

UNCLASSIFIED

AD 401 323

*Reproduced
by the*

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.

63-3-2

WDL-TR2001

LETTER REPORT

401 323

MONTHLY RELIABILITY, FAILURE, AND PROBLEM
SUMMARIES, LETTER REPORT FOR DECEMBER 1962

Prepared by

PHILCO CORPORATION
Western Development Laboratories
Palo Alto, California
A Subsidiary of Ford Motor Company

Contract No. AF04(647)-532
Contract No. AF04(647)-829
Contract No. AF04(695)-113

Prepared for

SPACE SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE
Inglewood, California

APR 15 1963

TISA

CATALOGED BY A3TIA
AS AD NO. 401 323

PHILCO

63 2 72

WESTERN DEVELOPMENT LABORATORIES

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	INTRODUCTION	
	1.1 General	1-1
2	FIELD AND VEHICLE FAILURES	
	2.1 General	2-1
	2.2 Program 162's Current Problems	2-1
	2.3 Program 461's Current Problems	2-3
	2.4 Current Vehicular Problems.	2-3
3	RELIABILITY PROBLEM AREAS	
	3.1 General	3-1
	3.2 RPA No. 53	3-1
	3.3 RPA No. 72	3-1
	3.4 RPA No. 73	3-1
	3.5 RPA No. 74	3-2
	3.6 RPA No. 77	3-2

SECTION 1

INTRODUCTION

1.1 GENERAL

The general format of this report is narrative. Current failures during the month are discussed with a descriptive paragraph which includes the location of the failure in detail, probable or known causes, date of failure, type part, corrective action, and effect on flight schedules. Each month the failures previously reported are up-dated with the current status until firm solutions are reached. Section 2 covers those serious field and vehicle failures that have developed during the reported month, but are not directly associated with Reliability Problem Areas (RPA's).

Section 3 of this report discusses in detail the problems which developed during the reported month which have been considered serious enough to formalize into RPA's. Each RPA that developed reportable items during the month is covered in detail sufficient to indicate its most correct status and to reflect any activity which serves to eliminate the problem. In addition to the RPA discussion, a Reliability Problem Status Form is added to outline all active RPA's of the reported programs.

SECTION 2

FIELD AND VEHICLE FAILURES

2.1 GENERAL

The following narratives cover critical/major field and vehicle failures of Programs 461 and 162 which occurred during December 1962, as well as bringing the status of past-reported failures up-to-date. The more serious failures were reported to SSD by TWX or telephone; other failures of the same classification, but of less serious consequence, are also described in the ensuing paragraphs.

2.2 PROGRAM 162's CURRENT PROBLEMS

2.2.1 Quad-Helix Elevation Motor

(Reported initially in the August Failure and Problem Summary, TR1914, for a failure at ATS. A second report was made by phone 14 December 1962 on a similar failure at TTS).

Analysis of the latter case has revealed that the motors failed because of a short in the Silicon Control Rectifier at the control winding circuit. A recommendation has been made to add a fuse to the circuit, which will give a fail-safe condition. Also, if further investigation shows the need of another type SCR, then that will be a further recommendation.

2.2.2 ATS UHF Doppler Parametric Amplifier

(Reported in TR1914).

One relay and two diodes failed over a period of two days. Analysis has revealed a shorted coil in the relay. This led to the subsequent failure of the diodes. There is no prior history of failure of this part, and cause is diagnosed as random; nevertheless, this item will be kept under surveillance.

2.2.3 ATS Verlorl Nutating Scanner

(Reported in TR1914).

The excessive vibrations in the scanner, which were observed during 50 percent crossover, were found to be caused by a weak mounting plate. The aluminum mounting plate was replaced with one fabricated from steel, and no further trouble has been experienced.

2.2.4 ATS Verlorl Transistor Encoder Amplifier

(Reported in TR1914).

Plans are being made to conduct a reliability engineering evaluation of this amplifier. This item has been included in the budget now being prepared for the follow-on contract.

2.2.5 NHS Verlorl Encoder

(Reported by phone 11 December 1962).

As reported previously, this failure occurred during FTV 1155, causing the loss of passes 29 and 30. The Verlorl antenna had been moved from the Radome to make room for the Prelort antenna; just before moving, a crack in the antenna elevation housing was welded. This welding apparently caused the housing to warp. Subsequently, heavy rains produced a leak which resulted in water entering the encoder and producing this failure. The housing has been caulked to prevent recurrence of failures of this type and, as added protection, sensitive components have been wrapped with moisture-resistant materials.

2.2.6 TTS Quad-Helix Antenna Azimuth Synchro Drive Motor

(Reported by phone 14 December 1962).

Analysis of two failed motors, which were sent to the vendor's plant for repair, disclosed that they were actually secondary in nature. Shorted Silicon Control Rectifiers in the field winding circuit caused

excessive current, which burned up the windings. A recommendation to prevent further recurrences of this type is to add a fuse to this circuit. Further investigation should determine if additional changes must be made.

2.3 PROGRAM 461's CURRENT PROBLEMS

2.3.1 PICE Memory Power Supply Failure

(Reported in September Failure and Problem Summary, WDL-TR1933).

The failure of this power supply caused the loss of pass 446 of FTV 3502. Cause of failure was a collector-to-emitter short in one 2N511A transistor. Although this failure had serious consequences, investigation showed it to be a normal wearout type failure. At the time of failure, this part had accrued 11,143 operating hours.

2.3.2 VTS T&D Antenna Hydraulic Supercharger Pump

(Reported by Telecon on 26 December 1962).

An investigation is under way to determine the exact cause of this part's failure. The vendor who supplies the pump and reworks units which have been in service has provided us with failure analysis of two of our pumps, which they repaired recently. A complete laboratory analysis of the failed portions of the pumps will be made prior to rendering an opinion as to the exact cause or causes of this failure.

2.4 CURRENT VEHICULAR PROBLEMS

There are no new vehicular problems to report.

SECTION 3

RELIABILITY PROBLEM AREAS

3.1 GENERAL

The following section discusses changes in status in active reliability problem areas (RPA's) during the reporting period.

3.2 RPA NO. 53 (ANGLE TRACKER ANTENNA SCANNER ASSEMBLY)(PROGRAM 461)

A modification kit for the purpose of installing a vibration monitor to give early indication of bearing wear is being implemented. The scheduled completion date is 15 February 1963.

3.3 RPA NO. 72 (COLLINS IC-85 DTM CHOPPER)(PROGRAM 461)

The six redesigned units which were submitted to Philco WDL for evaluation have completed the environmental portion of their qualification tests. Incomplete results of those tests have resulted in the failures listed below:

Insulation Resistance	- No. 3 and No. 6 are below spec.
Shock (non-operating)	- One failure (dwell time).
Low Temperature Storage	- No. 1 and No. 5 failed.
Low Temperature Operation	- Six failures in phase lag.
High Temperature Operation	- One failure.

The six units have been on life test at 43°C for 264 hours with three positive failures and two marginal failures.

3.4 RPA NO. 73 (AIR CONDITIONERS FOR PICE EQUIPMENT)(PROGRAM 461)

Since the issuance of last month's report (WDL-TR1980), Beckman Systems has decided not to make the proposed trial modification to the translation cabinet. Initiation of a field modification to this equipment is presently under way.

3.5 RPA NO. 74 (UHF COMMAND TRANSMITTER ROTARY JOINT)(PROGRAM 461)

Installation of the field modification kits have been completed and a workmanship test has been conducted. All tests are satisfactory; therefore, this reliability problem area is now closed.

3.6 RPA NO. 77 (VERLORT RADAR POTTER-BRUMFIELD RELAYS TYPE MH 6008, MH 6008-1, MH 6008-2) (PROGRAM 162)

A reliability investigation following the lines of circuit application analysis is partially complete. No indications of misapplication of the relays have been revealed. The primary emphasis of the investigation is shifting to determining inherent weaknesses in the relays which can be remedied.

RELIABILITY PROBLEM STATUS						
(PROGRAMS 461 AND 162)			MONTH ENDING		31 December 1962	
PROBLEM NO. AND DATE OPENED (1)	COMPONENT NAME (PART OR ASSY) AND NUMBER (2)	DESCRIPTION OF PROBLEM (3)	CAUSE OF PROBLEM (4)	CORRECTIVE ACTION (5)	CLOSING STATEMENT AND DATE OF CLOSURE (6)	
RPA #53 Date opened 30 November 1960	Angle Tracker Antenna Assem- bly WDL H-10 (Canoga No. 7329)	Noisy-vibrat- ing Scanner at VTS & NHS	Unbalanced Condition of Nutator Assem- bly and improp- er gear train tension.	ECR (Engineering Charge Re- quest) #270 for a scanner vibration monitor to be in- stalled at VTS is scheduled for completion 2/15/63. ECR #322 to replace existing tor- que tube and generator gears at VTS & NHS has been cancel- led.		
RPA #68 Date opened 13 September 1961.	Rotron Muffin Fan	Unusually high failure rate in Data Hand- ling Equipment.	Breakdown of "O" ring oil seals.	Joy manufactured Axivane Fan is available as a MIL-quali- fied replacement fan. Pro- posed Modifications Nos. 593 and 594 are cancelled and are rewritten into ECR #614 to authorized replacement of all Rotron Muffin Fans installed in field equipment to be re- placed with the Joy Axivane Fan.		

WDL 1109C

REV. 6-62

RELIABILITY PROBLEM STATUS					
(PROGRAMS 461 AND 162)			MONTH ENDING		
			31 December 1962		
PROBLEM NO. AND DATE OPENED (1)	COMPONENT NAME (PART OR ASSY) AND NUMBER (2)	DESCRIPTION OF PROBLEM (3)	CAUSE OF PROBLEM (4)	CORRECTIVE ACTION (5)	CLOSING STATEMENT AND DATE OF CLOSURE (6)
RPA #69 Date opened 6 Feb 1962	Electron Tube 5965 (General Electric, Westinghouse, RCA, Tungsol)	Excessive tube rejection rate in the Acquisition Programmer Milgo d.c. Amplifiers Model 1007-21D	Rejections are due to tube's inability to balance equipment output; however, reliability design studies indicate an apparent equipment design inadequacy.	Corrective action being implemented in the field is to use only specified MIL-Spec tubes as replacement items. Additional corrective action is currently under study. A spare D-C amplifier was modified to increase filament voltage from 6.5 to 9.4 volts. This modification was made in September but conclusive results have not been achieved; all testing was done in a static rather than a dynamic condition.	
RPA #70 date opened 3 April 1962	Electron Keyer Tube 6C21.	Excessive tube failure rate in Radar Modulator R3JK2 and RU361P	Cause of problem is overstressed parts	Corrective action has been recommended and is being studied.	

RELIABILITY PROBLEM STATUS					
(PROGRAM 461 AND 162)			MONTH ENDING		
			31 December 1962		
PROBLEM NO. AND DATE OPENED (1)	COMPONENT NAME (PART OR ASSY) AND NUMBER (2)	DESCRIPTION OF PROBLEM (3)	CAUSE OF PROBLEM (4)	CORRECTIVE ACTION (5)	CLOSING STATEMENT AND DATE OF CLOSURE (6)
RPA #71 Date opened 3 April 1962	Chopper, Stevens Arnold CH792	Excessive failure rate of chopper used in acquisition programmer, Milgo 1007- 21D.	Laboratory Analysis indi- cates that choppers were inoperative due to mis- adjustments and improper cleaning. A difference in the chopper reed appears also to con- tribute to the problem.	Cleaning and adjustment pro- cedures for servicing Steven Arnold Choppers have been distributed for field maintenance information. Further corrective action is pending the results of vendor recommendations to the subcontractor.	
RPA #72 Date opened 30 March 1962	Collins IC-85 DTM Chopper, Control and Display Equip- ment and Dis- play Dacon	Excessive failures	Inadequate vendor design and manufact- uring techni- ques.	Referred problem to vendor for design and fabrication improvement. Vendor acknowledged deficiencies and has attempted to im- prove the units. Six (6) of the new units are being tested by Philco for evalua- tion.	

RELIABILITY PROBLEM STATUS					
(PROGRAMS 461 AND 162)			MONTH ENDING		
			31 December 1962		
PROBLEM NO. AND DATE OPENED (1)	COMPONENT NAME (PART OR ASSY) AND NUMBER (2)	DESCRIPTION OF PROBLEM (3)	CAUSE OF PROBLEM (4)	CORRECTIVE ACTION (5)	CLOSING STATEMENT AND DATE OF CLOSURE (6)
RPA #73 Date opened 30 March 1962	Air Condition- ers for PICE equipment.	Excessive motor failures insufficient cooling of PICE equip- ment.	Poor applica- tion design.	Recommendation of piping building air-conditioned air into PICE cabinets and piping exhaust air outside of building is under study. The decision as to course of action is pending.	
RPA #74 Date opened 30 April 1962	C/T Rotary Joints and Wave Guide Section at NHS	Freezing of rotary joint, which prevent- ed motion of antenna in transverse and declination axes, and severe arcing and destruc- tion of nylon spacers.	Weakness in design of aluminum bearing on aluminum, re- sulting in chipping material, which worked into the bear- ings and caused the joints to freeze.	Engineering change request Nos. 302 and 353 for VTS and NHS provides for the re- design and fabrication of connecting flexible wave- guide to eliminate misalign- ment problems, re-design and fabrication of declination and transverse rotary joints to eliminate all metal bear- ing surfaces, and to provide for rotational adjustment of polarizer to eliminate mis- alignment.	ECR #353 has been installed at NHS and has successfully passed the QC workmanship test. This RPA is closed as of 31 December 1962

RELIABILITY PROBLEM STATUS					
(PROGRAMS 461 AND 162)			MONTH ENDING 31 December 1962		
PROBLEM NO. AND DATE OPENED (1)	COMPONENT NAME (PART OR ASSY) AND NUMBER (2)	DESCRIPTION OF PROBLEM (3)	CAUSE OF PROBLEM (4)	CORRECTIVE ACTION (5)	CLOSING STATEMENT AND DATE OF CLOSURE (6)
RPA #75 Date opened 30 April 1962	PAP 50 conduc- tor special cable (CA9074) from DAP Building to C/T Building at VTS	Intermittent conduction.	Moisture in- trusion at spliced joints which caused cable deterior- ation and low resistance between the conductors.	Restoration of present cable using best material and splicing techniques available. Recommend the use of approved armored type cable for all future underground applications, and scheduled maintenance inspection for existing cables. Also recommend in- vestigation of use of cable troughs for above-ground applications to insure easy maintenance and rodent pro- tection.	
RPA #76 Date opened 18 July 1962	Verlort Radar Strobe Lamps (Baldwin En- coders A9SP- 161A)Sylvania S913.	Elevation and Azimuth Strobe Lamps' erratic operation.	Change of strobe rate from 0.25 pps to 25 pps.	A trial modification is being evaluated at NHS. Final corrective action will depend on the outcome of this investigation.	

RELIABILITY PROBLEM STATUS					
(PROGRAM 461 AND 162)			MONTH ENDING 31 December 1962		
PROBLEM NO. AND DATE OPENED (1)	COMPONENT NAME (PART OR ASSY) AND NUMBER (2)	DESCRIPTION OF PROBLEM (3)	CAUSE OF PROBLEM (4)	CORRECTIVE ACTION (5)	CLOSING STATEMENT AND DATE OF CLOSURE (6)
RPA #77 Date opened 18 July 1962	Verlort Radar Potter Brumfield re- lays	Excessive Re- lay failures	Partial Results of the invest- igation indic- ate no misuse of the relay. There is a strong possi- bility that the relay it- self is at fault.	Subject to final results of present investigation.	
RPA #78 Date opened 18 July 1962	Telemetry De- commutator	Excessive tube failures	Undetermined	Under investigation	
RPA #79 Date opened 31 August 1962	GP 1 Equipment at NHS	Excessive part failures throughout the equipment	Of the five main areas of failure, one emerges as being most susceptible to corrective action. A reliability engineering review is under-	Corrective action shall be based on the feasibility of correcting the deficiencies disclosed by this investiga- tion.	

WDL 1109C
REV. 6-62

way to deter-
mine corrective
action needed.

DISTRIBUTION LIST

<u>Address</u>	<u>No. of Copies</u>
Commander Space Systems Division Air Force Systems Command Air Force Unit Post Office Los Angeles 45, California Attn: Technical Data Center	10
USAF Contract Support Detachment No. 3 Philco Corporation Western Development Laboratories Palo Alto, California	1
Philco Corporation Western Development Laboratories Palo Alto, California	75 + 1 reproducible
	86 + 1 reproducible

UNCLASSIFIED

UNCLASSIFIED