

AD-A279 608



MML TM 93-23

**COLLOCATED TUNABLE WAVENUMBER SENSOR/ACTUATORS
FOR SMART STRUCTURES**

N00014-92-C-0214

CDRL A001.12

Covering the period: 1 September to 30 September 1993

Submitted to:

Office of Naval Research
Scientific Officer
Code : 1221

Submitted by:

K. Bridger
L. Jones

**DTIC
ELECTE
MAY 27 1994
S F D**

MARTIN MARIETTA CORPORATION

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

October 6, 1993

This document has been approved
for public release and sale; its
distribution is unlimited



9415941

~~93 10 12 93~~

~~93-24110~~

Contract progress and activities since CDRL A001.11.

Summary of progress

The first actuator module delaminated during burnout. The module showed evidence (bulging) of pressure build up internally which is usually caused by too rapid a burnout schedule. The next module is being fabricated and will be in burnout by the end of this week. The burnout schedule will be adjusted to match TGA data. The pad of smaller actuators look good and are terminated ready for testing.

Telephone calls, trips, and significant results

Results bearing on prior problem areas

No prior problem areas.

Programmatic changes

None

Technical or scheduling problem areas

None -- delamination in the first actuators was taken into account in the scheduling.

Contract and cost schedule status

Expended funds as of 26 September 1993, including expenditures prior to 23 July, were \$125K against a current budget of \$165K.
A cost schedule, reflecting the 23 July program restart, is attached.

Plans for September 1993

Electrochemical measurements will be made on the first set of small actuators.
Electromechanical modelling on the actuators will be conducted.
Two actuator module iterations will be conducted.

- One will use a burnout profile based on a conventional (100-mg sample size) thermogravimetric analysis result;
- the other will be in a specially rigged furnace to monitor temperature, weight loss and strain during the burnout -- this sample will essentially be sacrificed but the amount of information gained will enable us to optimise the burnout cycle for this actuator size.

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

Accession For	
NTIS	CRA&I
DTIC	TAE
Unannounced	
Justification	
By <i>per. lti</i>	
Distribution/	
Availability Codes	
Dist	Avail & or Special
A-1	

SCHEDULE, MILESTONES, AND DELIVERABLES

Phase I	% Complete	1993						1994					
		J	A	S	O	N	D	J	F	M	A	M	J
CONTRACT START	0%	◆											
Task 1: Materials Preparation and Device Design													
Purchase additional starting materials	100%	▲											
Formulate ceramic materials	80%		■	■	■	■	■						
Materials characterization	80%		■	■	■	■	■						
Model	10%		■	■	■	■	■						
Task 2: Module Fabrication													
Prepare multilayer devices	20%			■	■	■	■						
Burnout, isopress, and fire devices	10%			■	■	■	■						
Polish and terminate devices	0%				■	■	■	■					
Task 3: Device Testing													
Initial electrical characterization	0%				■	■	■	■	■	■	■	■	■
Initial mechanical characterization	0%				■	■	■	■	■	■	■	■	■
Force/displacement versus field and prestress	0%				■	■	■	■	■	■	■	■	■
Strain versus field	0%				■	■	■	■	■	■	■	■	■
(Hipotting)	0%						■	■	■	■	■	■	■
Reliability testing (extended cycling)	0%						■	■	■	■	■	■	■
Final "proof" characterization	0%								■	■	■	■	■
DELIVERABLES	0%												△
REPORT	0%												△

EXPENDITURE CHART

3117-000 ONR
Co-Fired High-Force Actuators

