Refer to: ONR-94-0006

To: Scientific Officer
Office of Naval Research
Ballston Tower One
800 N. Quincy St.
Arlington, VA 22217-5660

Attn: Stephen Newfield/Code 4522

Subject: Monthly Report, Contract N00014-92-C-0214

June 3, 1994

Enclosed please find one (1) copy of the Monthly Technical Report for the above said contract, covering the period through May 31, 1994. Also enclosed is one (1) copy of the Monthly Costs & Expenditure Report for the period ending 5/29/94. Please contact this office at (410)204-2332 if you have any questions regarding the enclosed information.

Sincerely,

James M. Watts
Contracts

cc: Scientific office(N00014)
ACO (S2101A)
Director, NRL (N00173) Code 2627
DTIC
K. Bridger, file
Contract progress and activities since CDRL A001.19.

Summary of progress

- Two of the 3/4-sized and one of the full-sized actuator modules has been polished and is presently being terminated.
- After speaking with Andy Ritter at AVX Corp., we are currently experimenting with a different termination procedure to be used with the actuator modules. Rather than solder directly to the ceramic (which can cause cracking due to localized heating) we will be soldering a brass strip to the ceramic and then leads will be soldered to the brass.
- Three full-sized actuator modules are presently in burnout and are scheduled to be out this week.

Telephone calls, trips, and significant results

- None

Results bearing on prior problem areas

- No problem areas.

Programmatic changes

- We have requested (as per a letter to Jon Wester, Procuring Contracting Officer) a two week extension to the date for actuator module deliverables. Hence we are anticipating a delivery date of June 30, 1994.

Technical or scheduling problem areas

- None

Contract and cost schedule status

- Expended funds as of 31 May 1994, including expenditures prior to 23 July, were $280K against a current budget of $275K.
- A revised cost schedule, beginning at the 23 July program restart, and reflecting the $114K funding gap is attached.

Plans for June 1994

- We will begin and electrically and mechanically testing the two 3/4-sized and our first full-sized actuator modules.
- The actuator modules which survive burnout will be sintered, polished, terminated, and electrically and mechanically tested.
- We will begin preparing the final report.

Preparers

Dr. Keith Bridger, Program Manager (410) 204-2229
(email: BRIDGER@mml.mmc.com)

Ms. Lori Jones, Principle Investigator (410) 204-2223
(410) 204-2100 FAX
COLLOCATED TUNABLE WAVENUMBER SENSOR/ACTUATORS FOR SMART STRUCTURES

N00014-92-C-0214
CDRL A001.20
Covering the period: 1 May to 31 May 1994
Submitted to:
Office of Naval Research
Scientific Officer
Code: 1221
Submitted by:
K. Bridger
L. Jones

MARTIN MARIETTA CORPORATION
Martin Marietta Laboratories
1450 South Rolling Road
Baltimore, Maryland 21227-3898
(410) 204-2000

June 3, 1994
## Schedule, Milestones, and Deliverables

**Updated May 4, 1994**

### Phase I

<table>
<thead>
<tr>
<th>CONTRACT START</th>
<th>1993</th>
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<tbody>
<tr>
<td>Task 1: Materials Preparation and Device Design</td>
<td></td>
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<tr>
<td>- Purchase additional starting materials</td>
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<td>- Formulate ceramic materials</td>
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### Task 2: Module Fabrication

- Prepare multilayer devices
- Burnout, isopress, and fire devices
- Polish and terminate devices

### Task 3: Device Testing

- Initial electrical characterization
- Initial mechanical characterization
- Force/displacement versus field and prestress
- Strain versus field
- (Hipotting)
- Reliability testing (extended cycling)
- Final "proof" characterization

### Deliverables

**Report**

**Key:**

- Milestone: Δ
- Planned task: — —
- Completed task: — — — —
- Task with new projected completion: — — — — — — —

**ONR Sch Miles Deliv Ph-I**

May 31,
EXPENDITURE CHART

3117-000 ONR
Co-Fired High-Force Actuators

Spend profiles adjusted to reflect the unfunded final increment ($114K)

Task-loaded Projection
Linear-Projection
Actual

AMOUNT EXPENDED ($K)

May '94, Week 5 of 5

31-Jul 31-Aug 30-Sep 31-Oct 30-Nov 31-Dec 31-Jan 28-Feb 31-Mar 30-Apr 31-May 30-Jun

250
200
150
100
50
0

300
250
200
150
100
50
0
COLLOCATED TUNABLE WAVENUMBER SENSOR/ACTUATORS FOR SMART STRUCTURES

N00014-92-C-0214

CDRL A001.20

Covering the period: 1 May to 31 May 1994

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**DELIVERABLES**

**REPORT**

**KEY:**
- Milestone:
- Planned task:
- Completed task:
- Task with new projected completion:

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ONR Sch Miles Deliv Ph-I
May 31,
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