

2.2.1 Checkers and Consoles

<u>ITEM NO.</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PART NUMBER &amp; NOMENCLATURE</u>	<u>ORIGIN &amp; DETAILS OF DISCREPANCY</u>	<u>ACTION TAKEN</u>
4 (F)	9/18	Z01582	PD72C0020-9 Relay K-24 S/N R71033 N/A 327-3732200 Power Contactor Panel	When transferring to ground power, the IPS power was lost.	Relay K-24 was replaced with S/N R68791.
5 (F)	9/18	Z01009	327-3785300-9 Control Panel S/N 0018 N/A 327-3780300-9 Hydraulic Console Assembly S/N 0010	When returning to ground power, the IPS power was lost.	The control panel was replaced with S/N 0024.
6 (F)	9/19	Z01372	327-5318000-79 Digital Voltmeter S/N 0029 N/A 327-5310000-39 Flight controls Rack Assembly S/N 0005	The digital voltmeter tracked sluggishly and intermittently.	The voltmeter was replaced with S/N 0023.

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7	9/20	Z01336	327-3732201 Panel Assembly N/A 327-3700300-19 Rack Assembly	The IPS ac voltage went out of limits when the APS ac power was transferred. This was because of a tracking circuit in the varo which was no longer in use.	The tracking circuit was removed IAW FCA 4826.
8 (F)	9/21	Z01233	PS800900008D-1 DC Amplifier S/N 2459 N/A 327-5726000-129 Amplifier Module S/N 0047	The amplifier oscillated in all modes of operation. This occurred during calibration of the Stage I fuel tank pressure transducer.	The amplifier was replaced with S/N 2416.
9 (F)	9/20	Z01392	327-3930000-49 Flight Controls Checker S/N 0005 N/A 327-3900000-119 Flight Controls S/N C4-1008	The programmer IN PROCESS lamp lit when any test was in progress. A short-circuited CR 342 in the digital voltmeter chassis gave a signal to the 5385 chassis resulting in the faulty light indication.	The CR 342 was replaced.

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10	9/20	Z01367	327-3785300-9 Accessory Control Panel S/N 0018 N/A 327-3780300-9 Console Assembly S/N 0010	The panel did not give a NO-GO signal when the APS frequency was out of limits. The wire from Pin 7 of K-13 was not connected to K-9 Pin 2. Because of this, K-9 would not energize.	This wire was properly connected.
11	9/22	Z01393	327-5313000 Read Out Chassis N/A 327-5310000 Flight Controls Rack Assembly	The engine centering read advance 12 readout was intermittently switching from ratio reading to null reading.	The relay contacts were cleaned and the chassis was then reinstalled. This corrected the intermittent condition.
12(F)	9/26	Z01365	327-3722300-9 Frequency Meter Panel S/N 0014 N/A 327-3720300-9 Rack Assembly S/N 0010	The meter was sticking on low limits.	The panel was replaced with S/N 0020.

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13 (F)	9/27	Z01345	327-3722300-9 Frequency Meter Panel S/N 0020 N/A 327-3720300-9 Rack Assembly S/N 0010	The frequency meter panel failed to send the required 28 volt signal to the 3785 chassis indicating light. This should have occurred when there was no 400 cycle signal in the panel.	The panel was replaced with S/N 0018.
14 (F)	9/27	Z01243	327-2486000-9 Temperature Calibrator Chassis S/N 0005 N/A 327-4080000-39 Signal Conditioner Rack S/N 0004	The Stage I lox topping temperature channel of the calibrator would not balance on the low scale position.	Capacitor C-2 was replaced and two questionable soldered joints were re-soldered.

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2.2.2 Facilities

<u>ITEM NO.</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PART NUMBER &amp; NOMENCLATURE</u>	<u>ORIGIN &amp; DETAILS OF DISCREPANCY</u>	<u>ACTION TAKEN</u>
1 (F)	9/11	Z01210	M-6340-D Grove Nitrogen Handloader N/A 327-2062211-9 Gas Panel	Handloader S/N L-32260 and S/N L-32262 were creeping above the regulating pressure of 1500 psig and 500 psig reflectively.	The handloaders were replaced with S/N L-23448 and L-27919.
2	9/13	Z01216	PD48S20075-29 Brodie Flowmeter S/N 067745 N/A 327-2062310-009 Fuel Piping Installation	Improper adjustment of the flowmeter "add" counter drive linkage was suspected. The upper digit counter failed to record 54 gallons during the last fuel loading operation.	The flowmeter was replaced with S/N 068244.
3	9/25	Z01473	32A10-4-0440 Flex Hose Lox Probe N/A 327-4811000 Lox Probe	A piece of rubber coating was missing from the nitrogen flex hose on the Stage II lox probe.	The hose was replaced.

2.2.3 Instrumentation

<u>ITEM NO.</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PART NUMBER &amp; NOMENCLATURE</u>	<u>ORIGIN &amp; DETAILS OF DISCREPANCY</u>	<u>ACTION TAKEN</u>
1(F)	9/11	Z01258	PC640300241-3 DC Amplifier S/N 4736 N/A 327-5726000-219 Amplifier Module S/N 0008	The amplifier pegged negative in all modes of operation during the calibration and check-out of the Stage I fuel tank pressure.	The amplifier was replaced with P/N PS800900008D-1, S/N 2459.
2(F)	9/11	Z01260	PS800900008D-1 DC Amplifier S/N 5552 N/A 327-5726000-219 Amplifier Module S/N 0008	The amplifier oscillated in all modes of operation during a routine checkout of Stage I helium tank pressure.	The amplifier was replaced with S/N 5425.
3(F)	9/11	Z01250	5-1150 Modulator N/A PS640300038-1 Voltage Control Oscillator S/N 46621	The 14.5 kc oscillator had a low frequency output, and could not be brought within the $\pm 7.5$ kc specification.	The modulator was replaced.

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## 2.2.3 Instrumentation

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4 (F)	9/11	Z01249	5-1150 Modulator N/A PS640300038-25 Voltage Controlled Oscillator S/N 46930	There was no output from the 40 kc oscillator.	The modulator was re- placed.
5	9/13	Z01148	5I0-16000S-S1 Relay N/A PS640300190-1 Reference Oven S/N E-6054-1	It was suspected that there was a short-circuit in the relay.	The relay was replaced.
6 (F)	9/13	Z01268	PS800900008D-1 DC Amplifier S/N 2431 N/A 327-5726000- 219 Amplifier Module S/N 0043	The amplifier pegged negative in all modes of operation dur- ing calibration of the lox tank level sensor.	The amplifier was re- placed with S/N 2337.

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2.2.3 Instrumentation

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7(F)	9/14	Z01269	PS800900008D-1 DC Amplifier S/N 3268 N/A 327-5726000-129 Amplifier Module S/N 0008	The amplifier pegged negative in all modes of operation during an attempt to calibrate Stage I lox tank pressure.	The amplifier was replaced with S/N 5261.
8	9/15	Z01199	1-242839-/ Patch Panel N/A 1-237428-20B/- Rack S/N 0001002	There were no valve traces of the Stage I and Stage II thrust chamber valves on the Aerojet Sanborn recorder.	The following patches were added to patch board number 10: A. Y24-C27-V24 B. X24-B27-T24 C. L27-S27-G27 D. K27-R27-F27 The valve traces then played through on the recorder.



2.2.3 Instrumentation

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9(F)	9/21	Z01234	PD8030000-49 DC Amplifier S/N A881 N/A 327-3742000 Amplifier Module S/N 0010	The amplifier had a slight oscillation in the calibration mode of operation. This occurred during the checkout of the Stage I hydraulic flow.	The amplifier was replaced with S/N A1015.
10	9/25	Z01033 Z01235	PS640300058 Sanborn Recorder S/N 9 N/A 327-X170000-39 Direct Writer Recorder S/N 004	The paper-drive assembly would not feed the paper through the recorder.	It was found that an incorrect fuse had been installed in the drive motor. A slow-blow fuse was installed and the recorder performed satisfactorily.
11(F)	9/27	Z01331	MS17 Scope Monitor Scope N/A 327-X380000 ASCOP Rack No. 1 S/N 004	There was no control of the vertical deflection.	The 6BQ7A tube was replaced in the rack.

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## 2.2.4 Launch and Handling

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1	9/12	Z01175	2494-05E Jib Hoist Gear Motor N/A 327-4770941 Jib Hoist	The jib hoist gear box leaked oil around the cover.	The bolts on the cover were tightened. This stopped the leakage.
2	9/13	Z01150	327-2062108-39 Nitrogen Start Manifold Assembly N/A 327-2062108-9 Nitrogen Start System	The nitrogen start manifold had a deep machine mark inside the tube. The mark was located approximately 1/4 inches to 1/2 inches from the flare seat. The tubes did not meet the requirements of process DP35024.	It was deemed that this condition was not detrimental to the launch of the missile. Final disposition of the discrepancy will be completed after the launch of the missile.
3	9/13	Z01179	Line 30 1/2" Hydraulic Line N/A 327-4762000 Umbilical Tower S/N 1008	The line was damaged because of rust.	The line was replaced.

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		2.2.4 Launch and Handling			
ITEM	MARS	PART NUMBER &	ORIGIN & DETAILS		
<u>NO.</u>	<u>DATE</u>	<u>NO.</u>	<u>NOMENCLATURE</u>	<u>OF DISCREPANCY</u>	<u>ACTION TAKEN</u>
4(F)	9/19	Z01405	M-6340 Nitrogen Handloader S/N C-28448 N/A 327-2062211-9 Gas Cancel Panel	The handloader had excessive leakage and could not be adjusted.	The handloader was replaced with S/N C-25670.
5(F)	9/21	Z01439	M-6340 Nitrogen Handloader S/N C-30754 N/A 327-2062211-9 Gas Console Panel	The handloader could not be shut off or adjusted.	The handloader was replaced with S/N C-30054.
6	9/25	Z01446	32A1-6-1920 Stage I Pneumatic Pressure Line N/A 327-8050820 Pressure and Pneumatic System	The line was dented in several places.	The line was replaced.

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2.2.4 Launch and Handling

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7(F)	9/26	Z01482	Hydraulic Line N/A 327-4762000 Umbilical Tower	The line was leaking at the B nut, and the nut was frozen to the line.	The line was replaced.

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2.2.5 Power, Electrical

<u>ITEM NO.</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PART NUMBER &amp; NOMENCLATURE</u>	<u>ORIGIN &amp; DETAILS OF DISCREPANCY</u>	<u>ACTION TAKEN</u>
1	9/8	Z01138	MR36W Voltmeter 0-50 VDC N/A 327-4509000-9 Standby Battery System 28 V S/N B38-1013	The voltmeter would not zero during calibration.	The voltmeter was replaced.
2 (F)	9/22	Z01465	684012 Diode N/A 327-4795000-19 28 VDC Power Supply S/N B1A-1038	Rectifier number one could not be adjusted above 28 volts dc. This was caused by short-circuited diodes between wires number 1, 34, and 51 of the voltage adjust diode.	The defective diodes were replaced.
3	9/25	Z01399 Z01492	DLX-159-209 Voltage Regulating Panel N/A 327-4795000-19 S/N B1E-1038	Rectifier number 1 had an unstable voltage output.	The mica insulators for diodes CR1 and CR2 in the voltage sensing panel, and capacitor C-1 in the same panel were replaced.

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2.2.5 Power, Electrical

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4(F)	9/28	Z01338	CHX157209 Voltage Control Panel S/N 60 N/A 327-4795000 28 Volt DC Power Supply S/N B1b-1038	The voltage output was unstable and dropped 25 volts when the inverters were started.	The panel was replaced with S/N 190-58.

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2.2.6 Quick Disconnects

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1(F)	9/11	Z01117	1126-21556 Face Seal N/A 327-4811000 Stage II Lox Probe	The face seal was worn. This caused the lox probe to leak.	The face seal was replaced.
2	9/21	Z01422	PD456000032-9 Lox Coupling S/N 096 N/A 327-8050310 Fill and Drain Assembly	The coupling was corroded on the surface; there was also pitting caused by the corrosion.	The Teflon seal and flange were removed from S/N 096 and installed in the casting of the airborne disconnect.
3(F)	9/21	Z01194	PS456000023D-13 Air Conditioning Disconnect S/N 332 N/A 327-4762000 Umbilical Tower S/N 1008	The locking mechanism failed to release the umbilical when pulled.	The disconnect was replaced with S/N 0000293.

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2.2.6 Quick Disconnects

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4	9/21	Z01415	327-8050079-11 Invar Ring N/A 327-8050310 Lox Fill and Drain System	There was corrosion found on the Invar ring.	The ring was replaced.

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3.0 Reliability, Significant Items

3.1 Airborne

3.1.1 Electrical

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
J-20	9-28-61	Z01050	Airborne Wiring 327-1080135  Broken wires ZN96A20 and ZN111A20 were found in the guidance bay. These wires are used in the BTL Guidance System. These discrepancies will impair the testing objectives of the missile.	9/14/61 RAR 142600-1318 was sent to M-D Quality Evaluation Group. This requested better inspection procedures during production and a Quality-controlled inspection at the pack and ship area after the vertical test.

3.1.2 Fuel and Feed

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
J17	8-22-61	G93697	Stage I Fuel Shutoff Valve PD47S0123-029	Minor leakage at the flange has occurred on over 50% of the valves installed. One valve has a scored diaphragm; another had paper in the diaphragm. M-D FAR's indicate that actuation problems are caused by flange and body design.
	8-22-61	G93698		
J19	7-25-61	G96732	The valve leaked fuel or gas at the diaphragm flange and required excess actuation pressure or excess actuation cycling.	9/25/61 RAR 208611-1323 requested that M-D vendor's source inspection take action to ensure correct diaphragm assembly. The valve design is currently being evaluated by M-D Project Engineering for possible improvement.
J17	8-24-61	G93862		
J19	8-2-61	G93876		
	8-7-61	G93660		
Spares	9-25-61	Z03531		

3.1.3 Hydraulics

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
J-19	8-2-61	C-18200	Hydraulic Regulator PD48S0053  S/N 0009010 failed during launch operation at AMR. Indication was the the 1700 psi nitrogen had leaked past the O ring on the accumulator piston and entered the hy- draulic system.	7/21/61 RAR 106001-1299 was written recommending an investigation be made of the vendor's design and as- sembly processes. The prime reason for this RAR was five previous failures of this unit, apparently caused by defective O rings.  8/3/61 S/N 0009010 was failure an- alyzed at M-C. The accumulator piston O ring was found defective.  8/8/61 RAR 106001-1306 was written to M-D requesting an investigation as to the cause of defective O rings.  8/26/61 M-D engineering action has been a design change to the units (modification AO 4294-03).  9/11/61 Action/Status Report on RARs 106001-1299, 1306 states that no positive solution has been resolved either by M-D or by the vendor, as to the cause of the O ring failure.

3.1.4 Pressurization

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
J10	11-19-60	D53644	Stage I Primary Helium Regulators	The failure rate has exceeded 0.5 per missile in the early J-lot.
J11	2-1-61 2-2-61	C14955 C14962	PD470000035-59	The rate has dropped since Mod A00769 was effective on J13 and subsequent missiles. This placed 10 micron filters on the regulator inlet.
J14	3-30-61	G91689	The regulators creep, leak internally, fail to regulate, or exhibit body leakage.	
M1	6-23-61	G87683		
J17	8-29-61	G89873		8/31/61 Rework agency failure analyses since then have attributed the problems to bellows-leaf spring pivot and pilot valve seat. This will be corrected in Modification A04281 effective on J21, M4 and subsequent missiles.  9/29/61 The problem is being held open to monitor effectiveness of this modification.

3.1.4 Pressurization

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
J16	4-19-61	G96836	Stage II Primary Helium Regulators	The failure rate has exceeded 0.5 per missile in the early J-lot.
M1	6-19-61	G87526	PD48S0037-69	The rate dropped since Modification A00769 was effective on J13 and subsequent missiles. This placed 10 micron filters on the regulator inlet.
J19	7-31-61	G96749	Regulators creep, leak	
	8-3-61	G93878	internally, fail to regulate,	
	8-3-61	G92135	or exhibit body leakage.	

8/31/61 Failure analyses since then have been attributed problems to the bellows leaf spring pivot and pilot valve seat. This will be corrected in Modification A04281 effective on J21, M4 and subsequent missiles.

9/28/61 The problem is being held open to monitor effectiveness of this modification.

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3.1.4 Pressurization

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
J14	3-8-61	G91234	Stage II Lox V/R Valve PD47S0128-019	Frequent occurrences of this problem have been noted since Missile J-14.
J17	9-2-61	G87697		
M4	9-21-61	Z03620	The valves froze in an open or partly closed position	9/23/61 FAR's show that the freeze- ups were caused by water in the re- lief piston freezing because of a cold environment. An IDC from O. Bender, M-C Titan Engineering, to Project Engineering at M-D pointed the need for a heater on moisture drain hole. This change was refused.
	9-21-61	Z03621	when lox was in the tank.	9/22/61 An IDC from Titan Engineering to M-C operations recommended contin- uous use of vent covers during mis- sile preparation, and cycling of the valve when in a cold environment.

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3.1.4 Pressurization

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
J7	7-21-60	C05907	Tee Fittings PC571500001D, PC571500002D	The fittings began cracking in serious quantities on Missile J13. Failure analysis showed that the cause was overheating of the forgings at the flash line. No corrective action could be effected through the vendor (Parker Aircraft).
G8	9-22-60	C23316		
J13	1-31-61 2-2-61 2-9-61 2-18-61 2-19-61	C16859 D61871 C16695 G94414 G94437	The failures were either cracking and/or leakage of Parker PD and PS type aluminum MS tee fittings.	9/11/61 EDCS number X06824 dated 8/9/61 is in process to replace these fittings with those made of stainless steel.
J14	3-1-61	G94416		
M1	5-12-61	G95769		
M2	7-19-61	G87558		
J17	8-10-61	G92049		
M3	8-11-61	Z00484		

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3.2 Ground Support Equipment

3.2.1 Checkers and Consoles

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
J20	9-27-61	Z01582	Relay 3732K-24  IPS power dropped out when transferring from missile power to ground power. This caused the Instrumentation section to recalibrate their equipment.	9/20/61 ETR 410701-004A was issued to M-C. F/A laboratory. The preliminary report stated a micro-switch arm was not adjusted correctly to engage the relay with positive action. Final failure report will determine what reliability action is to be taken.

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3.2.2 Launch and Handling

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J19	7-25-61	G96759	N <sub>2</sub> Start System Handloader	7/27/61 As a result of these problems, and the fact that FAR's did not indicate a correctable deficiency, the M6353 unit was changed to a Victor GD700 unit on the recommendation of M-D. This unit was less reliable than the 146353 unit because of a basic design deficiency.
	8-1-61	G96776	M6353D, GD700	
	8-3-61	G93877	N <sub>2</sub> start regulators have been erratic and have exhibited bleed, creep and general instability in pressure regulation. Many of these instances have not been recorded on Trouble Reports since adjustment of unit has temporarily corrected the trouble.	
				8/17/61 The M6353 unit has been returned to service (it will perform satisfactorily for a period of time) pending test of a GD-31 regulator recommended in RAR 622901-1314.

3.2.3 Quick Disconnects

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
GSE	7-21-61	G93755	Hydraulic Quick Disconnects (On-Mark) PD45S0140-29, -79, -99, -109  Twenty disconnects with this part number have been rejected for leakage since 2/23/60. Seven of these units were ob- tained from MRB for failure analysis and reliability studies.	8/30/61 Engineering Test Request(ETR) number 036 was initiated, outlining applicable test parameters and test methods contained in drawing PD45S0140.
	7-22-61	D57320		
	7-28-61	G98941		
	7-31-61	G93648		
	8-10-61	Z00422		
M-3	8-10-61	Z00434		9/1/61 The seven rejected units were subjected to a series of pull and pressure tests IAW the ETR in an attempt to reproduce the failures. Detailed findings were given in fail- ure analysis report 510519-013A.
GSE	8-15-61	G93823		

These were essentially as follows:  
Failures could be reproduced in  
only two of the seven units, and  
both of these units were found  
to contain damaged O ring back-  
ups.  
Failures could not be similarly  
reproduced in the remaining five  
units.  
No physical irregularities were  
found.

(Continued)

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2.2.3 Quick Disconnects (Continued)

<u>MISSILE</u>	<u>DATE</u>	<u>MARS NO.</u>	<u>PROBLEM DESCRIPTION</u>	<u>RELIABILITY STATUS</u>
				<p>It was concluded that these five units, and possibly others in the past, had been rejected in error.</p>
				<p>An IDC with the FAR will be sent to Quality Measurements for corrective and precautionary measures.</p>
				<p>During the course of the investigation, it was learned that these units will be modified for greater reliability in operational use, but that the R &amp; D program will retain present configurations.</p>
				<p>This item will remain open pending issuance and acknowledgement of the IDC.</p>

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