
 Part Number: [unclear]
 Manufacturer: [unclear]

Program: [unclear]
 P/N: [unclear]

Part Name, Number & Description	Potential Failure Mode	Potential Effect(s) of Failure	C C I C	Severity S C I	Frequency F C I	Detection D C I	Suggested Action	Area/Individual Responsible & Completion Date	ACTION			
									W	C	I	
Fuel Control System Fuel Injection Valve Assembly Provides a surface for gas above the fuel injection valve Ignites unburned gas and causes an explosion	Valve to hold open to inject air	Results when assembly cannot open Valve in assembly has been opened without	1	Severe, possible of explosive gas ignition Ignition possible at fuel valve Ignition of fuel possible	3	Ignition, Fuel Valve, Fuel Valve, and Fuel Injection Valve						
	To operate at level	Ignition of fuel at valve	5	Ignition of fuel at valve Ignition of fuel at valve	3	Ignition Valve Fuel Valve						
	Valve to close valve	Ignition of fuel at valve Ignition of fuel at valve	7	Ignition of fuel at valve Ignition of fuel at valve	3	Ignition Valve Fuel Valve						

CONFIDENTIAL

TI-NHTSA 019207

Administrative Staff Control Executive Process Control
 Public Administration
 James H. Miller
 Chief of Staff

Section Factors, Plans and Analysis
 Executive and Plans
 Public Administration
 James H. Miller

Prepared by: James H. Miller
 Date: 10/1/70

Part Name, Number & Description	Proposed Action	Detailed Description of Action	Priority	Potential Impact of Action	Section Worldview	D.C. No.	Suggested Action	Area/Individual Responsible & Completion Date	ACTION PLAN					
									Start	End	By	Status		
<p>71-NHTSA 019208</p> <p>Provides a system of clear, concise, and readable reports and records.</p> <p>Provides feedback to identify the effectiveness of proposed actions.</p> <p>Provides a directory system for the administrative structure.</p> <p>Provides physical location of the individual concerned.</p> <p>Provides a reference system which catalogs the administrative structure relative to the program under review.</p> <p>Provides a change to program the individual concerned.</p> <p>Provides a directory system to locate and identify the individual concerned in the program under review.</p> <p>Provides a change to program the individual concerned.</p> <p>Provides a change to program the individual concerned.</p> <p>Provides a change to program the individual concerned.</p> <p>Provides a change to program the individual concerned.</p>	Waits to properly review reports	Provides out of position	1	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review reports							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	2	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	3	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	4	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	5	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	6	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	7	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	8	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	9	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Waits to properly review the proposed administrative program	10	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	1	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	2	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	3	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	4	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	5	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	6	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	7	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	8	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	9	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							
	Waits to properly review the proposed administrative program	Provides out of position	10	Improves administrative structure and provides updated information on status and progress	Comparison with distribution of similar programs	1	Waits to properly review the proposed administrative program							

CONFIDENTIAL

File No: 7070

and of 01-21 to 02-09-1973

Investigation: Road Control System Primary Switch
 Under Investigation: Section 1, Dallas
 Case No: 7070

Bridge Failure File No: 7070

Location and Name of Facility:
 Dallas, Texas
 Highway Mileage Post:

Prepared by: Texas Instruments Inc.
 High Speed Design Group

Part Name, Model & Revision	Principal Failure Mode	Principal Effects of Failure	P/F	Principal Cause of Failure	P/C	Repair Method/Action	M/F	Associated Action	Appropriateness of Completion Rate	ACTION Required	M	F	C	R
Primary Switch Provides electrical contact between electrical equipment from either bridge	Failure to properly maintain electrical contact	Complete switch open Complete switch closed Erratic operation	1	Primary Switch Opened Short-circuited Faulty wire to switch	1	Subsequent opening Complete pin and pin socket in use Check with supplier for material per operation co. data	1							
	Failure to maintain electrical contact	Complete primary circuit complete and starting to ground		1	Faulty material installed	1	Check with supplier for material per operation Check with supplier for material per operation co. data	1	Check with supplier for material per operation co. data Check with supplier for material per operation co. data					

CONFIDENTIAL

TI-NHTSA 019209

Administrative Control System, Production Division 6-100
New Development System 2-1000
New Development System

Hardware and Programming
New Development System
New Development System

Prepared By: [Name]
Date: [Date]

Task Name, Number & Description	Functional Purpose	Detailed Description of Work Item	WBS Code	Priority	Resource Allocation	Start/End Dates	Status	Responsible Person	Approval/Review Date	Completion Date	ACTION			
											Planned	In Progress	Completed	On Hold
[Task Description]	[Functional Purpose]	[Detailed Description]	[WBS Code]	[Priority]	[Resource Allocation]	[Start/End Dates]	[Status]	[Responsible Person]	[Approval/Review Date]	[Completion Date]				
	[Functional Purpose]	[Detailed Description]	[WBS Code]	[Priority]	[Resource Allocation]	[Start/End Dates]	[Status]	[Responsible Person]	[Approval/Review Date]	[Completion Date]				

CONFIDENTIAL

TI-NHTSA 019210

Subject: Local Council for the Blind, Inc.
 15-51 to 15-52-1952
 New York State

Section 15-51 to 15-52-1952
 New York State

Prepared by: James J. [Name]
 Date: [Date]

Part Name, Chapter & Section	Statutory Section	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code	Section Number of Code
Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]
Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]	Section 15-51 to 15-52-1952 Provision regarding [unclear] [unclear]

CONFIDENTIAL

TI-NHTSA 019211

Administrative Control Group - Personnel Section - 6-20-52
Headquarters, United States Army, Washington, D. C.

Section Follow With and in Release
Personnel and Plans Section
Headquarters, United States Army, Washington, D. C.

Report by: [Name Redacted]
RFR Date (Orig): 1953

Item Name, Status & Description	Potential Problem	Potential Impact of Failure	C	I	R	Priority	Control of Failure	S	Status	Completion Date	Department Responsible & Completion Date	ACTION		C	I	R	
												Start Date	End Date				
[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]
	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]
	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]	[Redacted text]

CONFIDENTIAL

TI-NHTSA 019212

Department of Central Intelligence Features List
 Date: 03/03/2024

Features and Plans (FPA)
 Date: 03/03/2024

Created by: User
 Date: 03/03/2024

Part Name	Parent Name	Parent ID	Parent Category	Parent Description	Parent Value	Parent Unit	Parent Type	Parent Sub-Type	Parent Status	Parent Color	Parent Icon	Parent Image	Parent Audio	Parent Video	Parent File	Parent Link
Part Name	Parent Name	Parent ID	Parent Category	Parent Description	Parent Value	Parent Unit	Parent Type	Parent Sub-Type	Parent Status	Parent Color	Parent Icon	Parent Image	Parent Audio	Parent Video	Parent File	Parent Link
Part Name	Parent Name	Parent ID	Parent Category	Parent Description	Parent Value	Parent Unit	Parent Type	Parent Sub-Type	Parent Status	Parent Color	Parent Icon	Parent Image	Parent Audio	Parent Video	Parent File	Parent Link
Part Name	Parent Name	Parent ID	Parent Category	Parent Description	Parent Value	Parent Unit	Parent Type	Parent Sub-Type	Parent Status	Parent Color	Parent Icon	Parent Image	Parent Audio	Parent Video	Parent File	Parent Link

CONFIDENTIAL

TI-NHTSA 019213

Subject: **Space Control Switches Pressure Switch**
 System Responsibility: **Stephen R. Gellner**
 UIC: **ASST-10000**

Qualifiers and Values:
 Model: **10000/10000/10000**
 Engineering Release Date:

Prepared by: **John Eastman**
 PWS Data Class: **72800**

Part Name, Number & Description	Potential Failure Mode	Potential Effect(s) of Failure	S.C. #	Potential Cause(s) of Failure	O.C. #	Design Verification	S.P. #	Recommended Actions	Area/Individual Responsible & Completion Date	SECTION #	UIC	REV	DATE
<p>Pressure Switch Provides a hydraulic sealing surface on SW J12</p> <p>Provides external signal for installation loss within core</p> <p>Provides face feature for "W1" wrench</p> <p>Provides fluid passage to pressure-sensing element</p> <p>Provides gland for internal wiring</p> <p>Provides flange with inter-face with other components on face pressure-sensing structure</p>	Fails to seal	Leakage of brake fluid	1	Incorrect surface finish specification Incorrect material specification Improperly specified quantity Dimensional pressure	1	Comprehensiveness of inspection on SW standard Comprehensiveness verification of design at laboratory tests Basic testing to determine specified limits	1						
	Fails to correctly install in core	Damage threads in core Does not allow installation	7	Threads specified incorrectly Threads not sized per SW spec Flaking balling	7	Comprehensiveness of applicable SW and SWI standards	245	Comprehensiveness and accuracy of drawing practices relative to thread and thread					
	Hydraulic leakage but fails to properly seal and seal	Brake fluid leakage	7	Threads specified incorrectly Threads not sized per SWI spec Flaking balling	7	Comprehensiveness of applicable SW and SWI standards	245	Comprehensiveness and accuracy of drawing practices relative to thread and thread					
	Incorrect face size	Damage to face flats during assembly "W1" wrench does not fit	5	Face features incorrectly specified per established SW/SWI spec	1	Comprehensiveness of applicable SW and SWI standards	1						
	Fluid passage is too small	Electrical signal from switch is delayed or pressure signal especially at very low temp. Subject to blockage by foreign matter	9	Inadequate size of fluid passage specified Inadequate review of SW standard practices	1	Review of SW standard practices Review of industry practices	1						
	Fluid passage is too large	Regulator drive will receive excessive pressure - drive installation - drive pressure-sensing operation	9	Fluid passage oversized according to SWI	1	Review practice	1						
	Fails to seal internal pressure ports	Leakage of brake fluid	9	Gland dimensions incorrectly specified Surface finish incorrectly specified Gland pressure incorrectly determined	1	Comprehensiveness of representation of gasket supplier Comprehensiveness testing	1						
	Flange fails to mate properly with other components of pressure sensor	Dis. top edge results in assembly difficulty Dis top wall results in bad component alignment Flange too thick results in poor drive Flange too thin results in reduced burst capacity Seepage when change results in system contamination which causes error	9	Seepage or leakage due to specification of dimensions and tolerances	1	Seepage and leakage to determine other characteristics for seal strength Tolerances stack-up analysis Final review	1						
	Material can split or weld	Improper force applied Dimensional tolerances during installation or subsequent service Threads grow to design, leads to assembly difficulties	9	Improper material selection	1	Comprehensiveness evaluation of physical properties	1						
	Material change	Leakage of core leads to leakage	9	Improper material selection	1	Review of material properties	1						
	Material dimension is incorrect or missing (fluids)	Leakage	9	Improper material selection	1	Comprehensiveness with similar products	1						
	Inadequate environmental protection	Low-temp attack causes embrittlement of face areas which leads to leakage or fracture Corrosive problems	9	Seepage or leakage due to specification of dimensions	1	Comprehensiveness of environmental testing Review of plating practices	2	27					

T-NHTSA 019214

Subs: Speed Control Electronics Pressure Switch
 Design Responsibility: Donald E. Gifford
 Other Areas Involved:

Suppliers and Plans:
 Model Year/Model(s):
 Regulatory Reference(s):

Prepared by: James L. ...
 PWS Date: 02/07/72

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	S.N.C.	C.R.L.	Theoretical Cause(s) of Failure	O.C.	Design Description	D.P.	R.P.	Recommended Action	Area/Individual Responsible & Completion Date	ACTION #	STATUS	TR.
STATIONARY TERMINAL (3488) Provides a brass blade for interconnection Provides a silver-plated surface for electrical contact Provides a Passure for device calibration Provides Passure to ensure adequate stability over time Provides Passure which mates with slots in base for insertion of terminal Provides electrical path from silver plated contact to outside connector	Poor interconnection	Design requires extra-wire(s) of active connector installed	5	C	Guidelines/requirements of brass blade Material specified too thin	3	Review design and dimensions of active connector to ensure correct tolerances and adequate service	1	15					
	Wedge geometry incorrect	Difficult to install wiring connector	5	C	Lead-in chamfers on terminal are insufficiently specified Material specified too thick	1	Review design and dimensions of active connector Compare with design of similar type product	1	5					
	Fails to provide adequate electrical contact	Device appears over-stimulated (operational conditions) High millivolt drop	9	C	Silver leads specified too thin Incorrect contact material specified Contamination Incorrect contact thickness specified	7	Review of TI specifications and general connector design info Eliminate paths for ingress of moisture	1	27					
	Excessive loss of contact surface dimension (operational loads)	Shift in response over life	7	C	Silver leads specified too thick Base hardness specified too soft	1	Review of TI specifications and general connector design info Life testing	1	3					
	Erosion of contacts (electrical loads)	Shift in response over life Insufficient to be conclusive	9	C	Incorrect material specified for particular electrical loading	7	Review of TI specifications and general connector design info Review and test with actual electrical loads	1	27					
	Poor calibration	Fit, void loss Shift in response over life	5	C	Design is counter-intuitive Design too sensitive to vibration Material hardness is incorrectly specified Design too brittle - strength is reduced by calibration over life Pre-calibrated system is not accurate due to calibration	5	Mechanical Order (MO) analysis Force/deflection graph/curve testing Testing with actual production calibration machine	1	75					
	Intermittent in temperature related low base	Loss of contact Shift/Fluctuation in metal response	7	C	Incomplete understanding of design features of mating features	5	Comparison of design with similar type product Stability evaluation	5	175	Review mechanism which may lead to compensation of design modifications				
	Fails to provide adequate terminal	Terminal out of position	7	C	Incorrect dimensions and/or tolerances specified between slots and terminals Inadequate mating device design	5	Comparison of design with similar type product	5	75	Review alternate mating device concepts				
	Fails to provide adequate conductivity	High resistance shown at high millivolt drop	5	C	Incorrect material specified Inadequate connection area	1	Characteristics of systems using R = (V/I) / A Testing	1	5					

TI-NHTSA 019216

Page No., Number & Description	Potential Failure Mode	Potential Effects of Failure	Criticality	Potential Causes of Failure	Design Modification	D.R. (P. #)	R. (P. #)	Inspection Points	Time/Institutional Resources & Completion Date	ACTION		C	S	T	M	
										Actions Taken	By					
FORMER DESIGN (1987) Provides a brass kind for connection Provides a mounting point for the device via stud Provides features to engage adjacent stud into base Provides features which mate with stud in base for loca- tion of terminal Provides electrical path from terminal through stud opening and stud to mating connector	Poor interconnection	Device appears non-functional if mating connector installed	C	Design/Manufacturing of brass kind Material specified too thin	Review design and dimensions of mating connector to ensure proper interference and mating action	1	15									
	Hole counters for studs	Difficult to install mating connector		Lead-in shrouds on connector too thick/ Material specified too thick	Develop design and dimensions of mating connector Comparison with design of similar SVP's products	1	5									
	Fails to allow proper mating of stud installation	Shift/Fluctuation in stud position (longer stud) (Inappropriate design of stud and assembly) Wg. stud loss		Stud hole size in specified incorrect Stud hole position in specified incorrect Support surface for stud is incorrect- ly specified Design of feature aids movement	Comparison with design of similar products Check with manu- facturers of stud manufacturer Fixtures	5	10	Identify alternative structure techniques such as welding	Part 1011, Wg. 1011							
	Terminal is inade- quately seated into base	Loose terminal Shift/Fluctuation in stud position		Incomplete under- standing of design of mating feature	Comparison of design with similar SVP product Study evaluation	5	10	Define evaluation which can lead to re-evaluation of design modification								
	Fails to properly locate terminal	Terminal out of position		Incorrect dimensions and/or tolerances specified between stud and terminal Inadequate mating design concept	Comparison of design with similar SVP product	5	10	Define alternate mating design concepts								
Fails to provide ad- equate conductive		High resistance shown on high millivolt drop		Incorrect material specified Inadequate cross- section area	Dimensional of resistance using W = (I^2 R) / A Study by	1	5									

Edwards/Thomson: Speed Control Switchgear Pressure Switch
 Design Number: 010217
 Date: 08/11/88

Supplier and Plant Address:
 (Not Specified)
 Drawing Reference:

Created by: Tomo (mymom)
 P&ID Date: 08/11/88

Para. Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	S.N.C.	Functional Category of Failure	Design Specification	D.N.C.	Recommended Action	Responsible Person/Department & Completion Date	ACTION PLAN					
									1	2	3	4	5	
SPRING CHARGE Provides contact force Provides electrical path from movable contact to movable terminal Provides failure to separate with transfer arm Location movable contact Provides support for armature to movable terminal Allows die movement Provides force to open contacts	Low contact force	High millivolt drop across contacts	5	Insufficient pressure specified	Span deflection correction Force/deflection curves	1	10							
	High contact force	Shift in setpoints Time wasteful over life	7	Insufficient geometry specified	Span deflection correction Force/deflection curves	1	21							
	Fails to provide adequate conductivity	High resistance shown as high millivolt drop	6	Insufficient material specified Inadequate cross-section area	Calculation of resistance using $R = (2000L) / A$ Testing	1	5							
	Fails to interface correctly with transfer arm	Curve follows over life Shift in setpoints over life Excessive transfer pin stress Intermittent operation	9	Inadequate height of features specified Inadequate shape of features specified Inadequate position of features specified	Comparison of design with similar product Dimension and tolerances study similar products Actual measurement Testing	1	27							
	Fails to provide adequate separation for movable contact	Interference or arcing operation Open circuit	7	Wide tolerances incorrectly specified Flattened tolerances	Direct mfg. recommendations Comparison of design with similar product Testing	1	7							
	Fails to adequately locate movable contact relative to stationary contact	High millivolt drop over life Excessive contact erosion over life	7	Spring geometry incorrectly specified	Dimension and tolerance studies similar products Testing	1	26							
	Fails to transfer energy to movable terminal	Break or incomplete operation Shift in setpoints Open or short circuit	9	Wide tolerance incorrectly specified Flattened tolerances Change of tolerance style incorrect	Direct mfg. recommendations Comparison of design with similar product Testing	5	28	Identify alternate accessories methods, such as utility terminals	Mark Ballera, Mfg. Div. completion 08/88					
	Fails to allow overtravel	Shift in setpoints Time wasteful Dueson operation at assembly Poor utilization	7	Insufficient geometry specified Inadequate material specified	Span deflection correction Force/deflection curves	1	21							
	Inadequate force to open contacts	Inadequate resistance to mechanical vibration Short circuit	6	Insufficient geometry specified Inadequate material specified	Span deflection correction Force/deflection curves	1	27							
	Excessive force to open contacts	Shift in setpoints Time wasteful Dueson disruptive to assembly Poor utilization	7	Insufficient geometry specified Inadequate material specified	Span deflection correction Force/deflection curves	1	21							

TI-NHTSA 010217

Subj: Bombardier Control System Pressure Control
 System Component: Station B. OVI Line
 Other Found Defects:

Small text and figures -
 Total Year/Model/Co/Pr
 Engineering Release Date:

Prepared By: Taha Instrument
 Date: 02/07/1992

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	S.N.C.	Potential Causes of Failure	O.N.C.	System Malfunction	S.N.C.	S.P.N.	Recommended Action	Appr/Individual Responsible & Completion Date	ACTION			RESULTS		
											Station Label	Start	Stop	Start	Stop	Start	Stop
708021 (7412) Station B. OVI Line Provide a force between ratchet wheel and spring which causes ratchet contact for correct line.	Falls to adequate force causing spring to ratchet wheel.	Spring reaction about side of ratchet Spring falls off ratchet wheel.	5	Improper rivet diameter for wheel hole size Improper rivet length for spring material displacement Improper hole size Improper ratchet feature Improper material	1	Short manufacturer recommendations Comparison with similar products Testing to determine cause to rotate spring	1	5								
	Insufficient force between spring and ratchet wheel.	High resistance or no spring or looseness of spring and ratchet wheel.	5	Improper rivet diameter for wheel hole size Improper rivet length for spring material displacement Improper hole size Improper ratchet feature Improper material	1	Short manufacturer recommendations Comparison with similar products Testing to determine cause to rotate spring	1	5								

TI-NHTSA 019218

Subject: Speed Control Reluctance Proximity Switch
 Design Responsibility: Steven R. Offler
 Other Areas Involved:

Supplier and Plants in
 Critical View/Abilities:
 Organizational Release Date:

Prepared by: James Instruments
 Form Date: 08-1977 720001 L

Part Name, Number & Description	Potential Failure Mode	Potential Effect(s) of Failure	SEV	OC	Potential Cause(s) of Failure	D	O	Design Specification	D	O	Recommended Actions	Person/Individual Responsible & Completion Date	ACTION	R	S	O	C	U	I	L	
<p>Possible Contact Closure Provides electrical isolation between with secondary circuitry Provides electrical path from interface to spring Provides return of mechanical contact to spring Provides rigidity to maintain dimensions and therefore proper alignment over time Provides a feature to compensate against drift in a particular area</p>	Fails to provide adequate electrical contact	Opens primary over-estimated transmission mechanism High coil/lead drop	9	C	Incorrect material specified for shape Incorrect contact material specified Contamination Incorrect contact dimensions material specified	3	27	Design of TI over-estimate and general contact design life TI selects grade for degree of contamination	1	27											
	Fails to provide adequate contact force	High resistance when in high coil/lead drop	5	1	Incorrect material specified	1	5	Design with correct rivet configuration Testing	1	5											
	Inadequate attachment to spring	Shift in operation over life Ejects operation Open circuit	7	1	Incorrect geometry specified Incorrect material specified	5	20	Manufacturer recommendations Comparison with design of similar products	1	20	Design check dimension versus design life for potential interference	Steve Offler Date 7-2-8									
	Calibration drift	Shift in operation	7	1	Incorrect geometry specified Incorrect material specified	1	2	Manufacturer recommendations Comparison with design of similar products	1	2											
	Imprecise force calibration	High coil/lead drop	5	1	Incorrect geometry specified Incorrect material specified	1	15	Manufacturer recommendations Comparison with design of similar products	1	15											
	Excessive force compensation	Shift in operation over life	7	1	Incorrect geometry specified Incorrect material specified	1	21	Manufacturer recommendations Comparison with design of similar products	1	21											

Customer: General Motors Developmental Process - 5-11-88
 Design Responsibility: Station 1, Office
 Other Areas Involved:

Location and Plans of Final Responsibility:
 Engineering Division Dept:

Prepared by: Tomasz Instanczyk
 SPEN Date (Date): 12/88

Part Name, Number & Description	Potential Failure Mode	Potential Effect(s) of Failure	S	C	D	P	O	R	Recommended Actions	Responsible Person & Completion Date	ACTION					
											Priority	Severity	Occurrence	Detectability		
WASH (2028) Provides a section of the support surface for diaphragm Provides support for compressor type of gasket Guides and guides converter with respect to cup Surfaces with cup feature and provides a portion of contact stock for valve	Fails to correctly support the diaphragm	Reduced diaphragm life results in leakage	9	C	1	1	1	1	Comparison of diaphragm support surfaces on specified products Condition of shape of support surface specified in drawing Clearance between washer I.D. and converter lips is specified in drawing	Burr, Impact, and Thermal Cycle tests Comparison of diaphragm with similar products	1	2				
	Fails to allow proper valve compression	Leakage	9	C	1	1	1	1	Washer flexure in properly specified or unspecified Washer thickness is specified on wall Washer material and/or heat-treat is incorrectly specified	Burr, Impact, and Thermal Cycle tests Comparison of diaphragm with similar products	1	9				
	Converter is not properly located relative to cup	Shift in converter Erratic behavior	7	C	1	1	1	1	Improperly specified bushing guide I.D. Improperly specified washer O.D.	Comparison of diaphragm with similar products Tolerances stackup analysis	1	7				
	Converter travel is restricted by washer	Drive lever release device is stuck open/closed	5	C	1	1	1	1	Washer flexure in properly specified or unspecified Washer thickness is specified on wall Washer material and/or heat-treat is incorrectly specified I.D. of bushing guide is too small	Burr, Impact, and Thermal Cycle tests Comparison of diaphragm with similar products Tolerances stackup analysis	1	5				
	Fails to increase correctly with load	Difficult assembly (washer O.D. too large) Poor washer/converter location relative to cup (washer O.D. too small)	5	C	1	1	1	1	Washer O.D. specified incorrectly	Comparison of diaphragm with similar products Tolerances stackup analysis	1	5				
	Fails to allow proper valve	Reduced valve flexibility leads to leakage Reduced fatigue resistance leads to leakage	9	C	1	1	1	1	Thickness incorrectly specified O.D. incorrectly specified Edge condition incorrectly or unspecified	Tolerances stackup analysis Burr, Impact, and Thermal Cycle tests	1	9				

TI-NHTSA 019221

Item: Speed Control Diagnostic Firmware Switch
 Switch responsibility: Stephen H. Offiler
 Other items involved:

Supplier and Part #
 Model Year/Revision:
 Reference Drawing Date:

Prepared by: Tomasz Insurat
 PWS Date Chg: 7/26/92

Part Name, Number & Description	Potential Failure Mode	Potential Effect(s) of Failure	S.C. O.C. P.C.	Potential Cause(s) of Failure	Design Verification	D.P. P.M.	Recommended Action	Area/Individual Responsible & Completion Date	ACTION		RESULTS	
									W	C	S	O	P	C
CPUV SWC (74097) Half cassette base assembly and sensor assembly Provides a surface for part identification code Mount environmental protection and ambient to device	Wells to hold base to sensor cassette	Electric switch operation Cracked base Shift in operation Low base voltage withstand	7	Incorrect geometry of crimpable arm specified Incorrect geometry of forced radii Inappropriate material specified	1	21						
	ID characters illegible	Improperly identified parts of SWC	5	Geometry/Finish not properly specified Wrong material specified	2	15	Theoretical analysis to help rule coding operation more robust against manufacturing					
	Stability of electrical measurement	Corrosion causes electrical connection, loss of connection operation, switch operation falls off sensor Illegible coding	7	Wrong material specified for plating if applicable	1	7						

TI-NHTSA 019222

Subject: Small Central Reciprocating Pressure Switch
 Supplier: Honeywell; Station: R. O'Fallon
 Other Items Involved:

Signature and Title of
 Head of Organization:
 Invention Palace Date:

Prepared by: Tomer International
 WSH Date (014): 92887

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	C o n s e q u e n c e s	P o t e n t i a l C o n s e q u e n c e s	O C C u r r e n c e	Basic Specification	D e t e r m i n e d	S e r v i c e	R e m e d y A c t i o n	A s s e s s m e n t R e s p o n s i b l e & C o m p l e t i o n D a t e	A C T I O N R e q u i r e d	R e q u i r e d	T i m e	I t e m
Part 04516 Provides a system of slots which guide, locate, and physically support terminals Provides features to enhance the effectiveness of terminal position Provides a distinctive feature for the electrical elements Provides physical insulation of the contact components Provides a reference surface which locates the electrical elements relative to the screw base Provides a flange to support the terminal components Provides interference tabs to locate and temporarily hold the base in relation to the screw base prior to when Provides a flange surface for the screw base Provides lock tabs, legs, and features which cause an electrical connection Provides protection to electrical lead in connector	Fails to properly locate terminals Fails to properly locate the terminals - difficult insertion Fails to properly locate the terminals Terminal seating is insufficient Contact leakage between terminals or terminal-to-terminal Fails to electrically insulate; prevent of contact from electrical environment Fails to properly locate the contact elements relative to the pressure contact Insufficient protection of internal electrical lead Fails to properly locate/hold prior to screw Fails to create adequate clearance for screw rim Flange electrical connector does not fit properly Flange connector seal is not properly compressed	Terminals out of position Contact will not provide proper low yield time in use Contactless cross relative to each other on the base (such as other physical or thermal loads) Loose terminals Shift/translation in contact relationship Check of bond control system does not discharge High current leakage High resistance drop Breaths or evaporates contact action Shift in operation Breaths or evaporates contact action Insufficient compression may lead to loss of contact Excessive compression may remove contact from seating assembly to cause anomaly Too large may cause difficulty in assembly, term crushing, or prevent contact from seating to screw Top seal provides an effective seal possibly affecting subsequent assembly operation Base loose or insufficient contact with screw Base cracked Connector difficult to insert Connector falls off Spring of screw into contact easily Connector difficult to insert and/or falls off	3 5 7 7 9 2 7 9 5 7 9 9	Improper dimensions and/or tolerances specified between slots and terminals Insufficient contact pressure Excessive dimensions and/or tolerances specified between slots and terminals Excessive material specified Incomplete understanding of design of relative features Low insulation resistance Incomplete material specified Improper electrical specified Poor rolled part design i.e. wall thickness too thin, etc. Shape of the reference surface Invention of other design elements into the plane of the reference surface Insufficient clearance specified between mating features Incorrect seal gland design Narrow Design of interference tabs is insufficient Invention design of flange for screw rim Connector geometry and/or surface finish specifications is insufficiently specified Excessive material specified	Comparison with dimensions of similar 04516 product Review with assembly measurement drawings by detector correct dimensions are used in Comparison with design of similar 04516 product Comparison with design of similar 04516 product Comparison with design of similar 04516 product Physical evaluation Comparison with design of similar 04516 product Review notes with vendor Field flow analysis Specification of dimension or angle Show this surface to prevent migration of other elements Tolerance stackup analysis Review of standard gland design practices Discussion to select proper practices Practices specified on print Calculation and comparison to drawings limits of wire Excessive stackup analysis Comparison with design of similar 04516 product Review of dimensions relative to screw connector prints Review of dimensions relative to screw connector or lead Physical evaluation	5 1 1 5 1 1 1 1 1 1 1 1 1	75 5 7 75 9 9 20 20 15 7 9 20	Provide alignment feature design concepts Staking operations which may lead to reorientation of design modifications						

T-NHTSA 019223

File No: 27734

dated at 15:54 on 22-02-1972

Radio Failure Mode

Power Analysis

1 of 1

System: Squad Central Intuitive Pressure Switch
 Unit: 4000-001000: Station E. 607110
 Other Notes: (none)

Equipment and Parts:
 Model: 4000-001000: Station E. 607110
 Reference: Pilot's Guide

Prepared by: [Name]
 Date: 02/22/72

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	S/N	C	O	Potential Cause of Failure	Detection Verification	S/N	R. F. Pl.	Recommended Action	Person/Individual Responsible or Organization	ACTION					
												Effect	Time	Cost	Priority	Remarks	
Switch P/B Control Operates if the station is reachable electrical contact Conducts electrical current from station handset	Fails to properly transfer dial contact	Contacts stuck open Contacts stuck closed Erratic operation	S	C	O	Operator intervention required	Intercom checks between pit and site inside in use	S	S								
	Fails to conduct	Operator intervention required and handset on ground				Check with familiar line operator for possible re-align	Check with familiar line operator for material preparation											Check with Ford to find out verification of switching unit to ground for possible trouble
			S	C	O	Operator intervention required	Check with familiar line operator for possible re-align	S	S								

TI-NHTSA 019224

Subj: **General**
 Design: **General**
 Other: **General**

Category and Usage:
 Model No./Vehicle No.:
 Engineering Division:

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	D C W C	Potential Cause(s) of Failure	D C W C	Design Verification	D C W C	Recommended Action	Type/Individual Responsibility & Completion Date	ACTION RESULTS			
										Planned	Actual	Open	Close
WINDSHIELD SEAL, CRIMP Properly formed of correct size Provide friction to add to mounting base retention	Components enter matrix cavity	High surface leakage Seal not fully deep Erratic or improper matrix application	7	Outer thickness (if specified) too small Lipex or granules not applied Incorrect material	1	Review of stamped matrices for glass design Design with gasket manufacturer Comparison of design with similar product	1						
	Seal retains the matrix	Provided by judgement in D & A, gasket material		1	Outer thickness (if properly specified)	1	Review of standard practices for glass design Temperature/retention history Comparison of design with similar product	1					

TI-NHTSA 019226

Subj: Space Shuttle Main Engine Forward Drive
 Design Responsibility: Donald R. Offiler
 Other Name: Inmate

Supplier and Plant:
 Ford Ypsilanti, Mich.
 Engineering Release Date:

Prepared by: Tomm Ingersoll
 PWH Date (Orig): 02/83

Part Name, Number & Description	Functional Failure Mode	Functional Effects of Failure	Q R T L	Potential Cause(s) of Failure	D S C R I B E R	Design Specification	Q R T L	Recommended Actions	Item/Individual Responsible & Completion Date	ACTION REMARKS TAKEN	A C T I O N	R E S U L T	C O M P L E T E	P R O B L E M
Cap Screws and Washers Provides structural stress which holds pressure-bearing together Supports support, disengage, and under Provides support and location for disc Provides guide for transfer pin Provides portion of environmental seal plane Provides contact to interface with base/rotor assembly Provides support for pressure bearing Provides structural support for cap ring	<p>Fails to provide a suitable assembly for cap ring</p> <p>Fails to correctly locate support, disengage, or under</p> <p>Fails to support and locate the disc/rotor assembly</p> <p>Fails to guide transfer pin correctly</p> <p>Fails to allow a correct environmental seal</p> <p>Fails to properly locate relative to switch</p> <p>Fails to allow proper final assembly with cap ring</p>	<p>Lossage</p> <p>Reduced disc/rotor life</p> <p>Support disengage</p> <p>Shift in assembly</p> <p>Erratic operation</p> <p>Crack case or assembly</p> <p>Reduced disc life</p> <p>Erratic operation</p> <p>Deviate from start-rotate</p> <p>Ingress of water</p> <p>Deviate from start-rotate</p> <p>Shift in assembly</p> <p>Erratic or impulsive start</p> <p>Erratic operation</p> <p>Ingress of water</p> <p>Crack case</p>	<p>7</p> <p>7</p> <p>7</p> <p>7</p> <p>7</p> <p>7</p> <p>7</p>	<p>Crack wall thickness incorrectly specified</p> <p>Crack wall height incorrectly specified</p> <p>Incorrect external specification</p> <p>I.D. specified incorrectly</p> <p>Incorrect disc thickness specified</p> <p>Base transcription incorrectly specified</p> <p>Face surface condition of base, incorrectly specified</p> <p>Pin guide geometry is incorrectly specified</p> <p>Surface condition checked for good seal not understood or not correctly specified</p> <p>Geometry incorrectly specified</p> <p>Incorrect geometry of mating surface specified</p> <p>Post-assembly geometry is not controlled per design intent</p> <p>Cap diameter incorrectly specified</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>Base and location modify</p> <p>Comparison of design with similar product</p> <p>Tolerance stacked analysis</p> <p>Tolerance stacking analysis</p> <p>Visual testing</p> <p>Tolerance stacking analysis</p> <p>Environmental testing</p> <p>Stretch epoxy permeation testing</p> <p>Review of standard sized design value</p> <p>Tolerance stacking analysis</p> <p>Crack section actual device for inspection of interface</p> <p>Tolerance stacking analysis</p> <p>Base torque control</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>							

T-NHTSA 019226

Author: William James Conway, Josephine Frances Deitch
 Design Responsibility: Stephen E. Miller
 Other Items Involved:

Suppliers and Plants:
 Model Year: 1991
 Engineering Release Date:

Prepared by: Tomo Jansson
 PWS Data Group: Y2000

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	C C A S	P S C	Potential Causes of Failure	D S C	Design Description	D S C	S C	Recommended Action	Responsible Person & Completion Date	ACTION RESULTS			
												Action Taken	W S C	S C	P S C
MEC CYCLES Controls activation and re- lease mechanism of switch relative to engine frame The component in question would service life of engine	Failure to operate and/or release at the proper points of assembly	Wgn. shield loss	5	5	Shim material in- properly specified Shim's and nut's in- properly specified	1	Characterization impact test Comparison of design with similar product	1	5						
	Shim activation and/ or release mechanism change over time	Shift in design compared over time	7	5	Shim material in- properly specified Shim heat-treat in- properly specified Material thickness incorrectly specified	5	Shimline testing Pre- and post- characterization	1	26						
	Service life shorter than customer re- quirements	Shimline shift in comparison over time Shimline insensitive - open shimline	7	5	Shim material in- properly specified Shim heat-treat in- properly specified Material thickness incorrectly specified	5	Shimline testing Pre- and post- characterization	1	26						

TI-NHTSA 019227

Author: Fred C. ...
 Title: ...
 Date: ...

Number and Place:
 Date: ...

Prepared by: ...

Part, Item, Number & Description	Expected Failure Mode	Potential Effects of Failure	Criticality	Potential Cause(s) of Failure	Design Work/Reason	D.F.	S.F.	Suggested Action	Responsible Agency & Completion Date	ACTION		
										Planned	Actual	Remarks
Transfer primary from fluid to primary-making element	Fail to connect	Scale fluid leakage	7	<p>Crack rupture over life due to improper design of supporting elements</p> <p>Crack rupture over life due to manufacturing tolerances</p> <p>Crack rupture over life due to stress concentration</p> <p>Crack rupture over life due to uneven stress distribution</p> <p>Crack rupture due to incorrect material selection</p> <p>Insufficient thickness (as % of length) of supporting material</p> <p>Insufficient length/width of support</p>	<p>Heat, impact and thermal shock stress</p> <p>Natural etc. corrosion</p> <p>Corrosion of design with similar products</p>	1	3	<p>Check that the "B" setting of J is based on a large number of field inspections of similar products. Update data accordingly in drawings if necessary.</p>				
	Change in area of primary transfer over life	Shift in support over life	7	<p>Insufficient thick dimension alonging</p> <p>Material too stiff</p> <p>Incorrect material specified</p>	<p>Life history of alternative location or increased grade</p>	1	2					
	Excessive change of pressure transfer area versus structure	Excessively high structure needed to adequately transfer pressure transfer from side area of structure due to unreliability of load pressure		7	<p>Material too stiff</p> <p>Incorrect material specified</p>	<p>Force and pressure versus deflection history of similar etc affected areas</p>	1	2				

TI-NHTSA 019228

Subject: **General**
 Design Responsibility: **Stephen B. OFFLER**
 Other Name (s):

Locations and Parts:
 Model Number(s):
 Manufacturing Alliance Data:

Prepared by: **James Inghram**
 File Name (tag): 770001

Part Name, Number & Description	Potential Failure Mode	Potential Effects of Failure	Criticality	Potential Causes of Failure	Order	Failure Identification	P.F.C.	Inspected/Active	Non/Individual Responsibility & Completion Date	ACTION			RESULTS		
										Actions Taken	S	D	C	S	D
<p>COMPRESSOR (CFP-46) Transfers pressure from fluid into discharge to a force on pressure-bearing disc Provides alignment and support to disc Provides a portion of the support motion for discharge Provides disc support during overpressure (gross/normal) Disc is supported pressure bearing holding from affecting bearings</p>	<p>Fails to properly transfer fluid pressure to force on disc</p>	<p>Shift in operation</p>	7	<p>Support O.D. improperly specified relative to washer I.D. Compressor washer O.D. improperly specified relative to washer I.D. Compressor thickness improperly specified Insufficient material specified</p>	1	<p>Tolerance studies analysis Force/deflection analysis on dynamic strength and resistance to plastic deformation Burst, fatigue, and Thermal Cycle tests</p>	1	7							
	<p>Fails to properly align and support disc</p>	<p>Losses tolerance allow misalignment which may cause shift in operation or prevent operation Disc out-of-plane relating to compressor may cause erratic operation or insensitive design, waste operation</p>	5	<p>Support O.D. improperly specified relative to washer I.D. Compressor washer O.D. improperly specified relative to washer I.D. Disc supports have improperly specified Disc assembly wall improperly specified</p>	1	<p>Tolerance studies analysis Comparison of design with similar product</p>	1	14							
	<p>Fails to properly support discharge</p>	<p>Reduced discharge life results in leakage</p>	9	<p>Condition of surface in contact with discharge are specified insufficient Condition of edges in contact with discharge are specified insufficient Clearance between compressor ring and washer I.D. are specified too wide</p>	1	<p>Burst, fatigue, and Thermal Cycle tests Comparison of design with similar product</p>	1	27							
	<p>Fails to properly support disc during overpressure</p>	<p>Disc deformation results in shift in operation Reduced disc life Reduced disc travel if disc section is restricted pressure</p>	7	<p>Features which control disc section during overpressure are improperly specified</p>	1	<p>Free and post-peak characterization Pressure-deflection characteristics of disc section</p>	1	21							
<p>Disc not used properly</p>	<p>Shift in complete new turn Reduced disc support</p>	9	<p>Washer hole improperly specified</p>	1	<p>Comparison of design with similar product Temperature characterization</p>	1	7								

Item Name: Equal Control Hydraulic Pressure Switch
 Item Responsibility: Stephen E. Offiler
 Other Areas Involved:

Supplier and Plant:
 Model Name/Version:
 Regulatory Reference:

Prepared by: Teena Innes
 (WH) Date Orig: 12/82

Part Name, Number & Description	Potential Failure Mode	Potential Effect(s) of Failure	C C P I C	Potential Cause(s) of Failure	O C C C	Design Verification	D F C L	R P N	Recommended Actions	Area/Individual Responsible for Corrective Action	ACTION RESULTS			
											Action Taken	E S C	S C C	P C M
SHAFT (7707462) Shafts friction between disc and converter Allow mounting of chamber forced by disc and converter	Fail to effectively reduce friction	Shift in suspension wear life Reduced disc life	7	Incorrect material specified Incorrect dimensions specified	1	Frequency and Thermal Cycle tests Pre- and Post-life characterization tests Tolerant analysis	1	7						
	Fail to allow venting	Shift in suspension wear life Reduced disc wear action	7	Use hole incorrectly specified	1	Comparison of design with similar products Tolerant char-	1	7						

TI-NHTSA 019230

Open Method 7700-1, 1-3, 1-3
 Administrative Staff Control / WIT RELEASE
 Only Areas Impacted: JIM MITT, QUALITY CONTROL

Agencies and S...
 Federal Government...
 Contributing Release Date:

Prepared by: JIMM BENT
 Task Date: 05/20/92
 Key Production Dates: 05/21

Process Description / Problem	Potential Failure Mode	Potential Impact of Failure	C C L E	O C L E	Current Controls	S C L E	R C L E	Recommended Action	Special/Initial Response/Action	ACTION		RESULTS	
										When Taken	When Taken	When Taken	When Taken
WIND-UP AND UNWIND	NO-OPERATOR PLACE	REDUCED WIND-UP REDUCED WIND-UP LINE REDUCED WIND-UP REDUCED WIND-UP	3	1	NO-OPERATOR PLACE REDUCED WIND-UP	3	3						
	WIND-UP TO LOW	NO-OPERATOR PLACE REDUCED WIND-UP	3	1	NO-OPERATOR PLACE REDUCED WIND-UP	3	3						
	WIND-UP TO HIGH	NO-OPERATOR PLACE REDUCED WIND-UP	3	1	NO-OPERATOR PLACE REDUCED WIND-UP	3	3						
NO WIND-UP TO WIND-UP	REDUCED WIND-UP	REDUCED WIND-UP LINE CONDUCTIVITY FAILURE LOSS OF CALIBRATION WIND-UP LINE	7	1	REDUCED WIND-UP CONDUCTIVITY FAILURE	7	7						
	NO WIND-UP	REDUCED WIND-UP LINE LOSS OF CALIBRATION WIND-UP LINE	7	1	REDUCED WIND-UP CONDUCTIVITY FAILURE	7	7						
	WIND-UP OF WIND-UP TO LOW	REDUCED WIND-UP LINE LOSS OF CALIBRATION WIND-UP LINE CONDUCTIVITY FAILURE	7	1	REDUCED WIND-UP CONDUCTIVITY FAILURE	7	7						
	WIND-UP OF WIND-UP TO HIGH	REDUCED WIND-UP LINE LOSS OF CALIBRATION WIND-UP LINE CONDUCTIVITY FAILURE	7	1	REDUCED WIND-UP CONDUCTIVITY FAILURE	7	7						
	WIND-UP OF WIND-UP TO LOW	REDUCED WIND-UP LINE LOSS OF CALIBRATION WIND-UP LINE CONDUCTIVITY FAILURE	7	1	REDUCED WIND-UP CONDUCTIVITY FAILURE	7	7						
	WIND-UP OF WIND-UP TO HIGH	REDUCED WIND-UP LINE LOSS OF CALIBRATION WIND-UP LINE CONDUCTIVITY FAILURE	7	1	REDUCED WIND-UP CONDUCTIVITY FAILURE	7	7						
	WIND-UP OF WIND-UP TO LOW	REDUCED WIND-UP LINE LOSS OF CALIBRATION WIND-UP LINE CONDUCTIVITY FAILURE	7	1	REDUCED WIND-UP CONDUCTIVITY FAILURE	7	7						
WIND-UP TO WIND-UP	REDUCED WIND-UP	CONDUCTIVITY FAILURE	3	1	REDUCED WIND-UP	3	3						
	WIND-UP TO WIND-UP	CONDUCTIVITY FAILURE	3	1	REDUCED WIND-UP	3	3						
	WIND-UP TO WIND-UP	CONDUCTIVITY FAILURE ACTIVATION FAILURE	3	1	REDUCED WIND-UP	3	3						
	WIND-UP TO WIND-UP	LOSS OF CALIBRATION	3	1	REDUCED WIND-UP	3	3						
	WIND-UP TO WIND-UP	CONDUCTIVITY FAILURE	3	1	REDUCED WIND-UP	3	3						
WIND-UP TO WIND-UP	WIND-UP OF	NO-OPERATOR PLACE	3	1	NO-OPERATOR PLACE	3	3						
	WIND-UP OF WIND-UP TO WIND-UP	NO-OPERATOR PLACE	3	1	NO-OPERATOR PLACE	3	3						

71-NHTSA 019232

Process Name: **TRUCKS, L-2, L-3**
 Location: **TRUCKS, L-2, L-3**
 Date: **05/14/92**

Operator and /
 Shift: **TRUCKS, L-2, L-3**
 Date: **05/14/92**

Prepared by: **TRUCK, L-2, L-3**
 Date: **05/14/92**
 Revision: **01**

MC
 Check C

Process Description / Failure	Potential Failure Point	Potential Impact of Failure	S/N	P/N	Potential Causes of Failure	Current Controls	S/N	P/N	Recommended Action	Date/Initials Responsible	Action Taken	RESULTS			
												U	M	N	
REPAIR OF CONTAINER	WELDER OFF LINE	NO REPAIRS MADE	5		POOR WORK	1. LINE FUNCTION CHECK	1	5							
TRUCKS, L-2, L-3	UNDER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
	OVER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
TRUCKS, L-2, L-3	UNDER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
	OVER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
	UNDER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
TRUCKS, L-2, L-3	UNDER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
	OVER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
TRUCKS, L-2, L-3	UNDER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
	OVER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
TRUCKS, L-2, L-3	UNDER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
	OVER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
TRUCKS, L-2, L-3	UNDER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					
	OVER CRIP	REWORKING OF TRUCKS, L-2, L-3	5		WELDER ON LINE	1. WELDER SET-UP	1	15		WELDER					

TI-NHTSA 019233

Process Descriptive Purpose	Potential Failure Mode	Potential Effect(s) of Failure	C C F E	Potential Cause(s) of Failure	O N E	Current Controls	D F C	Recommended Action	Area/Individual Responsible	ACTION PERSON TAKEN	RESULTS				
											S	O	C	E	
STOP FLIGHT TO BRIDGE ENROUTE	INSUFFICIENT AIR PRESSURE	IN-DESIGNED PRESSURE AND SHIFT IN SET POINT OVER LIFE	7	PRESSURE TOO LOW	1	LOW PRESSURE SWITCH LOW FUNCTION TEST CYCLING ALERT	1								
	DELETED AIR COMMAND	REDUCED SERVICE LIFE ERRATIC OPERATION	6	DIFFUSER HEATING CONTROL	1	LOW DISPOSITION G.C. MISFECTION LOW FUNCTION TEST CYCLING ALERT	1								
	STOP FLIGHT FLIGHT AND TAKE OFF ON CROSS RIDE	INCORRECT DATA	LOSS OF AIR CONTROL OR CORRUPTED FEEDBACK	7	INCORRECT SET-UP WRONG CODE	1	A.C. DISPLAY OPERATOR VERIFY	1							
		ILLEGIBLE DATA	LOSS OF AIR CONTROL OR CORRUPTED FEEDBACK	7	INCORRECT SET-UP WRONG CODE	1	A.C. DISPLAY OPERATOR VERIFY	1							
STOP FLIGHT TO BRIDGE ENROUTE	CROSS RIDE RESPONSE	WILL NOT BRIDGE AND TAKE OFF	5	EXCESSIVE CROSSING PRESSURE	5	P-DISK APC A.C. DISPLAY OPERATOR VERIFY	3	PROTECT CRUISE SYSTEM SET-UP BRIDGE/ENROUTE	PRODUCTION						
	NO DATA	LOSS OF AIR CONTROL OR CORRUPTED FEEDBACK	6	INCORRECT SET-UP	1	A.C. DISPLAY OPERATOR VERIFY	1								
STOP FLIGHT TO BRIDGE ENROUTE	OUT OF CONTROL	WILL NOT BRIDGE AND TAKE OFF	5	WINDING IMPED AIR WIND BRIDGE	1	100% PILOT FROM BRIDGE CONTROL POSITION APC	1								
	CONTROL NOT FULLY ENABLED AND TAKE OFF	BRIDGE HEIGHT OUT OF SPEC. FAILURE TO OBSERVATION	5	TOOL WEAR ON CLIP-OFF TOOL WEAR ON CLIP-OFF IMPERFECT FEEDBACK ADJUSTION FROM WEAR	3	BRIDGE HEIGHT APC 100% PILOT FROM BRIDGE PREDETERMINED FRAME, LOW POSITION MISFECTION DISCUSS	1								
STOP FLIGHT TO BRIDGE ENROUTE	INSUFFICIENT CROSS	LOSS THRESHOLD	9	BRIDGE WIND INSUFFICIENT WIND PRESSURE	1	PREDETERMINED FRAME, PILOT FROM BRIDGE APC SET-UP INSPECTION	1	POST-INSPECTION APC TEST FRAME FOR CORRECT FRAME-OUT PERFORMANCE	WFT BRIDGE						
	TURING TOOL CORRECTS UNDESIRABLE POSITIONS	BRIDGE POSITION OUT OF SPEC.	6	INCORRECT TOOL SET-UP TOOL WEAR	1	BRIDGE POSITION APC SET-UP INSPECTION	1								
STOP FLIGHT TO BRIDGE ENROUTE	WELL LOCATING DISPERSE	WILL NOT ALLOW BRIDGE OPERATION	5	TOOL WEAR SET-UP BRIDGE	1	VISUAL INSPECTION BRIDGE APC SET-UP INSPECTION	1								
	WELL LOCATING PILLOT	WILL NOT ALLOW BRIDGE OPERATION	6	TOOL WEAR SET-UP BRIDGE	1	VISUAL INSPECTION BRIDGE APC SET-UP INSPECTION	1								
STOP FLIGHT TO BRIDGE ENROUTE	BRIDGE FOR SET WEAR/CORRECT	REDUCED SERVICE LIFE	9	TOOL WEAR SET-UP BRIDGE	1	SET-UP INSPECTION BRIDGE HEIGHT APC VISUAL INSPECTION BRIDGE APC	1								
	BRIDGE BRIDGE TO BRIDGE ENROUTE	LOSS BRIDGE	7	WIND BRIDGE WIND BRIDGE INCORRECT SET-UP WEAR	3	BRIDGE BRIDGE APC BRIDGE BRIDGE APC SET-UP INSPECTION PREDETERMINED FRAME.	1								

TL-NHTSA 019234

Process Description/ Part	Potential Failure Mode	Potential Effect(s) of Failure	C o n s e q u e n c e	Potential Cause(s) of Failure	C o n s e q u e n c e	Current Controls	S e r i o u s i t y	Recommended Action	Area/Individual Responsible	ACTION		S t a t e s	C o m p l e t e	P e r i o d
										1	2			
	INCREASE RIMMING	LOOSE SPRING DAMAGE SPRING	7	INCORRECT SET-UP MISUSE	3	SPRING INSPEL SPC PERMANENT MARK. RIMM HEIGHT SPC SET-UP INSPECTION	1	25						
	RESET RIMMING	NO SPRING SPRING WILL NOT OPERATE	3	POOR	6	IMP. PRESSURE SENSOR IMP. PRESSURE CHECK	1	15	TRAINING RE-EDUCATION TRAINING					
DRAIN/REIN FORCEABLE CONTACT	INSUFFICIENT ROLL	LOOSE CONTACT	7	LOW ROLL BROKEN ROLL INCORRECT SET-UP MISUSE	1	ROLL DIAMETER ON SPC SET-UP INSPECTION PERMANENT MARK.	1	7						
	EXCESSIVE ROLL	DAMAGED CONTACT LOOSE CONTACT	7	INCORRECT SET-UP MISUSE	1	ROLL DIAMETER ON SPC PERMANENT MARK. SET-UP INSPECTION	1	7						
	CONTACT RUBBING	CONTACT WEAR/DAMAGE EXCESSIVE OVER LIFE	7	POOR FEED	3	IMP. PRESSURE CHECK	1	25						
HIGH SPRING ANGLE	ANGLE TOO HIGH	REDUCED SPRING LIFE BROKEN SPRING LIFE SHIFT IN SET-POINT OVER LIFE DAMAGE IN-UP	9	NON-ADJUSTED TOOL INCORRECT SET-UP	1	ANGLE SPC SET-UP INSPECTION PERMANENT MARK. IMP. POSITION SENSOR	1	7						CRITICALITY OF PART TOOL, OPERATOR IDENTIFIED. ITERATIVE PROCESS IMPLEMENTED AND DISCUSSED.
	ANGLE TOO LOW	LOW CONTACT ON MOUNT FAILURE DAMAGED SPRING	9	LOW TOOL INCORRECT SET-UP	1	ANGLE SPC SET-UP INSPECTION PERMANENT MARK. IMP. POSITION SENSOR	1	7						"...SEE ABOVE..."
SET-UP POINTS, INITIAL, AND MOUNT AND ROLL	SET NOT CHECKED	WILL NOT INIT AND ROLL INTERNAL POSITION OUT OF SPEC.	5	PHONE NUMBER ALL DOWN ROLL	1	IMP. X PLYOT FROM SENSOR INTERNAL POSITION SPC	1	5						
	INTERNAL NOT FULLY RETRACTED AND ROLL	INTERNAL POINT OUT OF SPEC FAILURE IN COLLECTION	5	OUT-OF-TIME, MOUNT/ SENSOR DIRECTION FROM MOUNT SENSOR	3	IMP. X POSITION ON SENSOR SENSOR PERMANENT MARK. INTERNAL HEIGHT SPC	1	15						
MOUNT SENSOR INTERNAL SENSOR	INSUFFICIENT FORCE	LOOSE SENSOR	9	BROKEN TOOL INSUFFICIENT TOOL PRESSURE	1	SET-UP INSPECTION PARENT SENSOR SPC PERMANENT MARK.	1	9						
	SETTING TOOL, CHANGE IMPROPERLY MOUNTED	INTERNAL POSITION OUT OF SPEC.	5	INCORRECT SET-UP TOOL MOUNT-SENSOR	3	INTERNAL POSITION SPC SET-UP INSPECTION	1	15						
COLLECTOR TOOL MOUNTING	ON SENSOR FORCE TOO LOW, BUSH CLOSED	SENSOR CYCLE LIFE CHOP ACQUISITION SHIFT IN COLLECTION	9	OPERATOR SET-UP EXCESSIVE COLLECTION TOOL	1	IMP. X BUSH AT CHECK STATION IMP. X FUNCTION TEST CYCLED MOUNT FILEDING	1	9						
	ON SENSOR FORCE TOO HIGH, BUSH CLOSED	CHOP MOUNT REDUCED CYCLE LIFE SHIFT IN COLLECTION	9	OPERATOR SET-UP EXCESSIVE COLLECTION TOOL	1	IMP. X BUSH AT CHECK STATION IMP. X FUNCTION TEST CYCLED MOUNT FILEDING	1	9						
	TRACK BUSH NOT COLLECTED	CHOP MOUNT REDUCED CYCLE LIFE SHIFT IN COLLECTION	5	OPERATOR SET-UP	1	IMP. X BUSH AT CHECK STATION IMP. X FUNCTION TEST CYCLED MOUNT FILEDING	1	5						

T1-NHTSA 019235

FILED IN THE OFFICE OF THE SECRETARY OF DEFENSE, WASHINGTON, D.C. ON 10/27/92 AT 10:00 AM BY [unreadable]

Case No: 792-1 12-1 12-2
 Responsible: STAIR OFFICER / RCT KELLY
 or Area: CONTROL JIB UNIT, QUALITY IMPROVING

Supervisor and
 Field Manager:
 Engineering Area: _____

Asset: TWO CRANE CAR, LOAD TRUCK, LOAD TRUCK F-ARMED
 PART: HELIX

Prepared by: THOMAS
 Date: 5/79
 By Production Dept: 28...

EC

Check: C

8-20-79 10:00 AM

Failure Description/ Cause	Potential Failure Mode	Potential Effects of Failure	S e r i o u s i t y	P o t e n t i a l C o n s e q u e n c e s	C o n t r o l s	D e t e c t i o n	P r e v e n t i o n	Symptoms Indicators	Appropriate Responsibilities	ACTION Items Taken	S e r i o u s i t y					
											C	O	D	R		
CRANE UNIT Load characteristics change	Calibration of control system	WTF HELIX ARM EXHAUST ACFT OVER HEAVY	1	X	IMPROPER USE OF CALIBRATION NEW DATA USING FIELD RECORDING MISUSE TOOL TIME OVERVIEW SET-UP LIMIT	1	9									

Subject: **General Motors Mustang Performance 2+4000**
 Design Department: **General Motors**
 Design Branch: **Design**

Supplier and Plant Name:
 Model Year: **1971**
 Description: **Mustang**

Prepared by: **Tommy Lovgren**
 Date: **12/27/71**

Part Name, Number & Description	Potential Failure Mode	Potential Effect(s) of Failure	S.N.C.	Potential Cause(s) of Failure	Design Description	D.F.M.C.	Prevented Action	Approximate Frequency or Completion Rate	S E V I O R			
									S	E	V	I
(2076) Some flexible element of fluid containing cavity Transfers pressure from fluid to pressure containing element	Leak to outside fluid	Brake fluid leakage	1	Cracked rubber due to life due to low pressure design of mounting element Cracked rubber due to life due to excessive flexure of mounting element Cracked rubber due to life due to stress concentration caused by nonuniform stress distribution Chemical attack due to incorrect material specified Improper tolerances in all layers of thickness material Insufficient inspection/testing of thickness	Metal, bronze, and natural cork boots Material of construction Construction of boots Design of boots	1	Verify that the "check" cavity of 1 is bonded on a large amount of fluid quantity or elastic product rather than pressure in cavity of 1 or pressure.					
	Change in area of pressure transfer area life	Shift in suspension over life	7	Excessive slight thickness change Although the stiff Excessive material specified	Life history of change in area of pressure transfer	1						
	Excessive change of pressure transfer area using pressure	Excessive high pressure needed to adequately form pressure transfer area with time, or complete due to unreliability of form pressure		7	Although the stiff Insufficient material specified	Form and pressure means difference leading to different pressure area	1					

Porter
 EXHIBIT NO. 45

TI-NHTSA 018238

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN AREA)

Document Number
Revision Level
Revision Date

Page 1

System
Subsystem
Component Pressure Switch

Design Responsibility Pressure Switch Group

Original (Initial) Date

Model Year(s)/Vehicle(s) Various

Key Date 1993

Prepared By

Core Team Design Engineering, Manufacturing Engineering, Manufacturing Quality

Document #

Item #	Name / Function	Potential Failure Mode	Potential Effects of Failure	S e v e r i t y	C o n s e q u e n c e	Potential Cause(s) / Mechanism(s) of Failure	D e t e c t i v e	Current Design Controls	D e t e c t i v e	R e p a r a b l e	Recommended Action(s)	Responsibility & Target Completion Date	Action Results / Actions Taken
803790	CLIP (2713) (2728) Provides clamping force which holds pressure sensor together.	Fails to provide a suitable geometry for clamping.	Leakage	5	1	Clamp wall thickness incorrectly specified.	1	Sharp and impact testing.	1	2			print specified
803791	DIAPHRAGM (OR SEAL) (2713) Forms flexible element of fluid containment cavity.	Fails to contain fluid.	Fluid leakage.	5	1	<p>Gradual rupture over life due to improper design of supporting elements.</p> <p>Gradual rupture over life due to excessive flexure/strain/tear.</p> <p>Gradual rupture over life due to stress concentrations caused by asymmetric strain distributions.</p> <p>Chemical attack due to incorrect material specified.</p> <p>Increased thickness (or # of layers) of diaphragm material.</p> <p>Insufficient tooling/changing of diaphragm.</p>	1	Sharp, impulse, and thermal cycle tests.	1	2			industry usage comparison.
803792	DIAPHRAGM (OR SEAL) (2713) Provides a portion of the support surface for diaphragm.	Fails to correctly support the diaphragm.	Reduced diaphragm life results in leakage.	5	1	Contours of diaphragm support surface are specified incorrectly.	1	Sharp, impulse, and Thermal Cycle tests.	1	2			FEA

Kapton

CONFIDENTIAL

Leakage

TI-NHTSA 019239

Washer					Condition of edges of support surface specified incorrectly Clearance between washer I.D. and converter bump is specified too wide.	Comparison of design with similar products.			
Provides support for compression of gasket.	Fails to allow proper gasket compression.	Leakage.	6	<p>Washer thickness is incorrectly specified or unspecified.</p> <p>Washer thickness is specified too small.</p> <p>Washer material grade heat-treat is incorrectly specified.</p>	<p>1 Burst, impulse, and Thermal Cycle tests.</p> <p>Comparison of design with similar products.</p>	1	6		
Interacts with cup feature and provides a portion of support stack for clamp.	Fails to interface correctly with cup.	<p>Offcut assembly (washer O.D. too large).</p> <p>Peak vertical converter location relative to cup (washer O.D. too small).</p>	7	Washer O.D. specified incorrectly	<p>1 Comparison of design with similar products.</p> <p>Tolerance stackup analysis.</p>	1	7	Comparison of design with similar products	
	Fails to allow proper clamp.	<p>Reduced burst capability leads to leakage.</p> <p>Reduced fatigue resistance leads to leakage.</p>	8	<p>Thickness incorrectly specified.</p> <p>O.D. incorrectly specified.</p> <p>Edge condition incorrectly or unspecified.</p>	<p>1 Tolerance stackup analysis.</p> <p>Burst, impulse, and Thermal Cycle tests.</p>	1	8	CONFIDENTIAL	
CONVERTER PROJECTION	A ₀ = .287 .293								
Provides a portion of the support surface for diaphragm.	Fails to properly support diaphragm.	Reduced diaphragm life results in leakage.	8	<p>Contours of surface in contact with diaphragm are specified incorrectly.</p> <p>Condition of edges in contact with diaphragm are specified incorrectly.</p> <p>Clearance between converter bump and washer I.D. are specified too wide.</p>	<p>1 Burst, impulse, and Thermal cycle tests.</p> <p>Comparison of design with similar product.</p>	1	8		

Q.D. wash
VS ± 0.005

1.023
1.059

1.069
1.065

1.002
+0.010

2 = .017
.101

CONVERTER PROJECTION

A₀ = .287
.293

TI-NHTSA 0192400

Report Scatback

300806		EXPOSED (2880)								Page 3	
Provides a specific seating surface per SAE J512.	Fails to seal.	Leakage of brake fluid.	9	FF	Incorrect surface finish specification. Incorrect material specification. Incorrectly specified geometry. Excessive pressure.	1	Cross-check of print dimensions vs. SAE standard. Comprehensive evaluation of design of interface flange. Burst testing to customer specified limits.	1	9		
Provides correct thread for installation into mating part.	Fails to properly install in mating part.	Design flaws in mating part during installation. Does not allow installation.	7	FF	Threads specified improperly. Threads not gauged per ANSI spec's. Pitting buildup.	3	Cross-check of applicable SAE and ANSI standards.	3	12		
	Apparently installs, but fails to properly seat and seal.	Excess fluid leakage.	8	FF	Threads specified improperly. Threads not gauge per ANSI spec's. Pitting buildup.	1	Cross-check of applicable SAE and ANSI standards.	3	27		
Provides flange which interfaces with other components to form pressure-bearing structure	Material compa.	Leakage of oil/gas leads to leakage.	8		Improper material selection	1	Review of material properties.	1	9		
	Material degrades in presence of working fluid(s).	Leakage	9		Improper material selection.	1	Cross-check with similar products.	1	9		
	Inadequate environmental protection.	Long-term attack causes weakening of key areas which leads to leakage or breakage.	9		Improper or insufficient plating specification.	1	Comprehensive environmental testing.	3	27		

TI-NHTSA 019241

CONFIDENTIAL

Part/Process Name: **STATION P.V.**
 Design Responsibility: **STATION P.V. UNIT**
 Other Name (Internal): **STATION P.V.**

Supplier and Plants Affected:
 (List Supplier/Plant/Plant)
 Engineering Reference Index:

Prepared by:
 JOHN DUNCAN (Date): 12/28/93 Group: E
 Key Product/Part Index:

Process Description/ Purpose	Potential Failure Mode	Potential Effects of Failure	S E V E R I T Y	P O S S I B I L I T Y	Potential Cause(s) of Failure	O C C U R R E N C E	Current Controls	D E T E C T I O N	P R E V E N T I O N	Recommended Action	Person/Individual Responsible	ACTION Action Index	S E V E R I T Y	P O S S I B I L I T Y	D E T E C T I O N	P R E V E N T I O N
	CHECK THIS	INTERNAL CORROSION	7	1	WORN O-RINGS PRESSURE CORROSION MIS-ALIGNMENT WORN PART STUCK-IN WORN TOOL	1	100% VISUAL AIR LEAK CHECKS CHECK TO A STOP FLANGED PRESSURIZED WATERPROOF	1	7							
	CHEM MIGHT GET OF MIS-POSITION	WORN DISK/ROTOR IMPERFECT-OL LINK BANDS/BASE LACK OF WATERPROOFING SEAL CORROSION INTERNAL CORROSION	7	1	LOOSELY CHANGING PRESSURE IMPERFECT WPM TOOL WORN TOOL MIS-ALIGNMENT BRUSH-ON-SEAL, ETC OF	1	CHEM TANGLE ON SFC AIR LEAK CHECKS WPM CERTIFICATION PROGRAM	1	7							
	NO FRESHING	INTERNAL CORROSION MAY TO PART BROKEN/OL CHECK LOST AT FUEL CHECK BROKEN/OL LINK (OL)	7	1	WDM CHECK STOP & RE- CHECK FOLLOWING UNEXPECTED PROBLEMS	1	100% VISUAL AT PACK CHECK TANGLE SFC	1	94	RE-WITH (CHECK) CHECK TO STOP AT CHECK STAGE	HFC INC	CMP	7	2	1	14
	NO FUEL CHECK	INTERNAL CORROSION MAY TO POTENTIAL LEAK FROM	7	2	WDM CHECK STOP AND RE-CHECK FOLLOWING UNEXPECTED CHECK	2	100% VISUAL CHECK TANGLE ON SFC NEXT INSPECTION	2	17	RE-WITH (CHECK) CHECK TO STOP AT CHECK STAGE	HFC INC	CMP	7	2	1	14
	CHECK ELK/MS	CONTAMINATION CHECKED LINKS AT SFC INSPECTION	7	1	WDM CHECK STOP ON UNEXPECTED CHECK STAGE	1	WDM CHECK AT PACK CHECK TANGLE ON SFC CHECK UNCLEAN CLEAN	2	14		HFC INC	CMP	7	2	1	14
	FINISHED DESIGN FUNCTION TEST	DIFFERENT CALIBRATION SMT UNEXPECTED BEHAVIOR WDM MAY GOOD BEHAVIOR	7	2	TRAVELING OUT OF CALIBRATION INCORRECT SMT BEHAVIOR	2	CALIBRATION PREPARED ON SFC FOLLOW PROBLEM SPECIALIST AND PERIODIC PERIODIC MAINTENANCE	1	14		HFC INC	CMP	7	2	1	14
	FINISHING O-RING SENSOR	O-RING MAY BEHAVE FINISHING O-RING	7	1	WDM CHECK STOP OR UNEXPECTED BEHAVIOR	1	O-RING INSPECTION TRAIN STATION P.V.	3	14		HFC INC	CMP	7	2	1	14
	FINISHING AND PACK FINISHED BEHAVIOR	WDM CHECK STOP FINISHING BEHAVIOR TO WDM LOCATION	5	1	INCORRECT PACKING CHECK OTHERWISE BEHAVIOR	1	PACK AUDIT VISUAL STANDARDS PACKING ON SMT-200 PACKING	1	5		HFC INC	CMP	7	2	1	14

T-NHTSA 019243

167
166
165
164
163
162
161
160
159
158
157
156
155
154
153
152
151
150
149
148
147
146
145
144
143
142
141
140
139
138
137
136
135
134
133
132
131
130
129
128
127
126
125
124
123
122
121
120
119
118
117
116
115
114
113
112
111
110
109
108
107
106
105
104
103
102
101
100
99
98
97
96
95
94
93
92
91
90
89
88
87
86
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69
68
67
66
65
64
63
62
61
60
59
58
57
56
55
54
53
52
51
50
49
48
47
46
45
44
43
42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1