Advanced Research Projects Agency (ARPA)
Contracts Management Office (CMO)
Virginia Square Plaza
3701 North Fairfax Drive
Arlington, VA 22203-1714

ATTENTION: Mr. Donald C. Sharkus

SUBJECT: Liquefied Metal Jet Program (LMJP)

REFERENCE: (a) Contract Number MDA972-93-C-0035, ARPA Order Number 9328/03

ENCLOSURES: (1) Deliverable Item Sequence Number 0002AA, R & D Quarterly Status Report, 15 July 1995 through 15 October 1995
(2) Deliverable Item Sequence Number 0002AA, Program Financial Status Report, 15 July 1995 through 15 October 1995
(3) Deliverable Item Sequence Number 0002AB, Quarterly Technical Report, 15 July 1995 through 15 October 1995

Sir:

Enclosures (1), (2), and (3) are submitted in accordance with reference (a) requirements. If you require technical information concerning this submittal, please contact R. E. Terrill at (214) 995-1094. If you require contractual information, please contact Al Naylor at (214) 995-3200.

Sincerely,

Laura Harvey
Data Manager

cc: DSO - Dr. Richard T. Loda
    DSO - Dr. Ira D. Skurnick
    DSO - Ms. Claire P. Ricaurte
    DPRO/TI
    DTIC - Selections

19951019 039
LIQUEFIED METAL JET PROGRAM
AUTOMATION AND ROBOTICS
RESEARCH INSTITUTE (ARRI)

R&D QUARTERLY STATUS REPORT
REPORTING PERIOD: 15 July 1995
THROUGH 15 October 1995

Sponsored by:
Advanced Research Projects Agency (ARPA)
Contract Management Office (CMO)
Liquefied Metal Jet Program (LMJP)
ARPA Order No. 9328/03

Issued by: ARPA/CMO
Under Contract No.: MDA972-93-C-0035
Deliverable Item Sequence No.: 0002AA

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document are those of the authors and should
not be interpreted as representing the official
policies, either expressly or implied, of the
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Government."

Distribution Statement:
Approved for Public Release
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Prepared by:
Texas Instruments Incorporated
Defense Systems & Electronics
13532 North Central Expressway
Dallas, Texas 75265

12 October, 1995
**REPORT DOCUMENTATION PAGE**

Public reporting burden for this collection of information is estimated to average 110 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

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<th>7. Performing Organization Name(s) and Address(es)</th>
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<td>Mr. Nick Dringenburg, Dr. Charles Smith, Mr. Patrick DuBosa, Mr. R.E. Terrill, and Dr. John Priest</td>
<td>Automation Robotic Research Institute Texas Instruments Inc 7000 Jack Newell Blvd. South P.O. Box 655912 Fort Worth, TX 76118-7115 Dallas, TX 75265</td>
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Dist or Special

*MSN 7540-01-280-5500*

*Standard Form 298 (Rev. 2-89)*
*Proposed by ANSI STD 239-18*
*298-102*
LIQUIFIED METAL JET PROGRAM (LMJP)

AUTOMATION AND ROBOTICS RESEARCH INSTITUTE (ARRI)

R&D QUARTERLY STATUS REPORT
DATA ITEM 0002AA
15 JULY 1995 THROUGH 15 OCTOBER 1995

1.0 INTRODUCTION

This report covers the period from 15 July 1995 through 15 October 1995. The Quarterly Technical Reports are organized by the statement of work (SOW) listed in section 5.0 of the proposal. These are:

- Reports and demonstration
- Equipment
- System test and experimentation
- Test coupon evaluation
- Technology transfer.

Many significant technical issues have been overcome. Generation of test and evaluation coupons of 63/37 solder circuit patterns on copper coupons have been accomplished on the Phase I system. Final fabrication and assembly of the copper system has been completed, tested, and several attempts to generate copper spheres have been made.

2.0 PROGRESS DURING THE REPORTING PERIOD

- Generated solder circuit paths on copper substrates.
- Began evaluation of solder on copper coupons and etched solder on copper coupons
- Completed fabrication of copper system.
- Began testing and operations of copper system.

3.0 PLANNED ACTIVITIES FOR NEXT REPORTING PERIOD

- Demonstrate PWB fabrication capability to Industry.
- Produce higher quality solder coupons for evaluation.
- Demonstrate copper droplet formation.
- Develop white paper for ARPA to continue program.
- Final report and environmental impact study.
4.0 EQUIPMENT PURCHASE OR CONSTRUCTED

Assembled/Constructed:

- Completed fabrication and functional testing of copper system.
- Constructed and tested improved solder deflection system.

Purchased:

- None

5.0 NOTIFICATION OF KEY PERSONNEL CHANGES

None

6.0 INFORMATION FROM TRIPS, MEETINGS, AND SPECIAL CONFERENCES

- Progress report and sample coupons presented at the 1995 ECEM workshop.
LIQUEFIED METAL JET PROGRAM
AUTOMATION AND ROBOTICS
RESEARCH INSTITUTE (ARRI)

R&D QUARTERLY STATUS REPORT
PROGRAM FINANCIAL STATUS

REPORTING PERIOD: 15 July 1995
THROUGH 15 October 1995

Sponsored by:

Advanced Research Projects Agency (ARPA)
Contract Management Office (CMO)
Liquefied Metal Jet Program (LMJP)

ARPA Order No. 9328/03

Issued by: ARPA/CMO
Under Contract No.: MDA972-93-C-0035

Deliverable Item Sequence No.: 0002AA

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Prepared by:

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Defense Systems & Electronics
13532 North Central Expressway
Dallas, Texas 75265

12 October, 1995
**R & D Quarterly Status Report**

**Program Financial Status**

6. **Author(s)** Mr. Nick Dringenburg, Dr. Charles Smith, Mr. Patrick Dubois, Mr. R.E. Terrill, and Dr. John Priest

7. **Performing Organization Name(s) and Address(es)**
   - Automation Robotic Research Institute
   - 7300 Jack Newell Blvd. South
   - Ft. Worth, TX 76118-7115
   - Texas Instruments Inc.
   - P.O. Box 655012
   - Dallas, TX 75265

8. **Performing Organization Report Number**
   - 0002AA

9. **Sponsoring/Monitoring Agency Name(s) and Address(es)**
   - Advanced Research Projects Agency (ARPA)
   - Contract Management Office (CMO)
   - Virginia Square Plaza
   - 3701 North Fairfax Drive
   - Arlington, VA 22203-1714

10. **Sponsoring/Monitoring Agency Report Number**
    - ARPA Order Number 9328/03

11. **Supplementary Notes**

12a. **Distribution/Availability Statement**
    - Approved for Public Release; Distribution Unlimited

12b. **Distribution Code**

13. **Abstract (Maximum 200 words)**

   **This report covers the period from 15 July 1995 through 15 October 1995.**

14. **Subject Terms**
    - Liquidated Metal Jet (LMJ)

15. **Number of Pages**
    - 3

16. **Price Code**

17. **Security Classification of Report**
    - UNCLASSIFIED

18. **Security Classification of this Page**
    - UNCLASSIFIED

19. **Security Classification of Abstract**
    - UNCLASSIFIED

20. **Limitation of Abstract**

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**MSN 7540-01-280-5500 Standard Form 298 (Rev. 2-89)
Proposed by ANSI STD 239.18 298-102**
### R & D STATUS REPORT
#### PROGRAM FINANCIAL STATUS
#### OCTOBER 1995

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*Budget at completion (BAC) changes only with the amount of any scope changes. (Not affected by underrun or overrun).*

**Latest revised estimate based on currently authorized work:**

1. **Is current funding sufficient for the current FY? (Explain in narrative if "no").**
   - **YES**

2. **What is the next fiscal year's funding requirement at current anticipated levels?**
   - **0**

3. **Have you included in the report narrative any explanation of the above data and are they cross referenced?**
   - **NO**