



Space
Systems Division

NO. ASTIR/TM 12	REV. NO.
PAGE <u>1</u> OF <u>3</u>	
DATE 21 Aug: 1973	

APOLLO 17 LACE BACKGROUND NOISE

ANOMALY

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NO.	REV.
ASTIR/TM 12	
PAGE 2	OF
DATE 21 Aug. 19	

SUMMARY

The cause of the background noise is attributed, by process of elimination, to the analyzer itself. Testing on the prototype and qualification models has not been able to reproduce the problem. The Principal Investigator considers that he is not losing science data and thus it is recommended that the presently agreed operational procedures be continued.

INTRODUCTION:

The Lunar Atmospheric Composition Experiment (LACE) has experienced a zero offset condition in the low and mid mass channels of the science data since the experiment was first initialized on the moon. The offset manifests itself as a ramp which increases with decreasing mass (increasing high voltage sweep). The science data is superimposed on the ramp and thus not obscured by it, although the output gives the appearance that data may be missing towards the low end of the ramp.

ANALYSIS:

Analysis of the problem has been performed by Bendix and the Principal Investigator and is summarized below.

Tests on the prototype model, including alteration of the wire routing to simulate high voltage crosstalk effects, have not duplicated the problem.

Operation of the qualification model indicates no similar ramp on any mass channel, even though the vacuum conditions and multiplier sensitivity are good.

Command changes have been executed on the flight model in an effort to isolate the fault area. The commands causing no change in the effect are

- 1) Changes in analyzer optics (J. plates)
- 2) Filaments ON/OFF
- 3) Multiplier gain

while the following modes did affect the anomaly

- 1) High voltage stepper ON/OFF



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APOLLO 17 LACE BACKGROUND NOISE
ANOMALY

NO. ASTIR/TM 12	REV. NO.
PAGE 3	OF 3
DATE 21 August 1967	

- 2) Discriminator high/low (slight effect only)
- 3) Ion source heater ON/OFF. The heater affects the analyzer temperature and the effect appears to be temperature dependent.
- 4) Sweep step lock. The background level remains constant at the value for the respective step when the sweep is stopped with the high voltage on.

The premission calibration data for the flight unit was reviewed closely and evidence of the anomaly was found.

Review of the experiment circuit designs and construction revealed no obvious defects. The prototype and qualification models do not exhibit the problem, thus indicating that no inherent design problem exists. The fact that evidence of the problem existed before flight indicates that nothing happened to the system during its transportation to the moon.

CONCLUSIONS:

The conclusion is that a problem exists on the mechanical analyzer on the flight model as no other cause can be determined. The problem is temperature and voltage dependent.

This ASTIR is considered closed as no further analysis can be performed at this time. If further information or significant change in operation occurs, the problem will be reviewed in that light and an appendix to this TM will be prepared.

Number 12	Originated by: Bendix	Reference Document(s)
Date April 1973	Organization Name W. Tosh	

Short Title: LACE Background Noise

Study/Task Description:
 Review the LACE design and operational history through final acceptance testing to ascertain if the electrical noise background was seen in any of the test sequences and, if so, what was the cause. If results indicate a need, perform tests to duplicate and isolate the anomaly observed during lunar operation. Recent lunar performance indicating involvement of heater circuitry must be included in the evaluation.

Scheduled Completion Date	Output(s) Report documenting results with identification of cause and recommendations for future lunar operational planning and experiment data reduction.
<input checked="" type="checkbox"/> Interim 30 May 73 <input type="checkbox"/> Final TBD	

Authorization
 NASA *D. G. ...* *W. Eichelman* BENDIX *B. Rusky*

Results (use supplementary sheets as necessary):

The cause of the background noise is attributed, by process of elimination, to the analyzer. Testing on the prototype and qualification models has not been able to reproduce the problem. The premission calibration data for the flight unit was reviewed closely and evidence of the anomaly was found. The Principal Investigator considers that he is not losing science data and thus it is recommended that the presently agreed operational procedures be continued.

Details of the investigation are documented in ASTIR/TM-12.

It is recommended that this ASTIR be closed.

Completion Date	Approvals	Distribution:
<input checked="" type="checkbox"/> Interim	NASA <u><i>D. G. ...</i></u>	R. A. Gardiner W. Tosh
<input type="checkbox"/> Final	Bendix <u><i>B. Rusky</i></u>	W. Eichelman R. Miley
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ALSEP LONG TERM OPERATIONAL PLANNING
(FINAL)

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