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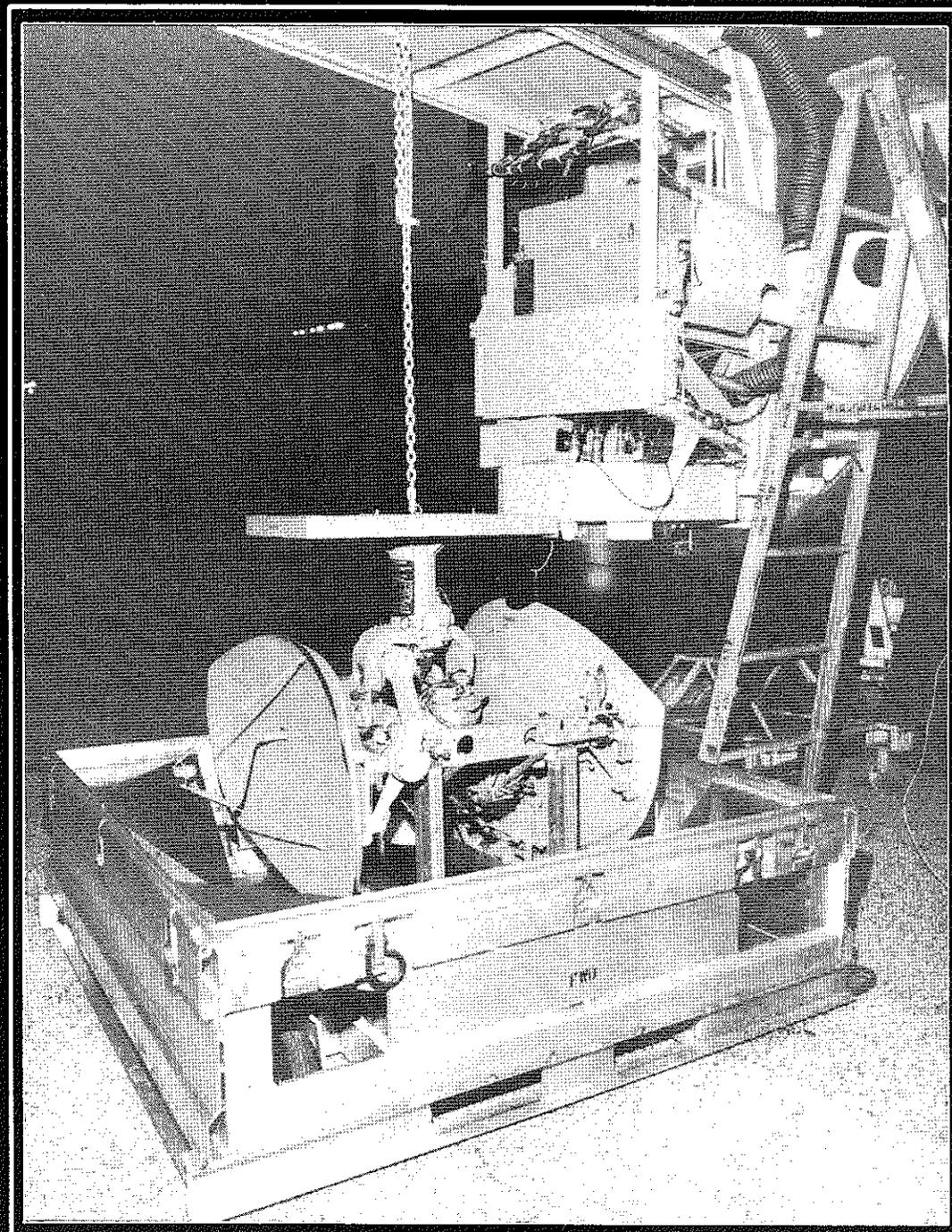
# ANNUAL REPORT

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# 1987



AIR FORCE PACKAGING EVALUATION ACTIVITY  
WRIGHT PATTERSON AIR FORCE BASE DAYTON OHIO 45433



**DEPARTMENT OF THE AIR FORCE**  
**HEADQUARTERS AIR FORCE LOGISTICS COMMAND**  
**WRIGHT-PATTERSON AIR FORCE BASE OHIO 45433**

1. In 1987, the Air Force Packaging Evaluation Activity (AFPEA) was reassigned to the newly formed Air Force Distribution Agency. Concurrent with this reassignment, the AFPEA had a slight change in name from "Agency" to "Activity". There is no change in the mailing address or it's mission.

2. The activity has been involved the past year in working on numerous weapon systems and upgrading the computer capabilities for computer-aided-design. Also, important new equipment capabilities have been ordered and are in the process of being installed or delivered. Among these are a new altitude chamber, high/low temperature for vibration, data acquisition, and prototyping capabilities. These additions should enhance the operations to provide better support to the Air Force programs. The items in the following report provide an overview of the support being provided to many of the weapon systems which assist in maintaining our future defense posture.

3. In the future, we look forward to assisting in reducing costs in face of diminishing budget resources. With the significant expenditures on packaging, there is a large potential opportunity to achieve reduced packaging costs. One of the significant efforts will be to provide the means to meet the new United Nations Hazardous Materials Performance Tests that are scheduled for implementation in 1990. Testing contracts are in preparation to allow Department of Defense (DOD) activities to obtain certification for the packaging to meet the new standards. This will be a significant task throughout DOD and industry considering the magnitude of hazardous materials both in the inventory and being procured.

4. As in the past, we encourage both DOD and industry to share improvements which can be of benefit to our world-wide packaging operations. We are looking forward to continued improvements in new materials and container designs to assist in making progress in supporting our weapons systems.

*William J. Friel*

WILLIAM J. FRIEL, Col, USAF  
DCS/Distribution

## **AFPEA MISSION**

THE AIR FORCE PACKAGING EVALUATION ACTIVITY PROVIDES THE DEPARTMENT OF THE AIR FORCE WITH AN ENGINEERING CAPABILITY THAT IS AVAILABLE TO ALL MAJOR COMMANDS AND TO CERTAIN OTHER FEDERAL AGENCIES. TO ASSURE DYNAMIC ENGINEERING AND TECHNICAL PROGRESS IN PACKAGING, THE AFPEA INVESTIGATES, DESIGNS, DEVELOPS, TEST, AND EVALUATES CONTAINERS, MATERIALS, METHODS, AND TECHNIQUES.

- AFPEA IS RESPONSIBLE FOR AN AVERAGE OF 80 PROJECTS.
- MAINTAINING 44 SPECIFICATIONS AND STANDARDS.
- AIR FORCE CUSTODIAN AND COORDINATION OF OVER 350 SPECIFICATIONS AND STANDARDS.
- LEAD SERVICE ACTIVITY FOR TESTING IN 12 ASSIGNED AREAS.

**AIR FORCE PACKAGING EVALUATION ACTIVITY**  
HQ AFLC/DSTZ  
JACK E. THOMPSON, DIRECTOR  
AUTOVON 787-2638

**DESIGN BRANCH**  
HQ AFLC/DSTZD  
RALPH ZYNDA, CHIEF  
AUTOVON 787-3362

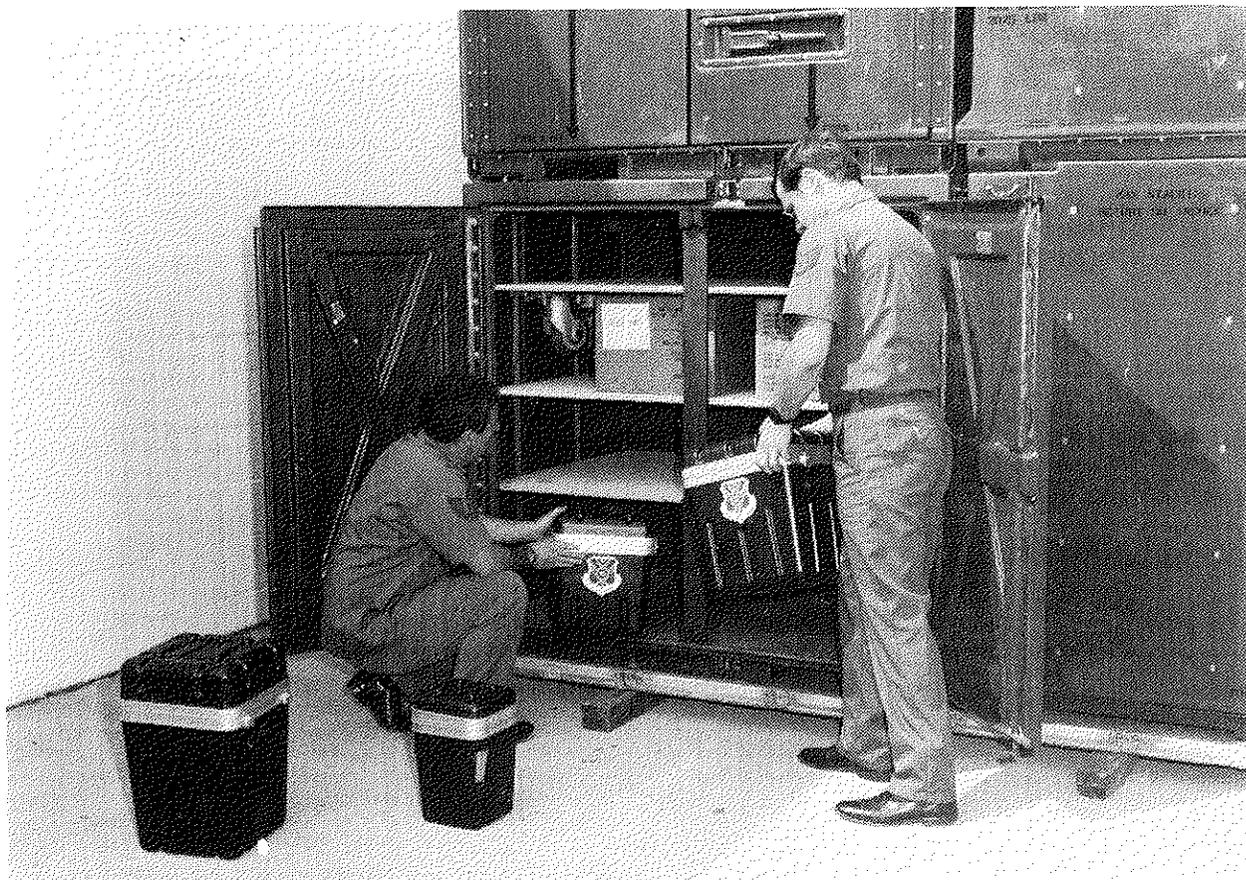
**MATERIALS ENGINEERING BRANCH**  
HQ AFLC/DSTZT  
M. A. VENETOS, CHIEF  
AUTOVON 787-4234

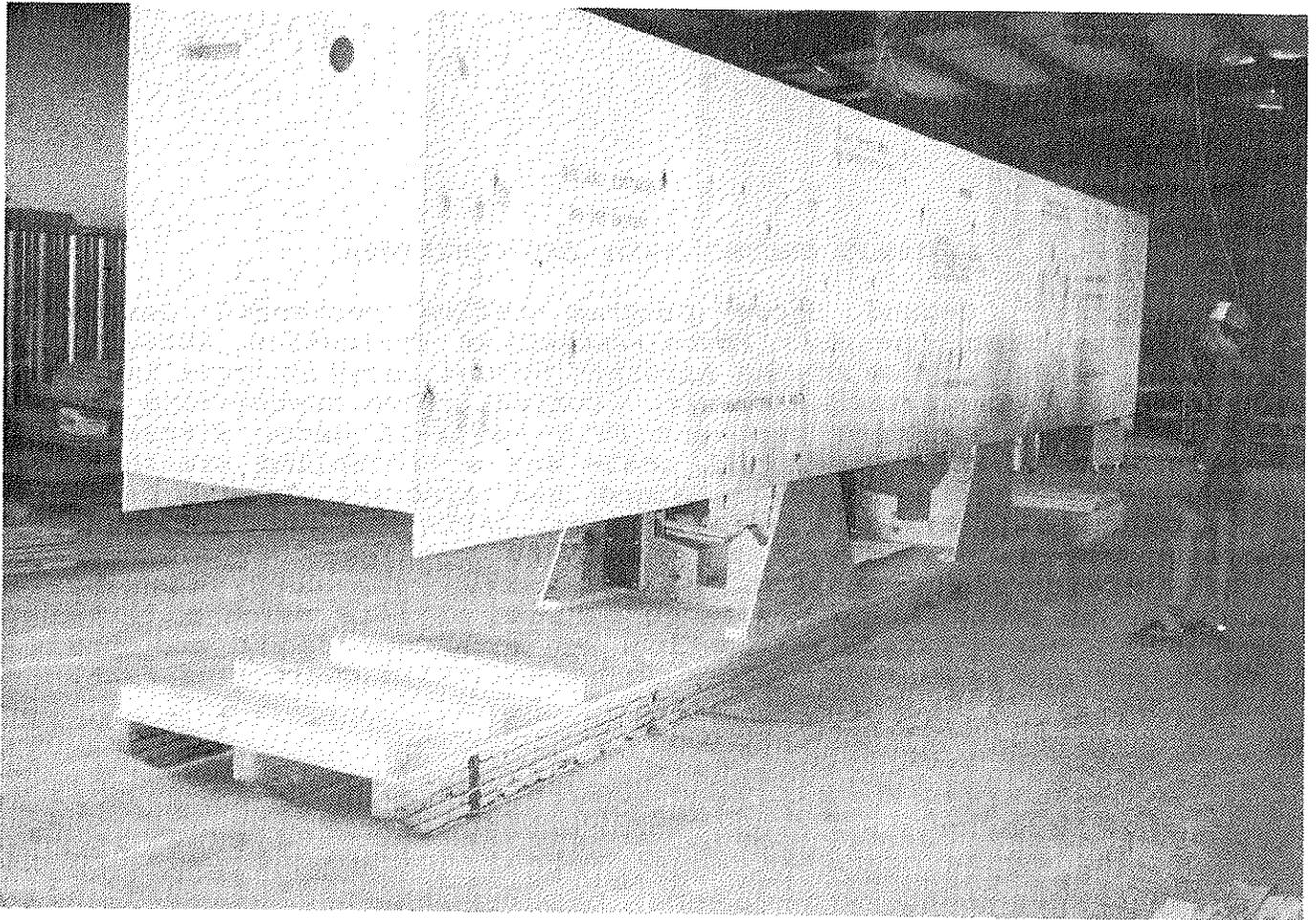
## MOBILITY CONTAINER DESIGN CHANGES

The Mobility containers are a set of fiberglass air cargo containers designed to be compatible with the 463L pallet system and for the movement of items during mobility operations on military and civilian aircraft. The Air Force Packaging Evaluation Activity (AFPEA) is evaluating the containers for design changes.

Among the changes which have been or will be implemented into the 1987 through 1989 container buy contract were less expensive plywood shelves, stronger tie down rings, and better corrosion control. The previous shelves were fabricated from marine-grade plywood. Determination was made by AFPEA that a less expensive exterior grade of plywood could replace the other shelving. The new shelves are expected to save the government over one million dollars on the new contract. Because the current tie down rings on the largest mobility container failed the tie down strength test, stronger tie downs are in the process of evaluation. If the new rings prove to be stronger and less expensive, they will be used as a standard for all containers. Zinc plate was added to the exterior hardware to prevent corrosion.

(HQ AFLC/DSTZD, Ms Caroline Smith, 73362)





#### F-15/4 CONFORMAL FUEL TANK CONTAINER

The Air Force Packaging Evaluation Activity (AFPEA) was asked by the F-15 Program Office to provide assistance in the design, prototyping and evaluation of a container for the F-15/4 Conformal Fuel Tank container. A wooden container 402" long X 48" wide X 71.75" high was designed by AFPEA engineers and a small business contract was awarded to American Crating Company, Tulsa OK for two prototype containers. The contractor prototyped and delivered the containers on time and reflected a great deal of pride and expertise in their fabrication. The containers will be tested by AFPEA when a dummy model of the fuel tank is available. A fit test of the actual fuel tank in the container has been suggested to the program office. The program office is currently deciding whether or not a container is required and if the container should be environmentally sealed.  
(HQ AFLC/DSTZD, Mr Ted Hinds, 73362)

## EVALUATION OF CONTAINER FOR BARE BASE PROGRAM

The Warner Robins Air Logistics Center (WR-ALC/MMVF) requested assistance from the Air Force Packaging Evaluation Activity to determine if a Korean manufactured container would be suitable for the Bare Base Program. The container was manufactured by the Hung Myung Industrial Company, Ltd as an Air Force Harvest Eagle container. One container was received for evaluation and subjected to rough handling and environmental tests. Although suitable for shipping, the container was not recommended for use in the Bare Base Program since it was not environmentally sealed. (HQ AFLC/DSTZD, Mr Larry Nugent, 73362)



## LEAD SERVICE CUSHIONING PROGRAM

As the lead service for cushioning materials, the Air Force Packaging Evaluation Activity has undertaken a US Army Armament, Munitions and Chemical Command project to research and update the currently available engineering data on several cushioning materials. The materials to be investigated will be 2, 4, 6, and 9 pound density polyethylene, 6 pound crosslinked polyethylene and 2, 4, and 5 pound bound fiber. The four categories of data to be generated are: peak G static stress, transmissibility, stress strain, and compressive set. The evaluations will be conducted under various temperature conditions, varying from -60°F to +160°F.

Five material thicknesses have been chosen to cover the commonly used cushioning thickness range from 1/2 to 6 inches. Peak G These containers did not pass qualification testing. static stress curves will also be generated at five different drop heights ranging from 12 to 84 inches. Modifications to the AFPEA cushion tester have been initiated to accommodate this extreme range. It is estimated that this project will require a minimum of 1 1/2 years to complete once testing commences in early 1988. (HQ AFLC/DSTZT, Mr David E. Filsinger, 74519)

## FIBERGLASS MAVERICK MISSILE CONTAINER

During 1987, the Air Force Packaging Evaluation Activity (AFPEA) has supported the Maverick Missile system program office, ASD/TAML, with fiberglass container development. The support work includes qualifying two additional sources to manufacture the fiberglass containers and evaluating engineering change proposals (ECP) for the current contract with Plastic Research Corporation (PRC).

In June 1987, a \$728,000 contract was awarded to a second source for 100 containers. Four containers were scheduled and delivered in November to AFPEA for qualification testing and evaluation. These containers could not hold pressure and the cradle system, which secures the missile into the container, was out of tolerance. The containers did not pass qualification testing.

In July 1987, a third manufacturer was awarded a \$459,000 contract to build two prototype maverick missile containers. This fiberglass container development effort is on schedule, with delivery set for March 1988.

AFPEA has also developed a test plan to evaluate an ECP that will provide squaring blocks for PRC manufactured containers. The tests will be used to determine whether the integrity of the container seal can be maintained after rough handling. This testing is tentatively scheduled for first quarter 1988.

(HQ AFLC/DSTZD, Mrs Susan Hughey, 73362)

### **ALUMINUM CONTAINER DESIGN CONCEPT**

The Air Force Packaging Evaluation Activity (AFPEA) has designed and prototyped its first in-house container using standard aluminum extrusions. The extrusions, materials and design used on other containers were modified to meet the new program requirements. Many of the modified drawings were prepared on the computer-aided design system.

AFPEA now has the ability to provide both container design, engineering, and prototyping. This approach to development of weapon system containers will result in extensive savings. The lead time for the first container will be substantially reduced and changes to container design during the prototyping and testing phases of the program will be easier. The end result offers container designs which meet user requirements, in a relatively short time and can be economically produced.  
(HQ AFLC/DSTZD, Mr Ted Hinds, 73362)

### **MULTI-PURPOSE CONTAINER FOR SMALL, SHOCK SENSITIVE ITEMS**

In June 1987 the Air Force Packaging Evaluation Activity issued Report 87-R-02 on the subject container system. This system consists of two containers capable of providing 15G protection to items between 1 and 10 pounds in weight and less than 9X9X9 inches in size.

During October 1987 additional free-fall drop tests at  $-20^{\circ}\text{F}$  and  $+120^{\circ}\text{F}$  were performed. The results indicate excellent performance at all temperatures. At room temperature to  $+120^{\circ}\text{F}$  the container provided 15G shock protection. At  $-20^{\circ}\text{F}$  the containers provided slightly over 20G shock protection. This increase is due to the increased stiffness of the foam cushioning material at this low temperature, and was an expected result.  
(HQ AFLC/DSTZT, Mr Larry A. Wood, 74519)

**CONTRACT FOR DEVELOPMENT OF FLAMMABILITY CRITERIA  
FOR PACKAGING MATERIALS**

A one year contract with Underwriters Laboratories to develop flammability rating criteria of packaging materials is nearing completion. The contract is an add-on/refinement effort to a previous contract with Ohio State University (OSU). The test equipment and procedures developed during the OSU contract were used to develop usable data under this contract.

The additional tasking of this contract includes:

- a. Develop additional burn test data.
- b. Refine the test equipment and procedures.
- c. Correlate the small scale burn tests to larger scale burn tests involving complete packages.
- d. Develop a list of independent laboratories capable of performing the flammability test.

Based on the favorable quarterly reports already received and assuming that the test results are reproducible, the test procedure and burn rates developed under this contract will be incorporated into future revisions of packaging material specifications.

(HQ AFLC/DSTZT, Mr Ted P. Smith, 74519)

**PERFORMANCE ORIENTED PACKAGING (POP) OF  
HAZARDOUS MATERIALS**

The Performance Oriented Packaging (POP) test program at Rochester Institute of Technology sponsored by the POP Joint Work Group (JWG) was completed in early 1987. The tests indicate that the larger metal drums containing liquids have questionable performance for Packing Group I items (6 foot drop test). The test program did prove that the performance tests can be performed with limited equipment. A central data storage point, Defense Technical Information Center (DTIC) was established as a central storage/retrieval location for POP test reports.

The POP JWG tasked the Air Force Packaging Evaluation Activity (AFPEA) with preparing a Statement of Work (SOW) for a contract to provide a source outside the Government to perform POP tests for Department of Defense (DOD) and DOD contractors. This approach is being taken because DOD lacks sufficient testing capability to handle this ongoing task internally. The concept utilized for the contract is to have each test requesting activity fund their individual tests from an established price schedule. The SOW is being coordinated with all the services and is scheduled to be in place by July 1988.

(HQ AFLC/DSTZT, Mr Ted P. Smith, 74519)

**LOW ALTITUDE NAVIGATION AND TARGETING INFRARED SYSTEM (LANTIRN)  
CONTAINER DESIGN**

The LANTIRN program has a new container specification which meets Air Force requirements. The Air Force Packaging Evaluation Activity was asked by the LANTIRN program office to update and/or correct the container specification to meet Air Force requirements with minimal changes to the original document. The 10G peak acceleration level which the Navigation and target pods can receive during testing and the 12-inch drop test height requirement were maintained.

The new container design dictates the use of aluminum for all major structures, with cam over center quick release-type latches for the container closure. A water lip, physical stop, four-way, forklift capability, solid handles and solid lifting rings are only a few of the enhancements made. The new container design will be a mix of standard and special extrusions combined with sheet aluminum. Overall the program is proceeding on schedule with the first production container deliveries expected in May 1988.

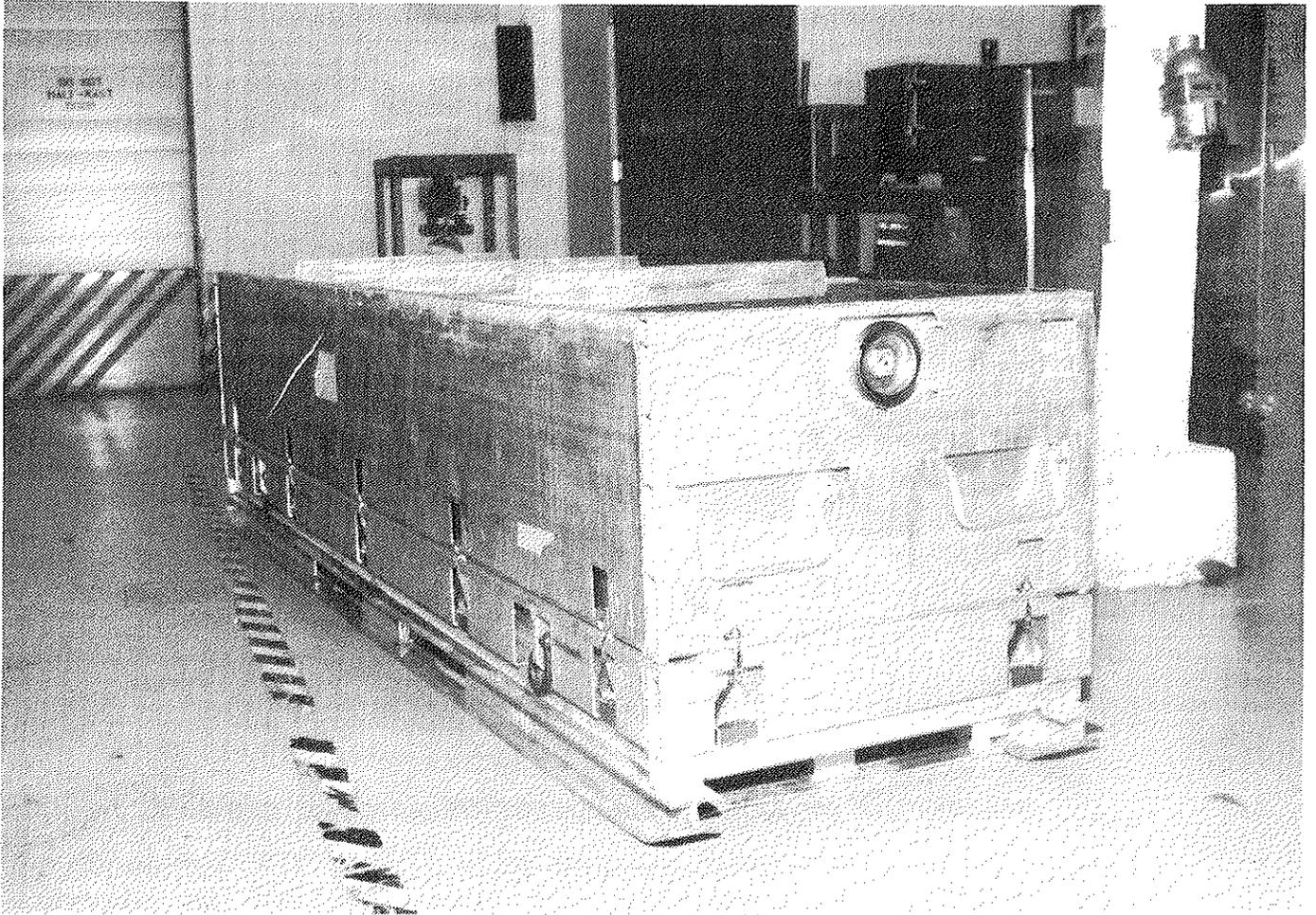
(HQ AFLC/DSTZD, Mr Ted Hinds, 73362)

**CONTAINER SYSTEM FOR LOW FRAGILITY AVIONICS**

The low fragility container system consists of a set of four containers capable of providing 15G protection for sensitive avionics equipment. These containers will accommodate items ranging in weight from 10 to 91 pounds with dimensions up to 24X20X20 inches. The system has now been stock listed, and is available for selection as a multi-application container in MIL-STD-2073-1B.

Warner Robins Air Logistics Center has assigned an item manager to control this system, and is in the process of procuring these containers in quantity for future program requirements.

(HQ AFLC/DSTZT, Mr Larry A. Wood, 74519)



AD/YNEP CONTAINER DESIGN



AFPEA DESIGN  
17

## COMPUTER-AIDED DESIGN SYSTEM

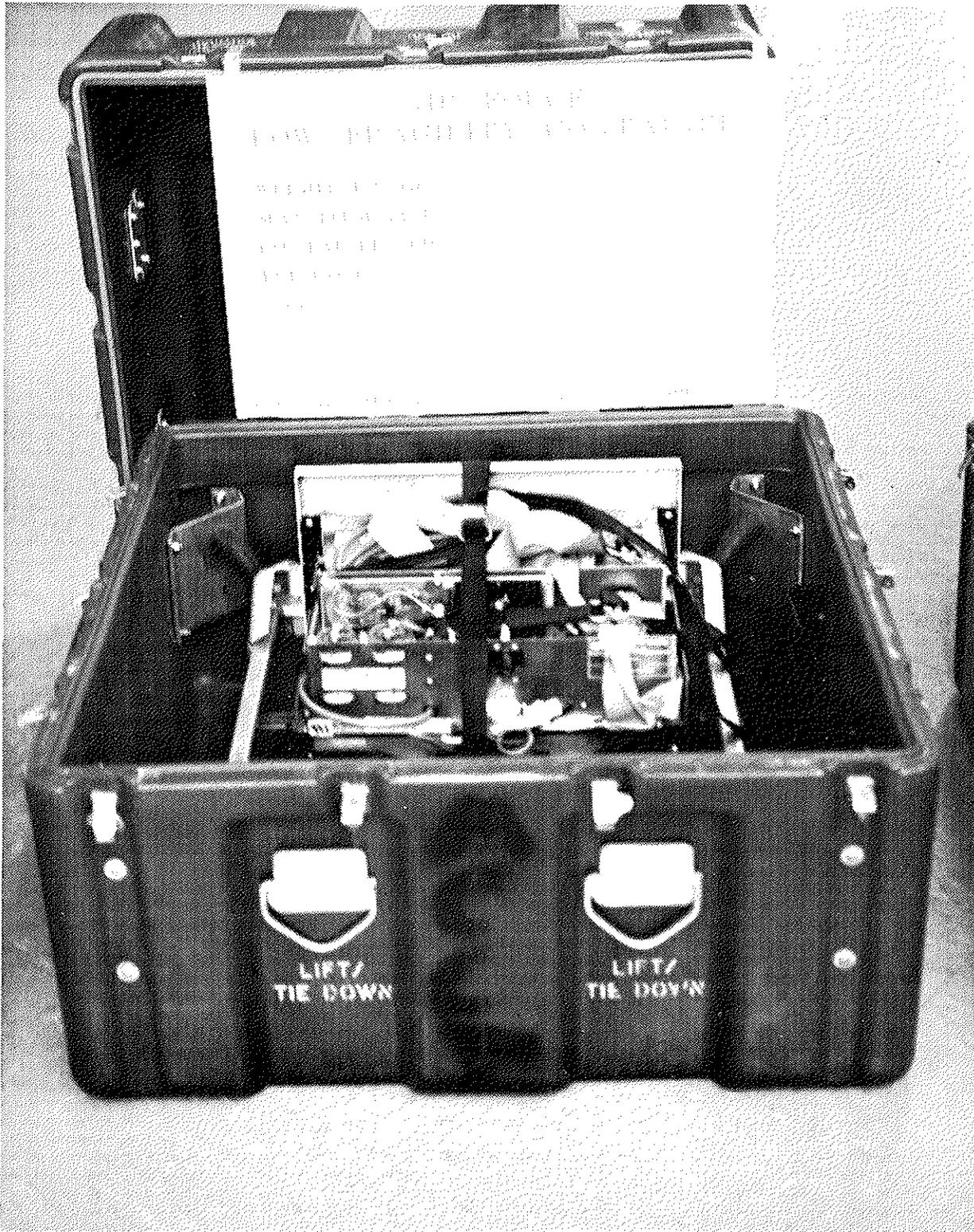
The Computer-Aided Design System (CADS) used for the development of special packaging instructions (SPIs) has been upgraded and expanded with personal computers (PCs). Three PC workstations were delivered to each of the five air logistics centers in the January through March 1987 time-frame along with a laser printer and a dot matrix printer and a document scanning device. Similar enhancements took place at the Air Force Packaging Evaluation Activity with the addition of an optical storage device for long term digital storage of SPIs. The new PC workstations are well received by the CADS technicians, resulting in substantial increase in SPI production. Problem areas requiring work are the scanner's vectorization of images and the International Graphics Exchange Standard translator which allows the transfer of drawings between different computer systems.

There have been some problems, as with any new system, but overall the system upgrade is a major success for the Air Force, reducing the cost of producing SPIs.  
(HQ AFLC/DSTZD, Mr Ted Hinds, 73362)

## CLEATED CORRUGATED PLASTIC CONTAINER

To further facilitate implementation of the cleated corrugated plastic containers, the Air Force Packaging Evaluation Activity prepared and had published Interim Amendment 3 (USAF) to Federal Specification PPP-B-601G, Boxes, Wood, Cleated-Plywood, 31 July 1987. Major commands and other interested Air Force activities have been alerted regarding the implementation of these reusable containers and they have been requested to ensure their reuse to the maximum extent possible (estimated at 12 trips or more). Factors which may adversely affect implementation are the rising cost of the plastic panel and reduced opportunities to reuse the containers.

(HQ AFLC/DSTZD, Mr Prisciliano Quijas, 73362)



SYSTEM PROVIDES GUARANTEED 15G PROTECTION FOR ITEMS BETWEEN 10 AND 91 POUNDS NET WEIGHT.

FULL METHOD II PROTECTION IAW MIL-P-116, SEE MIL-STD-2073-1B, APPENDIX E FOR STOCK NUMBERS.



ONE TEST IS WORTH  
A THOUSAND  
EXPERT OPINIONS