

T H E U N I V E R S I T Y O F M I C H I G A N  
COLLEGE OF ENGINEERING  
Department of Electrical Engineering  
Space Physics Research Laboratory

Quarterly Status Report No. KQ-11  
for the period  
1 June to 31 August 1962

MEASUREMENT OF THE MOON'S ATMOSPHERIC PRESSURE

This report, not necessarily in final scientific form,  
is intended for internal management uses of the  
contractor and NASA.

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ORA Project 03555

Under Contract with:

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
CONTRACT NO. NASw-133  
WASHINGTON, D.C.

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## INTRODUCTION

This is the eleventh status report describing the research effort under contract NASw-133, and it covers the period June 1 to August 31, 1962. This contract calls for the construction, integration, calibration and testing of a thermally controlled instrumented package which will be capable of measuring the atmospheric pressure on the moon. This package is to be incorporated in the Surveyor soft-landing lunar vehicle sometime in 1965.

### RESEARCH EFFORT DURING THE PERIOD

As described in Status Report KQ-11, the present effort is being directed toward the construction of two complete instrumented packages for test and evaluation purposes. Progress is reported here on the various sub-assemblies.

#### Thermally Insulated Instrument Container:

The thermally insulated instrument container assembly consists of an outer shell of drawn aluminum and an inner fiberglass reinforced plastic box which holds the electronics and pressure gauge. (See Status Report KQ-10.)

Two aluminum outer shells have been completed and are ready for assembly. However, the inner fiberglass reinforced plastic box has not been satisfactorily completed as yet. Three prototype boxes were obtained, but these were found to be unsatisfactory. A new vendor has been chosen for the production of these boxes, and it is hoped that satisfactory assemblies will be available within the next quarter.

#### Electronics:

All of the ordered high voltage power supplies have been received from Matrix Research and Development Corp. (six (6) units.)

One of these is a non-flyable prototype, four are flyable units with an operating range of  $-50^{\circ}$  C to  $+75^{\circ}$  C, and one a flyable unit capable of operating from  $-50^{\circ}$  C to  $+125^{\circ}$  C.

The electrometer amplifier unit to be used to monitor the pressure gauge output current is still in the development stage. Breadboard models of this amplifier have been operated satisfactorily in the temperature range from  $-50^{\circ}$  C to  $+75^{\circ}$  C. It is expected that at least one flyable unit will be completed in the next quarter.

#### Pressure Gauge:

The pressure gauge developed by the Geophysics Corporation of America (GCA) to be used in this experiment has been tested during the period covered by this report. The gauge tested was one of the latest models delivered to this laboratory, but still exhibited instability in sensitivity as discovered in previous models. Starting characteristics are adequate for our purpose. With the gauge operating in the  $10^{-12}$  mm Hg range, starting occurred within two minutes. A calibration of this gauge using hydrogen gas showed that the gauge was linear down to the lowest pressures attained ( $\sim 10^{-12}$  mm Hg), when corrections were made for the non-linearity of the NRC commercial model Redhead gauge used as the reference.

#### Multirange Linear Electrometer Amplifier:

The amplifier units being produced for GSFC under this contract with NASA are being constructed at this time. An engineering test model has been completed for our tests. One prototype unit has been delivered to GSFC for their preliminary tests. Present scheduling calls for delivery of three more units during the next quarter.

## REPORTS

During the period covered by this report, a scientific report was written which discussed the known facts and theories concerning the lunar atmosphere. A theoretical model of the lunar atmosphere is also presented. This report is now being printed and the required number of copies should be ready for shipment to NASA soon.

## FUTURE WORK

In the next quarter, it is expected that two packages will be completed and preparations made for environmental testing at GSFC. An initial test will be performed to prove the structural soundness of the design. This test will involve only the structural support subassemblies with simulated weights. Subsequent tests will be complete environmental type approval tests to HAC and JPL specifications.

Further work is to be done on the pressure gauge to eliminate the instability in sensitivity experienced in recent tests. Communication has already started with GCA concerning this problem.

## MONTHLY COST BREAKDOWN

Month	Wages		Overhead	Expendable Materials	Equip- ment	Travel
	Student	Non-student				
June	\$1,660	\$3,680	\$2,670	\$ 1,500	\$ 570	\$ 90
July	1,210	3,830	2,520	11,790	1,400	200
August	<u>2,400</u>	<u>780</u>	<u>1,590</u>	<u>1,660</u>	<u>0</u>	<u>0</u>
Totals	\$5,270	\$8,290	\$6,780	\$14,950	\$1,970	\$290

GRAND TOTAL    \$37,550

FUNDS REMAINING

As of 31 August, 1962, approximately \$77,190 remains of the currently allotted funds.

