All objectives of the contract have been achieved. During Phase 1 of the project Adaptive solutions designed, implemented, and tested a PC/AT form-factor board which has sockets for up to 4 CNAPS-1064 chips. This gives it a configuration option of 64 to 256 processing nodes (PN). The 256 PN configuration provides the computational power of 5.12 Billion Multiply-Accumulates per second.

During Phase 2 of the project the CNAPS Software Development Kit was ported from the CNAPS/VME board running in a SunOS environment to the CNAPS/PC board running in the Windows 3.1x environment. Later it was ported to the Windows/NT environment when NT became available.

(Continued on reverse)
During Phase 3 of the project a C-callable function library which includes basic matrix math functions, image processing algorithms, and neural network functions was created. This function library is callable from within C and C++ application programs using the CNAPS/PC board in the Windows/NT environment.

During Phase 3 of the project Adaptive also completed the tasks related to the exercised project option. Portions of the next-generation CNAPS chip (X2) were designed and simulated. Schematics of the various CNAPS chip functional areas were completed.

The design of the X2 chip was accomplished while maintaining full code compatibility with the previous generation of the chip. Therefore, no changes to the loader, CNAPS-C compiler, or the CPL assembler were required to support the X2. Previous versions of the compiler and assembler are to be used with the new X2 chip. As a result of the X2's code compatibility the three line item deliverables 5AG (CNAPS assembler and loader), 5AH (CNAPS-C compiler), and 5AI (Design document for CNAPS-C optimizations enhancements) are satisfied by deliveries of the CNAPS software development environment.

At the time of this report, the project has been authorized to spend $1,997,949.00 for the Phase 1, 2, and 3 tasks plus the one optional task. The project has accumulated expenses of approximately $1,997,949.00. No further work on the project will be required.
DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.
Final Technical Report

December 27, 1996

ARPA Order No.: A407
Contractor: Adaptive Solutions, Inc.
1400 NW Compton Drive, Suite 340
Beaverton, OR 97006
Contract No.: N00014-93-C-0234
Contract Amount: $1,997,949.00
Effective Date of Contract: November 8, 1993
Expiration Date of Contract: December 7, 1996
Principal Investigator: Wendell A. Henry
Telephone Number: (503) 690-1236
Title of Project: High Performance Hardware and Software for Pattern Recognition and Image Processing
Title of Work: Final Technical Report
Reporting Period: September 1, 1996 to December 7, 1996

Disclaimer
The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the Advanced Research Projects Agency of the U. S. Government.

19970106 077
Project Summary:
This contract helped fund the design, development, and debug of hardware and software modules to exploit the processing capabilities of the CNAPS architecture within a PC platform.

The contract funding was directed towards three specific objectives which were organized into different phases of the project. An optional objective to the contract was exercised and funded and was completed concurrent with the original Phase 3 objectives. The following outlines the primary objective of each contract phase plus the objective of the contract option.

Phase 1 Objective:
Build a PC/AT form-factor plug-in board using CNAPS 1064 chips which implement the CNAPS architecture.

Phase 2 Objective:
Port the Unix-based CNAPS Software Development Kit to the Phase 1 CNAPS/PC board and the Microsoft Windows environment.

Phase 3 Objective:
Design and implement a C-callable function library which includes image processing and neural network functions, and executes on the Phase 1 CNAPS/PC board.

Option 1 Objective:
Design portions of the next-generation CNAPS chip (X2).

All objectives of the contract have been achieved. During Phase 1 of the project Adaptive solutions designed, implemented, and tested a PC/AT form-factor board which has sockets for up to 4 CNAPS-1064 chips. This gives it a configuration option of 64 to 256 processing nodes (PN). The 256 PN configuration provides the computational power of 5.12 Billion Multiply-Accumulates per second.

During Phase 2 of the project the CNAPS Software Development Kit was ported from the CNAPS/VME board running in a SunOS environment to the CNAPS/PC board running in the Windows 3.1x environment. Later it was ported to the Windows/NT environment when NT became available.

During Phase 3 of the project a C-callable function library which includes basic matrix math functions, image processing algorithms, and neural network functions was created. This function library is callable from within C and C++ application programs using the CNAPS/PC board in the Windows/NT environment.

During Phase 3 of the project Adaptive also completed the tasks related to the exercised project option. Portions of the next-generation CNAPS chip (X2) were designed and simulated. Schematics of the various CNAPS chip functional areas were completed.

The design of the X2 chip was accomplished while maintaining full code compatibility with the previous generation of the chip. Therefore, no changes to the loader, CNAPS-C compiler, or the CPL assembler were required to support the X2. Previous versions of the compiler and
assembler are to be used with the new X2 chip. As a result of the X2's code compatibility the three line item deliverables 5AG (CNAPS assembler and loader), 5AH (CNAPS-C compiler), and 5AI (Design document for CNAPS-C optimizations enhancements) are satisfied by deliveries of the CNAPS software development environment.

At the time of this report, the project has been authorized to spend $1,997,949.00 for the Phase 1, 2, and 3 tasks plus the one optional task. The project has accumulated expenses of approximately $1,997,949.00. No further work on the project will be required.

**Deliverables:**

During the course of this project Adaptive Solutions has delivered specific contracted line items as they have been completed. Table 1, "Initial Delivery of Contracted Line Items," on page 4 presents a history of these deliveries.

In several cases Adaptive has shipped updated versions of the hardware and software as enhancements and bug fixes have been developed and tested. Table 2, "Delivery of Updated Contracted Line Items," on page 7 presents a history of these deliveries.

Appendix A of this report includes copies of Adaptive’s shipping notices for each of the deliveries.

**Fiscal Status:**

- Amount currently provided on contract: $1,997,949.00
- Expenditures and commitments to date: 1,997,949.00
- Funds required to complete work: $0.00

- Authorized Phase funding: $1,997,949.00
- Expenditures and commitments to date: 1,997,949.00
- Authorized Phase funds remaining: $0.00

---

Wendell A. Henry
Date 12/37/96
### Table 1: Initial Delivery of Contracted Line Items

<table>
<thead>
<tr>
<th>Line Item</th>
<th>Line Item Description</th>
<th>Date</th>
<th>Qty.</th>
<th>Destination Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1AA</td>
<td>10 Working copies of CNAPS/PC board</td>
<td>8/31/94</td>
<td>10</td>
<td>Dr. Barbara Yoon&lt;br&gt;ARPA/MTO&lt;br&gt;3701 N. Fairfax Dr.&lt;br&gt;Arlington, VA 22203-1714</td>
</tr>
<tr>
<td>1AB</td>
<td>10 User Licenses for PC based CNAPS-C software development environment</td>
<td>8/31/94</td>
<td>10</td>
<td>Dr. Barbara Yoon&lt;br&gt;ARPA/MTO&lt;br&gt;3701 N. Fairfax Dr.&lt;br&gt;Arlington, VA 22203-1714</td>
</tr>
<tr>
<td>1AC</td>
<td>Maintenance and Support for 1 year with each CNAPS-C license and each CNAPS/PC board</td>
<td>8/31/94</td>
<td>10</td>
<td>Dr. Barbara Yoon&lt;br&gt;ARPA/MTO&lt;br&gt;3701 N. Fairfax Dr.&lt;br&gt;Arlington, VA 22203-1714</td>
</tr>
<tr>
<td>1AD</td>
<td>10 User Licenses for PC based BuildNet software development environment</td>
<td>10/10/95</td>
<td>7</td>
<td>Mr. Kevin Kittka&lt;br&gt;PRC Incorporated&lt;br&gt;4301 N. Fairfax Dr., Suite 700&lt;br&gt;Arlington, VA 22203-1627</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1&lt;br&gt;Mr. Morgan Grover&lt;br&gt;Defense Group Inc.&lt;br&gt;429 Santa Monica Blvd., Suite 420&lt;br&gt;Santa Monica, CA 90401</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1&lt;br&gt;Mr. David Hess&lt;br&gt;David Taylor Model Basin, Code 54&lt;br&gt;Carderock Division, NSWC&lt;br&gt;Bethesda, MD 20084-5000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1&lt;br&gt;Mr. Jeff DeHart&lt;br&gt;Army Research Lab.&lt;br&gt;2800 Powder Mill Rd.&lt;br&gt;Attn: AMSRL-SS-IC&lt;br&gt;Adelphi, MD 20783-1197</td>
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<td>Line Item Description</td>
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<tr>
<td>1AE</td>
<td>10 User Licenses for PC based CNAPS Software development environment</td>
<td>6/2/95</td>
<td>7</td>
<td>Mr. Kevin Kittka&lt;br&gt;PRC Incorporated&lt;br&gt;4301N. Fairfax Dr., Suite 700&lt;br&gt;Arlington, VA 22203-1627</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4/28/95</td>
<td>1</td>
<td>Mr. Morgan Grover&lt;br&gt;Defense Group Inc.&lt;br&gt;429 Santa Monica Blvd., Suite 420&lt;br&gt;Santa Monica, CA 90401</td>
</tr>
<tr>
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<td>4/28/95</td>
<td>1</td>
<td>Mr. David Hess&lt;br&gt;David Taylor Model Basin, Code 54 Carderock Division, NSWC&lt;br&gt;Bethesda, MD 20084-5000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4/28/95</td>
<td>1</td>
<td>Mr. Jeff DeHart&lt;br&gt;Army Research Lab.&lt;br&gt;2800 Powder Mill Rd.&lt;br&gt;Attn: AMSRL-SS-IC&lt;br&gt;Adelphi, MD 20783-1197</td>
</tr>
<tr>
<td>1AF</td>
<td>Support for 1 year for each PC based Buildnet license and each CNAPS software development environment license</td>
<td>10/10/95</td>
<td>7</td>
<td>Mr. Kevin Kittka&lt;br&gt;PRC Incorporated&lt;br&gt;4301N. Fairfax Dr., Suite 700&lt;br&gt;Arlington, VA 22203-1627</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10/10/95</td>
<td>1</td>
<td>Mr. Morgan Grover&lt;br&gt;Defense Group Inc.&lt;br&gt;429 Santa Monica Blvd., Suite 420&lt;br&gt;Santa Monica, CA 90401</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10/10/95</td>
<td>1</td>
<td>Mr. David Hess&lt;br&gt;David Taylor Model Basin, Code 54 Carderock Division, NSWC&lt;br&gt;Bethesda, MD 20084-5000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10/10/95</td>
<td>1</td>
<td>Mr. Jeff DeHart&lt;br&gt;Army Research Lab.&lt;br&gt;2800 Powder Mill Rd.&lt;br&gt;Attn: AMSRL-SS-IC&lt;br&gt;Adelphi, MD 20783-1197</td>
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<tr>
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<td>Line Item Description</td>
<td>Date</td>
<td>Qty.</td>
<td>Destination Address</td>
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<td>0002</td>
<td>Data Item A003, Final Technical Report</td>
<td>12/30/96</td>
<td>3</td>
<td>Dr. Clifford G. Lau&lt;br&gt;Office of Naval Research&lt;br&gt;Ballston Centre Tower One&lt;br&gt;800 North Quincy St.&lt;br&gt;Arlington, VA 22217-5660&lt;br&gt;Attn: ONR 314&lt;br&gt;Ref: Contract N00014-93-C-0234</td>
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<td>Data Item A005, Documentation for C functions</td>
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<td>5AD</td>
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Dr. Barbara Yoon<br>ARPA/MTO<br>3701 N. Fairfax Dr.<br>Arlington, VA 22203-1714<br>Ref: Contract N00014-93-C-0234
Table 1: Initial Delivery of Contracted Line Items

<table>
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<th>Line Item</th>
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<th>Destination Address</th>
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| 0006      | Data Item B003, Final Technical Report      | 12/30/96 | 3   | Dr. Clifford G. Lau
Office of Naval Research
Ballston Centre Tower One
800 North Quincy St.
Arlington, VA 22217-5660
Attn: ONR 314
Ref: Contract N00014-93-C-0234 |

Table 2: Delivery of Updated Contracted Line Items

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<th>Line Item</th>
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| 1AA       | Updated CNAPS/PC board  | 6/2/95 | 7   | Mr. Kevi Kittka
PRC Incorporated
4301N. Fairfax Dr., Suite 700
Arlington, VA 22203-1627 |

|       |                         | 4/28/95 | 1   | Mr. Morgan Grover
Defense Group Inc.
429 Santa Monica Blvd., Suite 420
Santa Monica, CA 90401 |
|       |                         | 4/28/95 | 1   | Mr. David Hess
David Taylor Model Basin, Code 54
Carderock Division, NSWC
Bethesda, MD 20084-5000 |
|       |                         | 4/28/95 | 1   | Mr. Jeff DeHart
Army Research Lab.
2800 Powder Mill Rd.
Attn: AMSRL-SS-IC
Adelphi, MD 20783-1197 |
Table 2: Delivery of Updated Contracted Line Items

<table>
<thead>
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<th>Line</th>
<th>Line Item Description</th>
<th>Date</th>
<th>Qty</th>
<th>Destination Address</th>
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<tr>
<td>1AE</td>
<td>Updated CNAPS software development environment for PC</td>
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<td>PRC Incorporated</td>
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<td>4301N. Fairfax Dr., Suite 700</td>
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<td>12/30/96</td>
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<td>Mr. Morgan Grover</td>
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<td>Defense Group Inc.</td>
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<td>Santa Monica, CA 90401</td>
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<td>12/30/96</td>
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<td>Mr. David Hess</td>
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<td>David Taylor Model Basin, Code 54</td>
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<td>12/30/96</td>
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<td>Mr. Jeff DeHart</td>
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<td>Attn: AMSRL-SS-IC</td>
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<td>Adelphi, MD 20783-1197</td>
</tr>
</tbody>
</table>
Appendix A

Copies of Adaptive’s Shipping Notices
MATERIAL INSPECTION AND RECEIVING REPORT

1. PROCUREMENT/DELA (CONTRACT) NO: N00014-93-C-0234
2. SHIPMENT NO: ASI0001
3. DATE SHIPPED: 8/31/94
4. MT: TON
5. DISCOUNT/TERMS: Net
6. PRIME CONTRACTOR: Adaptive Solutions, Inc.
   1400 NW Compton Drive
   Suite 340
   Beaverton, OR 97006
7. ADMINISTERED BY: DCMAO Seattle
   Corporate Campus East III
   3009 112th Ave. NE, Suite 200
   Bellevue, WA 98004-8019
8. CODE: S4801A
9. SHIPPED FROM (IF DIFFERENT FROM 9): See Block 9
10. PAYMENT WILL BE MADE BY: DFAS Columbus Center
    DFAS CO Santa Ana
    PO Box 182381
    Columbus, OH 43218-2381
11. CODE: SC1006
12. REF: Contract N00014-93-C-0234
    Dr. Barbara Yoon
    ARPA/MTD
    3701 N. Fairfax Dr.
    Arlington, VA 22203-1714
13. CODE: S4801A
14. MARKED FOR: Dr. Clifford Lau, Office of Naval Research
    Ballston Centre Tower One, 800 N. Quincy St.
    Arlington, VA 22217-5660
    ATTN: ONR 314
    REF: Contract N00014-93-C-0234

<table>
<thead>
<tr>
<th>ITEM NO</th>
<th>STOCK/PART NO</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>UNIT</th>
<th>UNIT PRICE</th>
<th>AMOUNT</th>
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</thead>
<tbody>
<tr>
<td>0001AA</td>
<td>CNAPS/PC Board</td>
<td>10</td>
<td>EA</td>
<td>NSP</td>
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</tr>
<tr>
<td>0001AB</td>
<td>CNAPS-C User License</td>
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<td>EA</td>
<td>NSP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0001AC</td>
<td>CNAPS/PC and CNAPS-C Maintenance and Support for one (1) year</td>
<td>10</td>
<td>EA</td>
<td>NSP</td>
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</tr>
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</table>

PROCUREMENT QUALITY ASSURANCE

A. ORIGIN
☐ PCA ☐ ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

DATE: __________
SIGNATURE OF AUTHORIZED GOVT. REP: __________________________

B. DESTINATION
☐ PCA ☐ ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

DATE: __________
SIGNATURE OF AUTHORIZED GOVT. REP: __________________________

22. RECEIVER'S USE
Quantities shown in column 17 were received in apparent good condition except as noted.

DATE RECEIVED: __________
SIGNATURE OF AUTHORIZED GOVT. REP: __________________________

23. CONTRACTOR USE ONLY

DD Form 250, JUN 96
Previous editions are obsolete.
<table>
<thead>
<tr>
<th>Pkg. No.</th>
<th>Item No.</th>
<th>Product Code</th>
<th>Description</th>
<th>Order Qty</th>
<th>Ship Qty</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
<th>Extended Price</th>
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<tbody>
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<td>CNAPS-PC Board ASI0640C2-20</td>
<td>CNAPS/PC54 - 4 MB of data storage SN: 400025, 400026, 400027, 400028 SN: 400029, 400030, 400031, 400032 SN: 400033, 400034</td>
<td>10 10 ea</td>
<td>NSP NSP</td>
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<td>801-20071-01</td>
<td>801-20072-01</td>
<td>801-30046-01</td>
<td>801-30044-01</td>
<td>801-20026-01</td>
<td>0001AB CNAPS-C User License</td>
<td>CNAPS-C Version B21.A (3 diskettes per set)</td>
<td>10 10 sets</td>
<td>NSP NSP</td>
</tr>
</tbody>
</table>

**MAINTENANCE LISTED ON PAGE 2**

(CONTINUED ON PAGE 2)
**Ship to:** Dr. Barbara Yoon  
**ARPA/MTO**  
**3701 N. Fairfax, VA 22203-1714**

**Attn:** Dr. Barbara Yoon  
**Ref:** Contract N00014-93-C-0234

**Bill to:**  
5 sets - 6050 / 0210  
5 sets - 6051 / 0210

<table>
<thead>
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<th>Pkg No.</th>
<th>Item No.</th>
<th>Product Code</th>
<th>Description</th>
<th>Order Qty</th>
<th>Ship Qty</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
<th>Extended Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001AC</td>
<td></td>
<td>CNAPS-PC &amp; CNAPS-C Support</td>
<td>One Year CNAPS-PC Warranty and Support for ASI06404C2-20 for the following serial numbers: SN: 400025, 400026, 400027, 400028 SN: 400029, 400030, 400031, 400032 SN: 400033, 400034 - Coverage: CNAPS-PC boards are warranted to be free of defects in material or labor for one year. Adaptive Solutions will repair or replace a board at its factory in Beaverton, Oregon. Repair time is dependent on the availability of the failed materials. * Coverage September 1, 1994 - August 31, 1995, One Year CNAPS-C Software maintenance - Coverage: One year of software and manual updates, and unlimited &quot;Hot Line&quot; support. * Coverage September 1, 1994 - August 31, 1995,</td>
<td>10</td>
<td>10</td>
<td>ea</td>
<td>NSP</td>
<td>NSP</td>
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**Material Inspection and Receiving Report**

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<th>4. NA.</th>
<th>5. Discount Terms</th>
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<th>6. Prime Contractor Code</th>
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<tr>
<td>0 PCB 8</td>
<td>S4801A</td>
</tr>
<tr>
<td>Adaptive Solutions, Inc.</td>
<td>DCMAO Seattle</td>
</tr>
<tr>
<td>1400 NW Compton Drive</td>
<td>Corporate Campus East III</td>
</tr>
<tr>
<td>Suite 340</td>
<td>3009 112th Ave. NE, Suite 200</td>
</tr>
<tr>
<td>Beaverton, OR 97006</td>
<td>Bellevue, WA 98004-8019</td>
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<th>11. Shipped From (if other than 9) Code</th>
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See attached list per instructions from:

Dr. Barbara Yoon
ARPA/MTO

Dr. Clifford Lau, Office of Naval Research
Ballston Centre Tower One, 800 N. Quincy St.
Arlington, VA 22217-5660
ATTN: ONR 314
REF: Contract N00014-93-C-0234

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<td>3</td>
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<td></td>
</tr>
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**Procurement Quality Assurance**

- **A. Origin**
  - Acceptance of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

- **B. Destination**
  - Acceptance of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

- **Date**
- **Signature of Auth Govt Rep**

- **Date**
- **Signature of Auth Govt Rep**

**Receiver's Use**

Quantities shown in column 17 were received in apparent good condition except as noted.

- **Date Received**
- **Signature of Auth Govt Rep**

*If quantity received by the Government is the same as quantity shipped, indicate by (✓) mark, if different, enter actual quantity received below quantity shipped and indicate.*

**DD Form 250, JUN 96**

Previous editions are obsolete.
# Delivery List for Line Item 1AE

Delivered 4/28/95

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<thead>
<tr>
<th>Quantity</th>
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<tbody>
<tr>
<td>1</td>
<td>Mr. Morgan Grover</td>
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<tr>
<td></td>
<td>Defense Group Inc.</td>
</tr>
<tr>
<td></td>
<td>429 Santa Monica Blvd., Suite 420</td>
</tr>
<tr>
<td></td>
<td>Santa Monica, CA 90401</td>
</tr>
<tr>
<td>1</td>
<td>Mr. David Hess</td>
</tr>
<tr>
<td></td>
<td>David Taylor Model Basin, Code 54</td>
</tr>
<tr>
<td></td>
<td>Carderock Division, NSWC</td>
</tr>
<tr>
<td></td>
<td>Bethesda, MD 20084-5000</td>
</tr>
<tr>
<td>1</td>
<td>Mr. Jeff DeHart</td>
</tr>
<tr>
<td></td>
<td>Army Research Lab.</td>
</tr>
<tr>
<td></td>
<td>2800 Powder Mill Rd.</td>
</tr>
<tr>
<td></td>
<td>Attn: AMSRL-SS-IC</td>
</tr>
<tr>
<td></td>
<td>Adelphi, MD 20783-1197</td>
</tr>
</tbody>
</table>
**Adaptive Solutions, Inc.**  
1400 NW Compton Drive  
Suite 340  
Beaverton, Oregon 97006  
Tel: 503.890.1236  
Fax: 503.890.1249

**Ship to:** Defense Group Inc.  
**Suite 420**  
**429 Santa Monica Blvd.**  
**Santa Monica, CA 90401**  
**Attn:** Morgan Grover  
310.394.8599

**Ref.:** ARPA N00014-93-C-0234

<table>
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<tr>
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<th>Ship Qty</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
<th>Extended Price</th>
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<tr>
<td>1</td>
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<td>AS128PC-20</td>
<td>CNAPPS/PC Development Environment /128</td>
<td>1</td>
<td>1</td>
<td>ea</td>
<td>N/A</td>
<td>N/A</td>
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</tbody>
</table>
|        |        | AS12804C1-20 | Includes:  
CNAPPS/PC128  
128PN's, with 4 MB of data storage  
SN: 400113 | 1         | 1         | ea              | N/A        | N/A            |
|        |        | AS1SDKW10-1  | CNAPS Software Kit for Windows  
Version B1.1.0 | 1         | 1         | ea              | N/A        | N/A            |

Includes:  
- CNAPS-C  
  C' compiler designed for CNAPS architecture  
- CNAPS Programming Language (CPL)  
  A CNAPS assembler that allows the programmer complete access to all of the features of the hardware.  
- CNAPS CPL Source Code  
- CNAPS Debugger  
  An integrated set of powerful tools for source level symbolic debugging for either CNAPS-C or CPL.  
- CNAPS QuickLib Foundation Library  

(Upgrade to SN: 400027; Returned to ASI on RMA 146 on 4.26.95)
**Adaptive Solutions, Inc.**

1400 NW Compton Drive  
Suite 340  
Beaverton, Oregon 97006  
Tel: 503.690.1236  
Fax: 503.690.1249

**Ship to:**  
David Taylor Model Basin, Code 54  
Carderock Division, NSWC  
Bethesda, MD 20084-5000

**Attn:**  
David Hess  
301.227.4704

**Ref.:**  
ARPA A00014-93-C-0234  
REPLACEMENT BOARD FOR MODDED PC BOARD  
UPGRADE

<table>
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<tr>
<th>Pkg</th>
<th>Item</th>
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<th>Description</th>
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<th>Ship Qty</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
<th>Extended Price</th>
</tr>
</thead>
</table>
| 1   | 1    | ASIDS128PC-20 | CNAPS®/PC Development Environment /128  
Includes:  
- CNAPS®/PC128  
- 128PN's, with 4 MB of data storage  
- SN: 400114  
- CNAPS Software Kit for Windows  
Version B1.1.0  
Includes:  
- CNAPS-C  
- 'C' compiler designed for CNAPS architecture  
- CNAPS Programming Language (CPL)  
A CNAPS assembler that allows the programmer complete access to all of the features of the hardware.  
- CNAPS CPL Source Code  
- CNAPS Debugger  
An integrated set of powerful tools for source level symbolic debugging for either CNAPS-C or CPL.  
- CNAPS QuickLib Foundation Library | 1 | 1 | ea | N/A | N/A |

PLEASE RETURN SN: 400023 TO:  
ON RMA #:  
ADAPTIVE SOLUTIONS, INC  
1400 NW COMPTON DRIVE  
SUITE 340  
BEAVERTON, OR 97005

ATTN: RMA # 152  
(JOHN HAYNES)
Adaptive Solutions, Inc.
1400 NW Compton Drive
Suite 340
Beaverton, Oregon 97006
Tel: 503.690.1236
Fax: 503.690.1249

Ship to: Army Research Lab
2800 Powder Mill Rd.
Attn: AMSRL-SS-IC
Adelphi, MD 20783-1197
Attn: Jeff DeHart
301.394.3920

Ref.: ARPA N00014-93-C-0234
End User: Dave Hillis

<table>
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<th>Pkg.</th>
<th>Item No.</th>
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<th>Description</th>
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<th>Ship Qty</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
<th>Extended Price</th>
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</thead>
</table>
| 1    | 1        | ASIDS126PC-20 | CNAPS®/PC Development Environment /128 Includes:
|       |          |              | 128PN's, with 4 MB of data storage | 1         | 1         | ea              | N/A        | N/A            |
|      |          |              | SN: 400106 |           |           |                 |            |                |
|      |          | ASI12804C1-20 | CNAPS®/PC128 |           |           |                 |            |                |
|      |          |              | 128PN's, with 4 MB of data storage | 1         | 1         | ea              | N/A        | N/A            |
|      |          | ASI CSKU10-1 | CNAPS Software Kit for Windows Version B1.1.0 Includes:
|       |          |              | 1          | 1         | ea          | N/A        | N/A            |

\(\text{Upgrade to SN: 400033; Returned to ASI on RMA 150 on 4.06.95}\)
**MATERIAL INSPECTION AND RECEIVING REPORT**

**NMCINSTRUMENT GEN CONTRACT**

**N00014-93-C-0234**

**ORDERING NO. | INVOICE | PAGE | SP.
---|---|---|---
| | | 1 | 1**

**1. SHIPMENT NO. | 2. DATE SHIPPED | 3. WEIGHT | 4. DISCOUNT TERMS
---|---|---|---
**ASE0003 | 6/2/95 | ** | **

**5. PRIME CONTRACTOR**

Adaptive Solutions, Inc.
1400 NW Compton Drive
Suite 340
Beaverton, OR 97006

**6. SHIPPED FROM (if different than 5)**

See Block 9

**7. SHIPPED TO**

See attached list per instructions from:
Dr. Barbara Yoon
ARPA/MTO

**8. ADMINISTERED BY**

DCMAO Seattle
Corporate Campus East III
3009 112th Ave. NE, Suite 200
Bellevue, WA 98004-3019

**9. PAYMENT WILL BE MADE BY**

DFAS Columbus Center
DFAS CO Santa Ana
PO Box 182381
Columbus, OH 43218-2381

**10. MARKED FOR**

Dr. Clifford Lau, Office of Naval Research
Ballston Centre Tower One, 800 N. Quincy St.
Arlington, VA 22217-5660
ATTN: ONR 314
REF: Contract N00014-93-C-0234

**11. STOCK/PART NO. | DESCRIPTION | QUANTITY | UNIT | UNIT PRICE | AMOUNT
---|---|---|---|---|---
1AE | User license for PC based CNAPS software development environment. | 7 | EA | NSP | **

**PROCUREMENT QUALITY ASSURANCE**

**A. ORIGIN**

☐ PCA ☐ ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

**B. DESTINATION**

☐ PCA ☐ ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

**RECEIVER’S USE**

Quantities shown in column 17 were received in apparent good condition except as noted.

**SIGNATURE OF AUTH. GOVT. REP.**

DATE

Ty pe name and office

DATE

Ty pe name and office

**CONTRACTOR USE ONLY**

☐ if quantity received by the Government is the same as quantity shipped, indicate by ( ) mark, if different, enter actual quantity received below quantity shipped and encircle.
Delivery List for Line Item
1AE

Delivered 6/2/95

<table>
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<tr>
<th>Quantity</th>
<th>Addressee</th>
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<tr>
<td>7</td>
<td>Mr. Kevin Kittka</td>
</tr>
<tr>
<td></td>
<td>PRC Incorporated</td>
</tr>
<tr>
<td></td>
<td>4301N. Fairfax Dr., Suite 700</td>
</tr>
<tr>
<td></td>
<td>Arlington, VA 22203-1627</td>
</tr>
</tbody>
</table>
**Adaptive Solutions, Inc.**

1400 NW Compton Drive  
Suite 340  
Beaverton, Oregon 97006  
Tel: 503.690.1236  
Fax: 503.690.1249

**PACKING LIST**

**Ship to:** PRC Incorporated  
4301 N. Fairfax Drive  
Suite 700  
Arlington, VA 22203-1627

**Reference Contract N00014-93-C-0234**

**Attn:** Mr. Kevin Kittka  
(703) 516-6013

**Bill to:** 4085 - COGS UPDATE

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<th>Ship Qty.</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
<th>Extended Price</th>
</tr>
</thead>
</table>
| 1        | 1        | ASIDS128PC-20 | CNAPS\(^{\circ}\)/PC Development Environment /128  
Includes:  
- 128PN's, with 4 MB of data storage  
  - SN: 400128  
  - SN: 400127  
  - SN: 400125  
  - SN: 400124  
  - SN: 400123 | 7          | 7          | ea          | N/A        | N/A            |
|          | 1        | AS12804C1-20 | CNAPS\(^{\circ}\)/PC128  
Includes:  
- 'C' compiler designed for CNAPS architecture  
- CNAPS Programming Language (CPL)  
- A CNAPS assembler that allows the programmer complete access to all of the features of the hardware.  
- CNAPS CPL Source Code  
- CNAPS Debugger  
- An integrated set of powerful tools for source level symbolic debugging for either CNAPS-C or CPL  
- CNAPS QuickLib Foundation Library | 7          | 7          | ea          | N/A        | N/A            |
**MATERIAL INSPECTION AND RECEIVING REPORT**

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<td>User licenses for PC based BuildNet software development environment.</td>
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<td>1AF</td>
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<td>1 year support for each BuildNet license and each CNAPS development environment license.</td>
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<td>EA</td>
<td>NSP</td>
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</table>

**PROCUREMENT QUALITY ASSURANCE**

A. ORIGIN

☑ PQA □ ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

☐ PQA ☑ ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

**RECIEVER'S USE**

Quantities shown in column 17 were received in apparent good condition except as noted.

DATE RECEIVED: 

SIGNATURE OF AUTH GOVT REP: 

□ if quantity received by the Government is the same as quantity shipped, indicate by (X) mark, if different, enter actual quantity received below quantity shipped and encircle.

DATE: 

SIGNATURE OF AUTH GOVT REP: 

**Notes:**

- Do Form 250, JUN 86
- Previous editions are obsolete.
Delivery List for Line Items
1AD
1AF
Delivered 10/10/95

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<td>Mr. Morgan Grover</td>
</tr>
<tr>
<td></td>
<td>Defense Group Inc.</td>
</tr>
<tr>
<td></td>
<td>429 Santa Monica Blvd., Suite 420</td>
</tr>
<tr>
<td></td>
<td>Santa Monica, CA 90401</td>
</tr>
<tr>
<td>1</td>
<td>Mr. David Hess</td>
</tr>
<tr>
<td></td>
<td>David Taylor Model Basin, Code 54</td>
</tr>
<tr>
<td></td>
<td>Carderock Division, NSWC</td>
</tr>
<tr>
<td></td>
<td>Bethesda, MD 20084-5000</td>
</tr>
<tr>
<td>1</td>
<td>Mr. Jeff DeHart</td>
</tr>
<tr>
<td></td>
<td>Army Research Lab.</td>
</tr>
<tr>
<td></td>
<td>2800 Powder Mill Rd.</td>
</tr>
<tr>
<td></td>
<td>Attn: AMSRL-SS-IC</td>
</tr>
<tr>
<td></td>
<td>Adelphi, MD 20783-1197</td>
</tr>
<tr>
<td>7</td>
<td>Mr. Kevin Kittka</td>
</tr>
<tr>
<td></td>
<td>PRC Incorporated</td>
</tr>
<tr>
<td></td>
<td>4301N. Fairfax Dr., Suite 700</td>
</tr>
<tr>
<td></td>
<td>Arlington, VA 22203-1627</td>
</tr>
</tbody>
</table>
**Adaptive Solutions, Inc.**  
1400 NW Compton Drive  
Suite 340  
Beaverton, Oregon 97006  
Tel: 503.690.1236  
Fax: 503.690.1249

**PACKING LIST**

Ship to:  
The Defense Group  
Suite 420  
429 Santa Monica Blvd.  
Santa Monica, CA 90401  
Attn:  
Mr. Morgan Grover  
Ref:  
(301) 394-8599  
Reference Contract N00014-93-C-0234

Bill to:  
COGS

<table>
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<th>Pkg. No.</th>
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<th>Product Code</th>
<th>Description</th>
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<th>Ship Qty.</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
<th>Extended Price</th>
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<tr>
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<td>ea</td>
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<td>n/a</td>
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Reference PC SN: 400113
**Adaptive Solutions, Inc.**

1400 NW Compton Drive  
Suite 340  
Beaverton, Oregon 97006  
Tel: 503.690.1236  
Fax: 503.690.1249

**PACKING LIST**

| Ship to: | David Taylor Model Basin, Code 54  
Carderock Division, NSWC  
Bethesda, MD 20084-5000 |
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<th></th>
</tr>
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<tbody>
<tr>
<td>Attn:</td>
<td>David Hess</td>
</tr>
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| Ref: | (301) 227-4704  
Reference Contract N00014-93-C-0234 |
| Bill to: | COGS |

<table>
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Reference PC SN: 400114
**Packing List**

Ship to: Army Research Lab  
2800 Powder Mill Road  
Attn: AMSRL-SS-IC  
Adelphi, MD 20738-1197  
Reference Contract N00014-93-C-0234  
Attn: Mr. Jeff DeHart  
(301) 394-3920

Bill to: COGS

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<th>Product Code</th>
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<th>Ship Qty.</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
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<td>n/a</td>
<td>n/a</td>
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Reference PC SN: 400106
**Packing List**

Ship to: PRC Incorporated  
4301 N. Fairfax Drive  
Suite 700  
Arlington, VA 22203-1627  
Reference Contract N00014-93-C-0234

Attn: Mr. Kevin Kittka  
(703) 516-6013

Bill to: COGS

<table>
<thead>
<tr>
<th>Pkg. No.</th>
<th>Item No.</th>
<th>Product Code</th>
<th>Description</th>
<th>Order Qty.</th>
<th>Ship Qty.</th>
<th>Unit of Measure</th>
<th>Unit Price</th>
<th>Extended Price</th>
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<tr>
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<td>ASI BP for Windows</td>
<td>7</td>
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Reference:
SN: 4000130  
SN: 4000128  
SN: 4000125  
SN: 4000123
**MATERIAL INSPECTION AND RECEIVING REPORT**

**PRIME CONTRACTOR:** Adaptive Solutions, Inc.
1400 NW Compton Drive
Suite 340
Beaverton, OR 97006

**SHIPPED TO:**
Dr. Barbara Yoon
ARPA/MTO
3701 N. Fairfax Dr.
Arlington, VA 22203-1714

**REFERENCE:** Contract N00014-93-C-0234

**ITEMS LISTED:**

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>STOCK/PART NO.</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>AMOUNT</th>
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<tbody>
<tr>
<td>5AA</td>
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<td>Phase Lock Loop Schematics &amp; Tape</td>
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<td>NSP</td>
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<tr>
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<td>Mini-Sequencer Schematics &amp; Tape</td>
<td>1</td>
<td>EA</td>
<td>NSP</td>
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<tr>
<td>5AC</td>
<td></td>
<td>Input/Output Schematics &amp; Tape</td>
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<td>EA</td>
<td>NSP</td>
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<tr>
<td>5AD</td>
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<td>Power Transistor Schematics &amp; Tape</td>
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<td></td>
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<td>SRAM Schematics &amp; Tape</td>
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**PROCUREMENT QUALITY ASSURANCE:**

**ORIGIN:**
- [ ] PCA
- [ ] ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

**DESTINATION:**
- [ ] PCA
- [ ] ACCEPTANCE of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

**RECEIVER’S USE:**
Quantities shown in column 17 were received in apparent good condition except as noted.

**DATE RECEIVED:**

**SIGNATURE OF AUTH GOVT REP:**

**TYPED NAME AND OFFICE:**

**DATE:**

**SIGNATURE OF AUTH GOVT REP:**

**TYPED NAME AND TITLE:**

DD Form 250, JUN 86
**Adaptive Solutions, Inc.**

1400 NW Compton Drive  
Suite 340  
Beaverton, Oregon 97006  
Tel: 503.690.1236  
Fax: 503.690.1249

---

**PACKING LIST**

**Ship to:** ARPA/MTO  
3701 N. Fairfax  
Arlington, VA 22203-1714  
Reference Contract: N00014-93-C-0234  
Attn: Dr. Barbara Yoon

**Tel #:**

---

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**TOTAL US DOLLARS:**

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# Material Inspection and Receiving Report

## 1. Project Instrument Gen. Contract

- **Order No.:** N00014-93-C-0234
- **Invoice No.:**
- **Page:** 1
- **Acceptance Point:**

## 2. Shipment No.: 2.

- **Date Shipped:** 12/30/96
- **SL:**
- **Abbreviated Terms:** Net

## 3. Prime Contractor: Adaptive Solutions, Inc.

- **Code:** 0 PCB 8
- **Address:**
  - 1400 NW Compton Drive
  - Suite 340
  - Beaverton, OR 97006

## 4. Administered By: DCMO Seattle

- **Code:** S4801A
- **Address:**
  - Corporate Campus East III
  - 3009 112th Ave. NE, Suite 200
  - Bellevue, WA 98004-8019

## 5. Shipped From (If Different):

- **Code:**
- **Location:**

## 6. Payment Will Be Made By: DCMC Columbus Center

- **Code:** SC1006
- **Address:**
  - DFAS CO Santa Ana
  - PO Box 182381
  - Columbus, OH 43218-2381

## 7. Shipped To: Dr. Clifford Lau, Office of Naval Research

- **Code:** S4801A
- **Address:**
  - Ballston Centre Tower One, 800 N. Quincy St.
  - Arlington, VA 22217-5660
  - ATTN: ONR 314
  - REF: Contract N00014-93-C-0234

## 8. Marked For: Dr. Clifford Lau, Office of Naval Research

- **Code:** S4801A
- **Address:**
  - Ballston Centre Tower One, 800 N. Quincy St.
  - Arlington, VA 22217-5660
  - ATTN: ONR 314
  - REF: Contract N00014-93-C-0234

## 9. Item No., Stock/Part No., Description

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## 10. Procurement Quality Assurance

- **A. Origin:**
  - [ ] PCA
  - [ ] Acceptance of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.
- **B. Destination:**
  - [ ] PCA
  - [ ] Acceptance of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

## 11. Receiver's Use

- Quantities shown in column 17 were received in apparent good condition except as noted.
- **Date Received:**
- **Signature of Auth. Govt Rep:**
- **Type Name and Office:**

**Note:** If quantity received by the government is the same as quantity shipped, indicate by ( ) mark, if different, enter actual quantity received below quantity shipped and enclose.
Adaptive Solutions, Inc.
1400 NW Compton Drive
Suite 340
Beaverton, Oregon 97006
Tel: 503.690.1236
Fax: 503.690.1249

PACKING LIST

Ship to: Office of Naval Research
Ballston Centre Tower One
800 N. Quincy Street
Arlington, VA 22217-5660
Reference Contract: N00014-93-C-0234
Attn: Dr. Clifford Law
Ref: ONR 314

Tel #: 301-394-8599

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TOTAL US DOLLARS:
## MATERIAL INSPECTION AND RECEIVING REPORT

**Shipment No.:** AS10007  
**Date Shipped:** 12/30/96  
**Prime Contractor:** Adaptive Solutions, Inc.  
**Address:** 1400 NW Compton Drive, Suite 340, Beaverton, OR 97006

**Prime Contractor Code:** PCB 8  
**Prime Contractor Address:** Corporate Campus East III, 3009 112th Ave. NE, Suite 200, Bellevue, WA 98004-8019

**Code:** S4801A  
**Administration:** DCMO Seattle

**Shipper's Name:** See Block 9  
**Shipper's Address:** See attached list per instructions from:
- Dr. Barbara Yoon  
- ARPA/MT0

**Code:** SC1006  
**Payment Will Be Made By:** DFAS Columbus Center  
**Address:** DFAS CO Santa Ana, PO Box 182381, Columbus, OH 43218-2381

**Code:** S4801A  
**Marked For:** Dr. Clifford Lau, Office of Naval Research, Ballston Centre Tower One, 800 N. Quincy St., Arlington, VA 22217-5660

**ATTN:** ONR 314  
**REF:** Contract N00014-93-C-0234

### ITEM NO. 1

**STOCK/PART NO.:** 1AE  
**DESCRIPTION:** CNAPS Software Development Environment for WIN/NT Update  
**QUANTITY:** 10  
**UNIT:** EA  
**UNIT PRICE:** NSP  
**AMOUNT:**

### PROCUREMENT QUALITY ASSURANCE

**A. ORIGIN**

- [ ] PQA

**ACCEPTANCE** of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

**B. DESTINATION**

- [ ] PQA

**ACCEPTANCE** of listed items has been made by me or under my supervision and they conform to contract, except as noted herein or on supporting documents.

**DATE:**  
**SIGNATURE OF AUTH GOVT REP:**

**DATE:**  
**SIGNATURE OF AUTH GOVT REP:**

**RECEIVER'S USE**

- Quantities shown in column 17 were received in apparent good condition except as noted.

**DATE RECEIVED:**

**SIGNATURE OF AUTH GOVT REP:**

**TYPED NAME AND OFFICE:**

**TYPED NAME AND TITLE:**

**12. CONTRACTOR USE ONLY**
Delivery List for Line Items
1AE Update
Delivered 12/30/96

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Defense Group Inc.  
429 Santa Monica Blvd., Suite 420  
Santa Monica, CA 90401 |
| 1        | Mr. David Hess  
David Taylor Model Basin, Code 54  
Carderock Division, NSWC  
Bethesda, MD 20084-5000 |
| 1        | Mr. Jeff DeHart  
Army Research Lab.  
2800 Powder Mill Rd.  
Attn: AMSRL-SS-IC  
Adelphi, MD 20783-1197 |
| 7        | Mr. Kevin Kittka  
PRC Incorporated  
4301N. Fairfax Dr., Suite 700  
Arlington, VA 22203-1627 |
**Adaptive Solutions, Inc.**

1400 NW Compton Drive  
Suite 340  
Beaverton, Oregon 97006  
Tel: 503.690.1236  
Fax: 503.690.1249

**PACKING LIST**

Ship to: **Defense Group, Inc.**  
429 Santa Monica Blvd., Suite 420  
Santa Monica, CA 90401  
Reference Contract: N00014-93-C-0234

Attn: Mr. Morgan Grover  
Ref:

Tel #: 310-394-8599

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**TOTAL US DOLLARS:**

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Adaptive Solutions, Inc.
1400 NW Compton Drive
Suite 340
Beaverton, Oregon 97006
Tel: 503.690.1236
Fax: 503.690.1249

PACKING LIST

Ship to: Army Research Lab
2800 Powder Mill Road
ATN: AMSRL-SS-IC
Adelphi, MD 20783-1197
Reference Contract: N00014-93-C-0234
Attn: Mr. Jeff DeHart
Ref:
Tel #: 301-394-3920

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TOTAL US DOLLARS:
Adaptive Solutions, Inc.
1400 NW Compton Drive
Suite 340
Beaverton, Oregon 97006
Tel: 503.690.1236
Fax: 503.690.1249

PACKING LIST

Ship to: David Taylor Model Basin, Code 54
Carderock Division, NSWC
Bethesda, MD 20084-5000
Reference Contract: N00014-93-C-0234
Attn: Mr. David Hess
Ref:

Tel #: 301-227-4704

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TOTAL US DOLLARS:
**Adaptive Solutions, Inc.**

1400 NW Compton Drive  
Suite 340  
Beaverton, Oregon 97006  
Tel: 503.690.1236  
Fax: 503.690.1249

**PACKING LIST**

**Ship to:** PRC Incorporated  
4301 N. Fairfax Drive, Suite 700  
Arlington, VA 22203-1627  
Reference Contract: N00014-93-C-0234  
Attn: Mr. Kevin Kittka  
Ref:  
Tel #: 703-516-6013

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