

UNCLASSIFIED

AD 407 292

DEFENSE DOCUMENTATION CENTER

FOR

SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION, ALEXANDRIA, VIRGINIA



UNCLASSIFIED

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

63-4-1

407 292

CATALOGED BY DDC
AS AD No. 407292

Ford Motor Company
AERONUTRONIC DIVISION

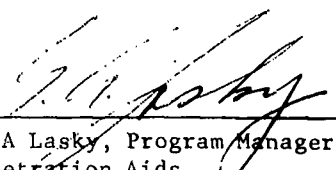
RELIABILITY SUMMARY REPORT FOR MAY 1963

Penetration Aids Development

Contract AF 04(694)-23

Dated 15 September 1961

Approved by:


G. A Lasky, Program Manager
Penetration Aids
Re-entry Systems Programs

AERONUTRONIC DIVISION

FORD MOTOR COMPANY

Newport Beach, California

Ford Motor Company
AERONUTRONIC DIVISION

COMPONENT FAILURE SUMMARY
RS-2

Month Ending May 31, 1963

COMPONENT NAME	AERONUTRONIC PART NUMBER	OPERATION DURING:	CURRENT MONTH					LAST SIX MONTHS				
			OPERATING CYCLES	NUMBER OF FAILURES				OPERATING CYCLES	NUMBER OF FAILURES			
				CRITICAL	MAJOR	MINOR	TOTAL		CRITICAL	MAJOR	MINOR	TOTAL
SEQUENTIAL TIMER ACCELERATION SENSOR	201203 and 202656	DEVELOPMENT TEST	ENV.					15	1			1
		CERTIFICATION AND ACCEPTANCE	ENV.					28				
			AMB.	290		1	1	427			2	2
		FIELD OPERATION	CHECKOUT FLIGHT					5				
SEQUENTIAL TIMER PULSE SEQUENCER	201203 and 202656	DEVELOPMENT TEST	ENV.									
		CERTIFICATION AND ACCEPTANCE	ENV.					14	1			1
			AMB.	335	1		1	744	1	3		4
		FIELD OPERATION	CHECKOUT FLIGHT					12				
ORIENTATION MECHANISM - RE-ENTRY	200595 and 201700	DEVELOPMENT TEST	ENV.									
		CERTIFICATION AND ACCEPTANCE	ENV.									
			AMB.	8				980				
		FIELD OPERATION	CHECKOUT FLIGHT					38				
ORIENTATION MECHANISM - VACUUM	201644 and 202580 and 203400	DEVELOPMENT TEST	ENV.									
		CERTIFICATION AND ACCEPTANCE	ENV.					16				
			AMB.	12				1341		6		6
		FIELD OPERATION	CHECKOUT FLIGHT									
SEQUENCE DISTRIBUTION BOX	202461 and 202543 and 203512	DEVELOPMENT TEST	ENV.									
		CERTIFICATION AND ACCEPTANCE	ENV.									
			AMB.	3				137		3	2	5
		FIELD OPERATION	CHECKOUT FLIGHT					12				
POWER SUPPLY	201201 and 202837	DEVELOPMENT TEST	ENV.									
		CERTIFICATION AND ACCEPTANCE	ENV.									
			AMB.					4			1	1
		FIELD OPERATION	CHECKOUT FLIGHT					5				
PAIRING EJECTION MECHANISM	201411 and 203024 and 204043	DEVELOPMENT TEST	ENV.					10				
		CERTIFICATION AND ACCEPTANCE	ENV.					32	1	3		4
			AMB.	3				7				
		FIELD OPERATION	CHECKOUT FLIGHT					4				
RE-ENTRY VARIJECTION	203181 et al.	DEVELOPMENT TEST	ENV.	19				28		1		1
		CERTIFICATION AND ACCEPTANCE	ENV.	6				12				
			AMB.	30	2		2	50		8	1	9
		FIELD OPERATION	CHECKOUT FLIGHT									
VACUUM VARIJECTION	203090 203252 et al.	DEVELOPMENT TEST	ENV.	31				54				
		CERTIFICATION AND ACCEPTANCE	ENV.	30				67				
			AMB.	28				116		4		4
		FIELD OPERATION	CHECKOUT FLIGHT					18				
RE-ENTRY SPRING EJECTOR	202397	DEVELOPMENT TEST	ENV.									
		CERTIFICATION AND ACCEPTANCE	ENV.									
			AMB.					21		4		4
		FIELD OPERATION	CHECKOUT FLIGHT									
VACUUM SPRING EJECTOR	203244	DEVELOPMENT TEST	ENV.									
		CERTIFICATION AND ACCEPTANCE	ENV.									
			AMB.									
		FIELD OPERATION	CHECKOUT FLIGHT					1				
VACUUM DECOY	203451 203449 et al.	DEVELOPMENT TEST	ENV.					30		8		8
		CERTIFICATION AND ACCEPTANCE	ENV.	2	1		1	12		7		7
			AMB.									
		FIELD OPERATION	CHECKOUT FLIGHT					16				

Ford Motor Company
AERONUTRONIC DIVISION

RELIABILITY PROBLEM STATUS
RS-3

PROBLEM NUMBER	COMPONENT NAME AND PART NUMBER	DESCRIPTION OF PROBLEM	CAUSE OF FAILURE	FAILURE FROM THIS PROBLEM			CONJECTIVE ACTION	EFFECTIVITY	FIX PROVEN PROBLEM CLOSED
				THIS MONTH	LAST SIX MONTHS	THIS MONTH			
C-105	Sequential Timer 202656	The sequencer motor failed to start when "recycle" voltage was applied.	Preliminary investigation indicated the motor-governor unit was at fault. Further investigation will be carried out by Aeronutronic and the supplier.	1	1	1	Pending the results of the investigation.		
C-79	Gas Generator Squib (Power Supply) 203004	The unit failed to ignite during acceptance testing.	Absorption of water by the igniter pellet occurred during humidity test. Leakage probably was the result of mishandling.	0	1	1	The sublot from which the failed unit was selected will not be used in higher assemblies.	May 22, 1963	May 31, 1963
M-106	Sequence Distribution Box 203512 (Relays 203480, 203482, 203717)	Relays indicated high contact resistance.	Supplier manufacturing and test methods and procedures were inadequate.	12	12	12	Procurement documents (drawings, specifications, etc.) have been upgraded to incorporate provisions for better manufacturing controls and more thorough testing.	May 3, 1963	May 3, 1963
M-100	Falting Ejector 204043	Ejection velocity was below lower specification limit during acceptance testing; also, the reaction load was above the upper specification limit.	The new design has slightly different characteristics with respect to velocity and reaction load.	0	3	3	Aeronutronic has proposed that the specification be changed to reflect actual system requirements, which include the demonstrated performance characteristics of the new unit.		
M-101	Shaped Charge Assy. 203030	The shaped charge did not completely cut the strap. The assay had been exposed to high salt fog, salt fog, and random vibration.	Handling of the shaped charge ribbon during and prior to installation caused fretting which resulted in inadequate performance during burning.	0	2	2	A special form block has been made to pre-form the ribbon prior to installation, thus preventing the damage during installation.	April 29, 1963	May 31, 1963

MAY 1963

RELIABILITY PROBLEM STATUS
RS-3

PROBLEM NUMBER	COMPONENT NAME AND PART NUMBER	DESCRIPTION OF PROBLEM	CAUSE OF FAILURE	FAILURE FROM THIS PROBLEM			CORRECTIVE ACTION	EFFECTIVITY	FIX PROVEN PROBLEM CLOSED
				THIS MONTH	LAST SIX MONTHS	MAY 1963			
M-94	MK 3/4 Re-entry Varijector (Low Range) 203180	Total corrected impulse was below the lower limit of acceptability during firings at both low (2) and ambient (1) temperature.	The specification requirements were unclear and the methods and procedures for obtaining impulse were not well defined.	0	3		The applicable specifications have been updated to reflect the results of a "statistical test program", the purpose of which was to clearly define the range of acceptable impulse values.	Production Units	May 31, 1963
M-106	MK 3/4 Re-entry Varijector (Ejector) 203799	Incomplete burning of the propellant occurred during functional test. Units had been exposed to qualification test environments.	The teflon nozzle seals allowed water to enter the motor case during exposure to humidity.	2	2		Improved process methods and controls have been incorporated for the teflon seal process. Requalification tests are in progress to evaluate the effectiveness of this fix.		
M-95	MK 3/4 Vacuum Varijector (Low Range) 203798	Total corrected impulse was below the lower limit of acceptability during firings at low temperature.	Same as Problem No. M-94.	0	2		Same as Problem No. M-94.	Production Units	May 31, 1963
M-102	Vacuum Varijector	The teflon coating separated from the part pads during exposure to temperature and humidity cycling.	The bonding and curing procedures were not adequately controlled by manufacturing process specifications.	0	6		Aeronutronic has revised the manufacturing process specification which controls this process.	Production Units	May 27, 1963
M-83	MK 6 Varijector 202252	Units failed to pass the "Radiflon" leak test after being subjected to qualification test environments.	Probable cause: Corrosion of the "O" ring seal areas on the motor case by the combined action of N_2O_4 and salt spray environments, respectively.	0	14		Performance tests of leaky units indicated no degradation, therefore this problem reverts to "minor" for RS purposes.	May 31, 1963	May 31, 1963

Ford Motor Company
AERONUTRONIC DIVISION

RELIABILITY PROBLEM STATUS
RS-3

PROBLEM NUMBER	COMPONENT NAME AND PART NUMBER	DESCRIPTION OF PROBLEM	CAUSE OF FAILURE	FAILURE FROM THIS PROBLEM			CORRECTIVE ACTION	EFFECTIVITY	FIX PROVEN PROBLEM CLOSED
				THIS MONTH	LAST SIX MONTHS	LAST SIX MONTHS			
M-76	ME 6 Re-entry Decoy Model 1013P	The nose canister would not eject from decoy.	Development test and friction/stress analysis indicate that the canister sticking problem is caused by excessive locking taper characteristic of the decoy profile.	5	35		Undelivered units will be reworked by bonding a solid teflon sheet on the conical surface of the nose canister to reduce friction.	SN 334 and Subs.	
M-88	ME 6 Re-entry Decoy Model 1013P	Nose canister bonded joints separated during vibration test. Unit had been through all other qualification environments.	Degradation of support bond strength during exposure to H ₂ O and vibration. The design appears to be marginal with respect to the present vibration requirement.	0	3		Aeronutronic is negotiating to reduce vibration requirements. Redesign of the nose canister is under investigation. (See M-76, above.)		
M-71	ME 6 Midcourse Decoy 203449 and ME 4 Vacuum Decoy 203451-501	Decoy did not deploy after exposure to humidity and/or plus propellant oxidiser (H ₂ O ₂). Separation of the aluminum coating occurred.	The decoy folds stuck together, and when piston released alcohol the decoy ruptured locally. High temperature-humidity cycling separates from the weld and also caused stickiness of the seams.	0	15		Tests indicate that a new teflon wrap and aluminum chromeate will protect the ME 6 decoy.		
							The humidity requirement has been waived by the customer.	1 and Subs. on ME 4 Units	
M-97	ME 6 Midcourse Decoy 203449	The aluminum and hub (veriflector end) separated from the canister during vibration testing.	Bond strength is very sensitive to process variations. Improvements are under investigation.	0	1		Pending the results of the investigation, action has been initiated to incorporate proof testing for bond strength. Supplementary riveting is presently being tested.		

MAY 1963

RELIABILITY PROBLEM STATUS
RS-3

PROBLEM NUMBER	COMPONENT NAME AND PART NUMBER	DESCRIPTION OF PROBLEM	CAUSE OF FAILURE	FAILURE FROM THIS PROBLEM		CORRECTIVE ACTION	EFFECT- TIVITY	FIX NUMBER PROBLEM CLOSED
				THIS MONTH	LAST SIX MONTHS			
M-107	ME 4 Vacuum Decoy 203431-501 and ME 6 Midcourse Decoy 203449	Decoy canister halves would not separate both during a functional test at 400 RPM and during manual disassembly.	Temperature induced tackiness of the decoy teflon wrap and the internal canister surfaces.	5	5	Development testing is underway to provide compatibility data on teflon wrap material and the canister surface. Aeronutronic is investigating canister separation to compare the forces available with the expected total restraining forces.		

MAY 1963

DISTRIBUTION

EXTERNAL

Capt. J. Eibling/BSYST Norton Air Force Base California	1 Copy	Advance Research Projects Agency (ARPA) Washington 25, D. C. Attn: Mr. C. M. McLain	1 Copy
BSTRA Norton Air Force Base California	1 Copy	Space Technology Laboratories Inc No. 1 Space Park Redondo Beach, California	
AVCO/Everett Research Labs 2835 River Beach Parkway Everett, Massachusetts		Attn: Document Processing	20 Copies
Attn: Dr. C. Petty	1 Copy	Aerospace Facility, San Bernardino P. O. Box 1308 San Bernardino, California	
AVCO/RAD 201 Lowell Street Wilmington, Mass.		Attn: Dr. H. Claflin	5 Copies
Attn: Dr. R. W. Detra	1 Copy	The Martin Company P. O. Box 179 Denver 1, Colorado	
U. S. Army Material Command Zeus Project Office Redstone Arsenal, Alabama		Attn: Mr. V. L. Easterly (Library)	1 Copy
Attn: AMCPM-ZET	2 Copies	Cornell Aeronautical Labs, Inc. 4455 Genesee Street Buffalo 21, New York	
Strategic SYSTO AFSSA-AS-2 United States Air Force Washington 25, D. C.		Attn: Mr. J. Pignataro	1 Copy
Attn: Lt. Col. H. S. Holdsambeck	1 Copy	Rand Corporation 1700 Main Street Santa Monica, California	3 Copies

DISTRIBUTION (Continued)

Massachusetts Institute of Technology Lincoln Laboratory - Kwajalein P. O. Box 56 Navy 824 FPO, San Francisco, California	Defense Documentation Center (DCC) Arlington Hall Station Arlington 12, Virginia	10 Copies
Attn: B. J. Benn	6555th Test Wing Patrick Air Force Base Florida	2 Copies
Massachusetts Institute of Technology Lincoln Laboratory Lexington 73, Mass.	Attn: DWTME	1 Copy
Attn: Mr. V. J. Guethlen	General Electric Company (RSD) 3198 Chestnut Street Philadelphia, Pa.	2 Copies
Massachusetts Institute of Technology Lincoln Laboratory Lexington 73, Mass.	Attn: Dr. Malkin	1 Copy
Attn: Dr. C. R. Weiser	Chief, Army Pacific Field Office Kwajalein Island, Marshall Islands Box 26, Navy 824 FPO, San Francisco, California	1 Copy
Air Tech Intelligence Center Wright-Patterson Air Force Base Ohio	Barnes Engineering Company Stamford, Connecticut	1 Copy
Attn: AFCIN-4	Attn: Mr. W. Planet	1 Copy
Bell Telephone Laboratories Whippany, New Jersey	Radio Corporation of America (RCA) Moorestown, New Jersey	1 Copy
Attn: Mr. T. Hutchinson 2B274	Attn: R. E. Kansas (DAMP)	1 Copy
Bell Telephone Laboratories Whippany, New Jersey	U. S. Naval Missile Center Code 100A Point Mugu, California	1 Copy
Attn: Mr. C. Hoover, Jr.	Attn: Mr. C. Gebert	1 Copy
Bell Telephone Laboratories Whippany, New Jersey		
Attn: Mr. D. W. Soyka		1 Copy

DISTRIBUTION (Continued)

INTERNAL

G. Specht	1 Copy
B. J. Boothe	1 Copy
J. G. Varley	1 Copy
J. S. Douglas	1 Copy
D. M. Kelley	1 Copy
J. S. Scherer	2 Copies
J. Stanwood	1 Copy
W. C. Olson	1 Copy

D. M. Mirecki
Aeronutronic Rep.
P. O. Box 1737
Vandenberg Air Force Base,
California 2 Copies

F. W. Adkins
Aeronutronic Rep.
P. O. Box 4127
Hangar "F"
Patrick Air Force Base, Florida 2 Copies