AFPTEF

Air Force Packaging Technology & Engineering Facility

1994 ANNUAL REPORT

"A New Direction,
A New Dedication"

DEPARTMENT OF THE AIR FORCE
Air Force Material Command
Wright-Patterson AFB OH 45433-5501

18 April 1995

ANNUAL REPORT 1994
AIR FORCE PACKAGING TECHNOLOGY AND ENGINEERING FACILITY

This annual report is developed to detail project accomplishments for the calendar year of 1994.

No. of Printed Pages: 57
OPR: AFMC LSO/LOP
Approved by: Howard English
Editor: Phyllis Offutt
Distribution: X
AUL/LSE, Maxwell AFB AL 36112-5564.....1
HQ AFISC/IMP, Norton AFB CA 92409-7001..1

HIGHLIGHTS FROM THE CHIEF

Another year has flown by! It was an exciting year for everyone. Again, we saw more of our family retiring as the Air Force continued to offer incentives in order to reduce civilian manpower. We lost three of our valuable people. Along with losing part of our family, the Air Force lost many years of packaging experience. Our retired were Ms Barbara Taylor, Mr Ed Moreavac, and Mr Avery Watson. We wish them the very best in the future and a very enjoyable retirement.

The end of 1994 saw the end of an era in DOD packaging. AFPEA came to an end! Well, that is not quite true. As AFMC re engineered the Headquarters, it became necessary to break out of the Headquarters some functions. As a result, AFPEA was placed in the new Forward Operating Activity (FOA). This FOA is officially known as the Logistics Support Office (LSO). The LSO is headed by Mr Howard English. The LSO is made up of the Air Force Traffic Management Division, the Air Force Automatic Identification Technology Program Management Division, the Air Force Materials Handling Engineering Division and AFPEA. Well, AFPEA is the old name. With the change, AFPEA became the Air Force Packaging Technology and Engineering Facility (AFPTEF). Now we have to learn a new acronym -- "AFPTEF". Our new office symbol is AFMC LSO/LOP. Our address and phone number is the same. Later in the report is a copy of the new LSO organization chart to help you follow the change. As you can see, the LSO breaks out of LG, the organizations that provided services to the Air Force and not strictly to AFMC. This change officially recognizes the true nature of the organization as one of service to the entire Air Force!

While our organizational change was big news around here, it was not nearly as eventful as the services we provided this past year to our customers. It was truly an outstanding year in the packaging business. We were challenged and we DELIVERED! As you read through this report, you will see many projects that solved really tough problems for people. Others brought out the ingenuity of people to come up with new solutions. It was a great year.

This coming year, we are taking on the challenge to market ourselves better. During the past year, I found several cases where program offices did not know we existed. These were within our own Command. We do great work! However it is not totally successful if we do not make sure that everyone knows that we are here and what we can do to help. This is the year that we try to get our message out to all. As part of that work, I would like to have each of you tell someone that there is a group in the Air Force that can solve ALL of their packaging problems. Also, we can do environmental testing of many end items. Please help and "spread the word".

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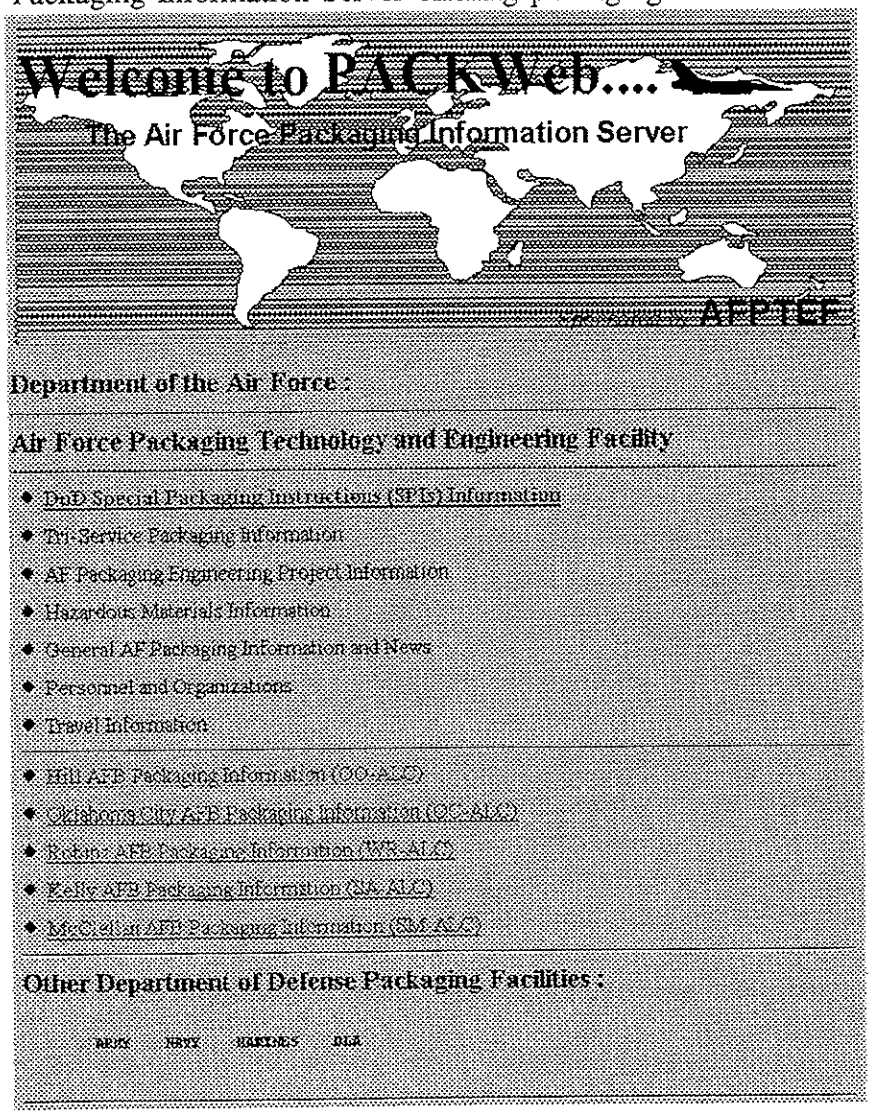
"PACKWeb"

The AF Packaging Evaluation Activity, AFPEA, is participating in the Defense Ammunition Packaging Council, DAPC, Project J1 on Tri-Service Coordination. Managed by the Army, the project direction is to improve the way each service communicates and coordinates "packaging" related information. The AF has extended efforts to enhance the mechanisms used by the Special Packaging Instruction Development and Distribution System, SPIDDS, by producing "PACKWeb". Coordinated with similar efforts by the Army, "PACKWeb" is the AF version of a Packaging Information Server offering packaging associated information over the World Wide Web (W3) through the use of "Mosaic" and the internet. PACKWeb can be accessed by its URL which is http://wpdis10. wpafb.af.mil.



As a new product offered by AFPEA, many areas of interest are still being loaded into the Server. "Under construction" is the term typically identified with the W3, since the information architecture is always growing and changing with our information needs.

As can be seen by the main page (left) for PACKWeb, there will be several areas of interest and ALL related to the world of "packaging". When hi-lighted (hypertext) a Mosaic user can click on a subject which will lead them into other "pages" of information.

This W3 technology can offer many options in getting information including movie clips, sound clips, slide shows, general files, FTP (file transfer protocol), menu response forms, questionnaires, and many more. Keep in touch, PACKWeb will be continuing to grow as information comes "on-line".

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ADVANCEMENTS IN CUSHION MATERIAL TESTING

(Ms. Evans)

During the past year, AFPEA developed test methods for generating low temperature dynamic cushioning data and high temperature compressive creep data for foam cushioning materials that potentially meet PPP-C-1752 requirements. Interested parties in DOD have been provided with all test results and manufacturers were provided with results for their own materials. Testing began in late August 1994 and will continue intensively for the next several months.

LOW TEMPERATURE DYNAMIC CUSHIONING TESTING

The dynamic performance test method in PPP-C-1752 is used except that test samples (6 in. x 6 in. x 4 in.) are conditioned to -20°F in a portable freezer unit placed next to our Lansmont 2300 cushion tester. Cushions are quickly removed from, tested and replaced in the freezer. Extensive trials for each material tested, using thermocouple probes inserted into cushion samples, is performed prior to actual testing to verify that during testing the samples remain at the required temperature throughout their thickness. Samples are allowed to condition for 30 minutes between each round of drops and a new set of samples are used for each static stress. Materials are tested at the same 6 static stresses used in room temperature tests, depending on the cushioning type (i.e., PPP-C-1752D). Cushion curves are then developed from the data. 73°F samples of each material, with the same dimensions, are also tested at the same static stress points to allow comparison to the materials cushioning abilities under "normal" use.

HIGH TEMPERATURE COMPRESSIVE CREEP TESTING

High temperature compressive creep data is also gathered IAW PPP-C-1752D except that the test period has been shortened from 42 to 7 days to reflect more realistic use conditions. This also allows AFPEA to provide immediately, useful information on materials more quickly to all interested parties. Since creep rates of most materials tend to level off within 1 week, often within 1 day, and significant amounts of creep often don't occur after this time, reducing the test period should still provide accurate data. Samples used measure 4 in. x 4 in. x 2 in. as recent round-robin testing with ASTM showed that there may be problems using smaller samples.

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PRESSURE TESTING OF SMALL CONTAINERS

In the course of testing small sealed containers, specifically Family of Munitions Container #1 (FMC #1) it has been discovered that the pressure testing requirements stated in MIL-STD-648 are very difficult if not impossible to meet in our prototypes and will be virtually impossible to meet in a production mode.

There are two approaches in conducting pressure tests. The first is the current approach used by AFPEA and described in MIL-STD-648, paragraph 5.5.2, a constant 0.05 psi/hr leak rate. The problem with the use of a constant pressure loss is that the smaller the container the smaller the volume of gas that it can lose. Thus, at extremely small container volumes there is an unrealistic restriction on the volume of gas lost during the pressure test. The Army Packaging Group utilizes a secondary approach to pressure testing, a volumetric loss approach. A flow rate of 5 cm^3/minute (18.31 in^3/hr) is used as the passing criteria for small containers. This volumetric rate is based on a 21 Dec 89 Information Paper titled "LEAKAGE REQUIREMENTS FOR SEALED CONTAINERS." The problem with the use of a constant volume loss is that for large containers it also places an unrealistic sealing requirement on the container.

The comparison of both methods shows a natural, yet theoretically distinct approach to pressure testing containers. Both historical data and experience gained by the Army Packaging Group and AFPEA validate their respective methods in some cases and identify significant problems in others. The question may not be which method is correct, it may be when is it more correct to use one method over the other. The goal is to provide adequate protection during long-term storage at the most reasonable cost. Therefore, at specific instances of volume, one of the test methods may be too restrictive causing the cost of the container to increase without increasing the value or level of the protection.

It is recommended that the experience of both services be put to use by using the strengths of both. The experience of the Army with the testing of small containers coupled with the current difficulty AFPEA has encountered with the sensitivity of pressure/leak testing small containers leads to the recommendation that for containers under approximately 5000 in^3 a volumetric leak rate of 18.3 in^3/hr (5 cm^3/minute) be used. It is also recommended that since the experience and positive results AFPEA has obtained in containers over 5000 in^3 the current pressure based leak rate of 0.05 psi/hr be maintained. This way the experience of both services is put to use and assets remain protected while in storage without incurring costs seen with unrealistic pressure/leakage requirements that add no value to the system.

More information on the use of, and the comparison of these two leak rate methods can be found in the AFPEA Point Paper titled Leakage Requirements for Small Containers Dated 28 Feb 94.

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OFFICIAL AF METRIC DRAWING FORMS?

The Air Force Packaging Evaluation Activity (AFPEA) IAW with Public Law 94-168 developed "B", "C", and "D" size Metric Drawing Forms. The format and size of the forms were developed in accordance with ASME Y14.1M. The forms were presented to the Air Force Engineering Data Group as an action item (94-7) at their April 94 meeting.

After form evaluation, it was decided at the October 1994 meeting that due to present EDCARS and soon to be JEDMICS equipment limitations the metric sized forms could not be scanned in without wasting valuable optical disk space. Each metric form had to be scanned in at the next larger size format to get all the information on the form; i.e. a metric "B (A3)" size form had to be scanned in as an english "C" size form. The metric forms will be reevaluated with JEDMICS release 4.0, due out in 1997. Release 4.0 is scheduled to handle metric sized drawing forms.

Until the time true metric size forms can be used, AFPEA will continue to scale the english size forms to accommodate our metric drawn parts.

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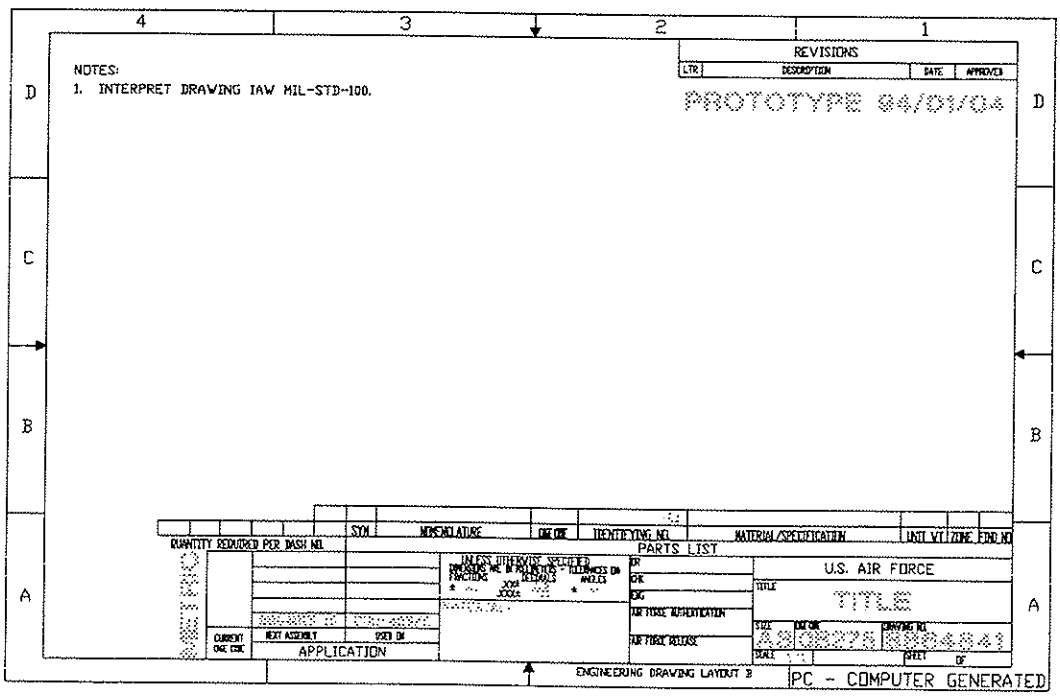
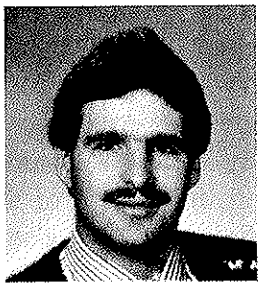


JOINTSTARS RTMM TRANSIT CASE



The Electronic System Center (ESC) at Hanscom AFB, MA requested the Air Force Packaging Evaluation Activity (AFPEA) assistance in designing a carrying case for the Joint STARS Program. The Joint STARS Program requires a carrying case to transport Remote Transportable Memory Modules (RTMM). The RTMM's are similar to a hard disk drive in a computer. Upon completion of a Joint STARS mission, the RTMM's are removed from the aircraft and transported to a base facility where the information collected on the RTMM is downloaded to a main computer. After reviewing Joint STARS requirements, AFPEA determined the best case design to be an off the shelve transit case. The weight of the case and the number of RTMMs required per mission were the driving factors in the design. AFPEA chose a water resistant, thin wall aluminum case. The case has four cam-over-center latches, pressure relief valve, one handle, and anti-static foam that houses six RTMM units. Maximum weight of the case is 42 pounds. AFPEA procured two cases for testing and designed the foam inserts. AFPEA will continue to assist the Joint STARS program next year by procuring the remaining amount of case require to fulfill the Joint STARS needs.

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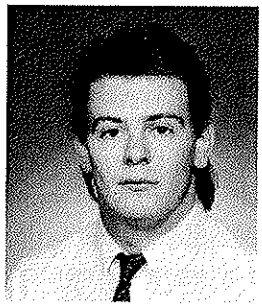
RTMM Transit Case

250AH LITHIUM BATTERY CONTAINERS



The Martin-Marietta Corporation in conjunction with SAFT of France developed six specially manufactured batteries that needed to be shipped from Poitiers, France to Cape Canaveral, Florida in a very short time. The Aerospace Corporation was tasked with solving this problem. Aerospace designed a Lexan/Aluminum handling fixture that they believed would satisfy the requirements, but they needed assistance with the design of a container and cushioning system and fabrication of the fixtures. They also needed to find someone who had the knowledge and experience to ship hazardous materials overseas. They came to the Air Force Packaging Evaluation Activity for assistance.

Each battery had to be shipped separately inside an 85 gallon steel drum which was UN certified for shipment of hazardous materials. A cushioning system was designed that would attenuate shock to 30 G's. Material was ordered and fabrication began. A self-contained transport recorder that would measure shock and temperature was to accompany each battery. Susan Evans of the Materials branch worked closely with Aerospace to ensure correct operation and data recovery from the recorder. Duane Pfund of the Policy branch cleared the way for the overseas shipment so that the batteries would not be delayed in transit. Ron DeLuga from the Design branch provided vital engineering support, and Don Vance used the computer controlled spindle cutting system in order to maintain the tight tolerances needed for the hundreds of fastener holes that had to match up during assembly.

With everyone putting forth their best effort toward the completion of this project on schedule, the first container, which would hold an inert battery termed the 'pathfinder', was completed in just one month; five days prior to the first deadline. Following several design changes and excellent cooperation from the shop, the second container was completed and shipped out on time. The following week, the final four containers were finished and ready for shipment a full month ahead of schedule.

Results from the transport recorder affixed to the pathfinder battery showed the maximum shock level seen by the battery was just 9 G's.

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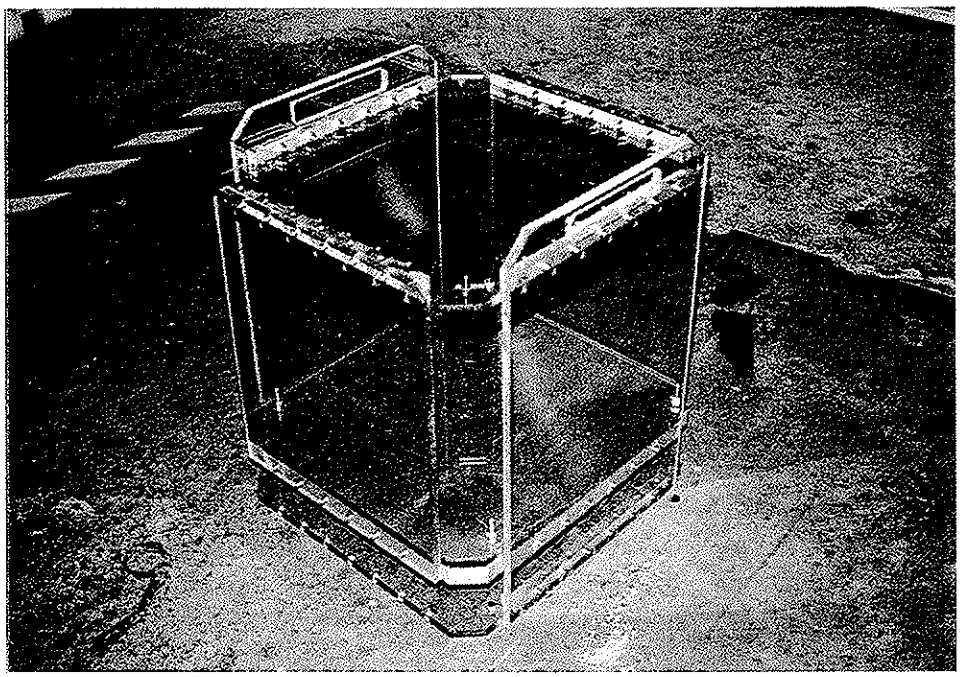

Lithium Battery Holding Fixture

SUPPORT OF KC-130 GUNSHIP 25mm CONTAINER

AFPEA is supporting the Special Forces KC 130 Gunship program office. The SPO is having a steel container developed for the 25mm ammunition. The Project is being managed by the SPO and conducted by the prime contractor. AFPEA has provided technical assistance on the requirements document for the container at the final pre-design conference which looked at the questions and differences between the SPO and the Prime Contractor, and on several internal containerization issues and questions raised by the SPO.

The containers being Designed are rectangular steel containers measuring approximately 100" long x 18" wide x 38" tall designed to ship and store 1000, 25mm rounds in there connected link tube carriers. The containers will be both shipped and stored as attached groups of three, that is the three individual containers will be shipped and stored together as a permanent unit load. At the loading point a fourth empty container is added to allow for storage of the empty link tube carriers.

AFPEA has offered and will be providing continued support to the SPO at the Critical Design Review, and during the testing phase of the development. This support includes assistance in the development of a test plan, insuring that the requirements document criteria are demonstrated both in the design and during testing and that the testing is conducted in a positive manner conductive to providing the Gunship SPO a qualified and quality shipping and storage container.

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COMBAT TALON II
KU-BAND ANTENNA CONTAINER
WHEEL MODIFICATION

The Air Force Packaging Evaluation Activity (AFPEA) provided engineering support to the Combat Talon II (CTII) program office this past year. CTII is a modified C-130 aircraft designed for special operations. Back in 1988, AFPEA designed the KU-Band Antenna Container for the CTII program. The container is an aluminum extrusion design with a special design feature. CTII required the container to be mobile about the aircraft. Therefore, instead of procuring a special piece of ground support equipment for handling the antenna, AFPEA designed the ground support equipment directly into the container. The container lid, incorporated with demountable caster wheels, allows personnel to temporarily store and maneuver the down loaded, broken antenna from under the aircraft. The container base incorporated with retractable wheels allows personnel to maneuver the new antenna into position and up load the antenna to the aircraft. Personnel also utilize the retractable wheels on the base to tow the container across the flight line to the antenna maintenance facility and maneuver the antenna inside the maintenance facility while repairing the antenna.

CTII program came back to AFPEA requesting a modification to the retractable wheels in the base of the container. CTII required the ground clearance of the base of the container to be increased to ten inches. Able to raise the container with the retractable wheels without the aid of a forklift and without having to reach into the wheel well. AFPEA was able to fulfill all of CTII requirements and design, prototype, test, and modify a container in less than 6 months. Revisions to the manufacturing drawings are currently underway and should be completed early Spring of next year.

With AFPEA's design, CTII program didn't require a special handling cart along with spare parts to be designed, procured, stock listed and distributed to AF facilities that handle the KU-Band Antenna. Not having to do something saves the AF time and money. It also gives the AF a faster turn around time in fielding needed equipment.

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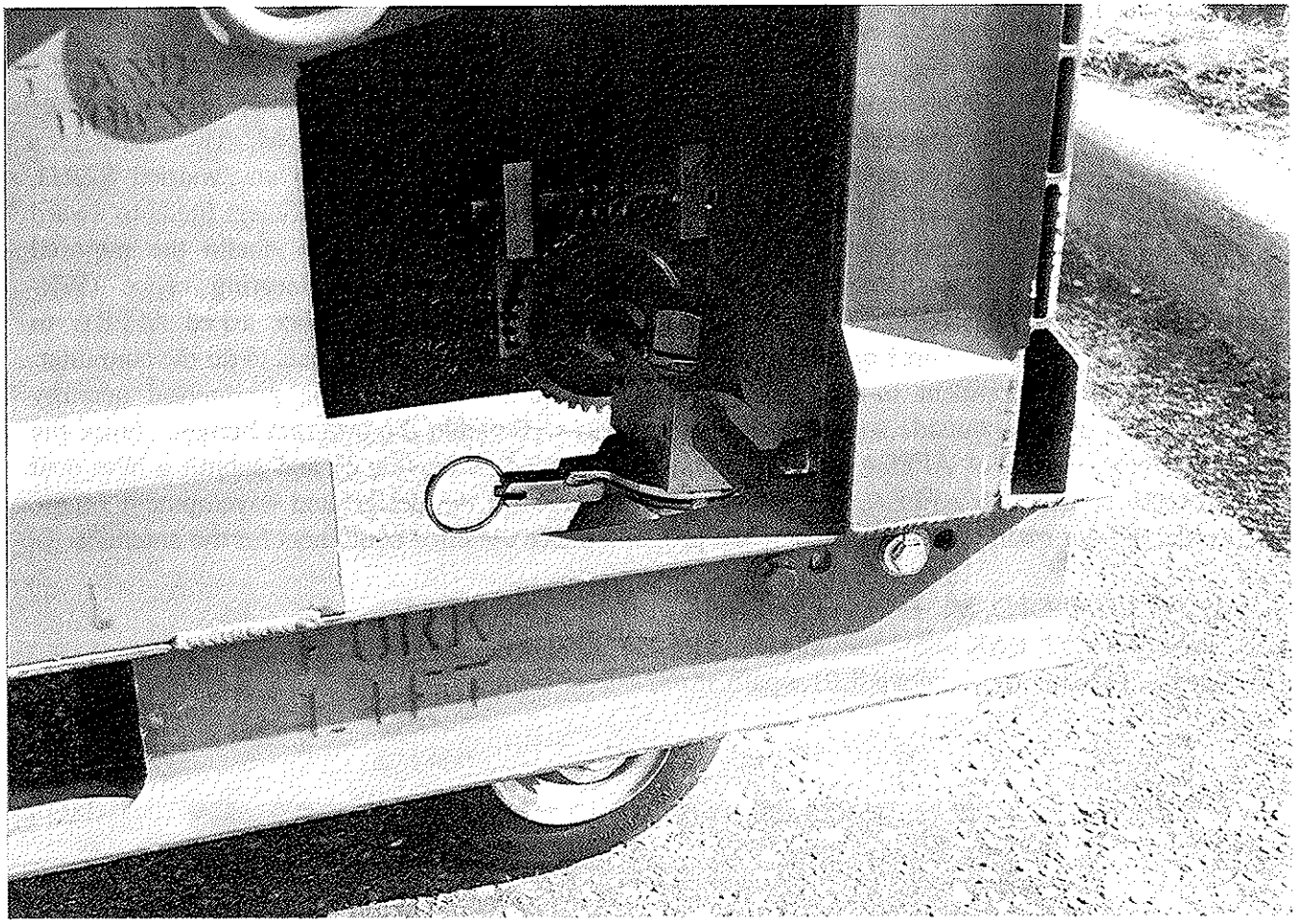

Ku-Band Antenna Container Wheel Mod

ADVANCE WARFARE DEFENSE ANTENNA (AWADS) PROGRAM SUPPORT

The Air Force Packaging Evaluation Activity assisted WR-ALC/LBLMA in successfully lowering the cost of their antenna shipping and storage container development and production contract by .55M. The contractor's (prime item contractor) original bid, in response to an awarded SERD, came in at 1.5M. The program office, not having sufficient funds to award the contract, had to look for an alternate way to obtain the required containers for the antennas. The logistics engineering office (WR-ALC/LYLR) in conjunction with the program office asked AFPEA to come up with a solution. AFPEA submitted a proposal to do the container design and development in-house and perform the procurement of the production quantity containers from an outside source at a cost that was well within the program budget. Once the contractor learned of AFPEA's involvement, they decided to reevaluate and submit a new cost proposal. Although AFPEA would have liked to perform the design and development of the container, our main goal was to ensure the program office obtained containers for the antennas.

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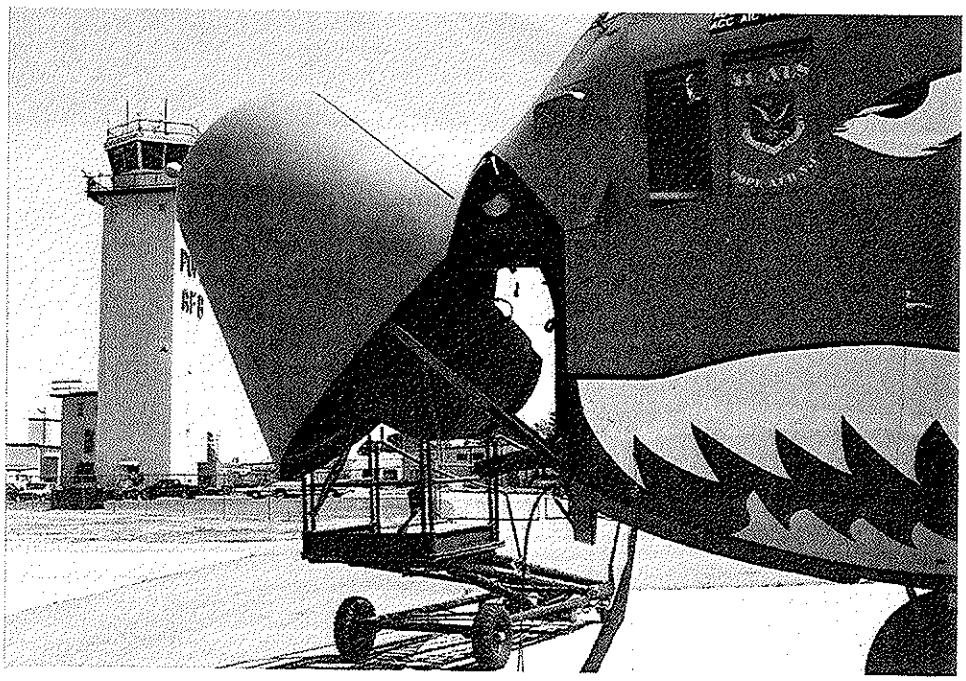

C-130, Showing AWADS Antenna

CONTAINER TEST PROGRAMS

CNU-556/E - AGM-130 TV GUIDANCE SECTION (TVGS)

The objective of this test series was to qualify the AGM-130 TV Guidance Section (TVGS) Container, CNU-556/E, for production release by ASC/YHC, Eglin AFB, FL.
The CNU-556/E, is a sealed, reusable, aluminum container engineered for physical and environmental protection for the AFM-130 TVGS during transportation and storage.

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CNU-431/E - AMRAAM RUGGEDIZED PROTECTIVE END CAP

The objective of this project was completion of the shipping, loading, and unloading requirements specified in the test plan to qualify the AMRAAM Ruggedized Protective End Cap for AMRAAM, ASC/YAD, Eglin, FL. The ruggedized end cap is a material handling protective end cap placed on the missile boat tail to prevent damage to the AMRAAM Rear Data Link.

Qualification testing was at the missile and container levels. Inspections were performed during the test sequences to examine the structural integrity of the missile, container, and end cap. The CNU-431/E is a sealed, reusable aluminum container for up to four missiles per container for storage and transportation.

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CNU-532, -533/E CONTAINERS "FAMILY OF MUNITIONS CONTAINERS" NUMBER 1 and 2

The objective of this test series was to qualify the Family of Munitions Container Number 1 (CNU-532/E) and Number 2 (CNU-533/E) for production release by HQ AFMC/LGTP, Wright-Patterson AFB, OH.

The Family of Munitions Containers Number 1 and Number 2 are small sized, sealed aluminum containers for transportation and storage of miscellaneous munitions such as fuses and boosters.

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JOINT STARS REMOTE TRANSPORTABLE MEMORY MODULE (RTMM) CASE

The objective of this test series was to determine if an off-the-shelf item would meet the transportation and storage requirements for the Joint Stars Remote Transportable Memory Module (RTMM) case.

The RTMM case is a sealed, reusable, aluminum case which conforms to MIL-C-4150J, Military Specification, Cases, Transit and Storage, Waterproof and Water-Vaporproof, Type I (waterproof), Style 1 (transit case), Class A (maximum gross weight up to 150 pounds), Variety HC (hinged closure). The cushioning system was engineered for physical and environmental protection for up to six RTMMs.

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AXES DESIGN and TESTING SUPPORT

AFPEA was asked by ASC/SMG, Wright-Patterson AFB, OH, to investigate rubber shock mount failure in the Control Unit, Industrial Radiographic X-ray Apparatus, Model: C-12283/GSM-367(V) during random vibration.

Testing included the determination of the electronics chassis center of mass, re-balancing the electronics chassis with additional weights and duplication of the previous failure. The control unit is an aluminum metal container. An electronics chassis is permanently secured within the container base on four rubber shock mounts.

In addition, ASC/SMG requested us to develop a proposal to redesign the existing control unit container system. A new design was proposed which would eliminate the rubber shock mounts. In addition, weight cube reduction, per user request, would be incorporated.

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AFRTS VIDEOTAPE CONTAINER TESTING

AFPEA responded to a request from the Armed Forces Radio and Television Service (AFRTS), and conducted tests on an 8mm videocassette container. The testing consisted of a rain test, stack test, repetitive shock vibration, and face, edgewise and corner-wise drops at high and low temperatures. The container failed the first round of tests, but with suggestions for improvement from us, a modified container was submitted, this time passing all tests. For our efforts, AFPEA received a letter of appreciation and a plaque from AFRTS recognizing us "for outstanding professional support to the AFRTS mission from 1990 to 1994, ensuring the safe and secure shipment of conus TV programming to United States forces and their families around the world".

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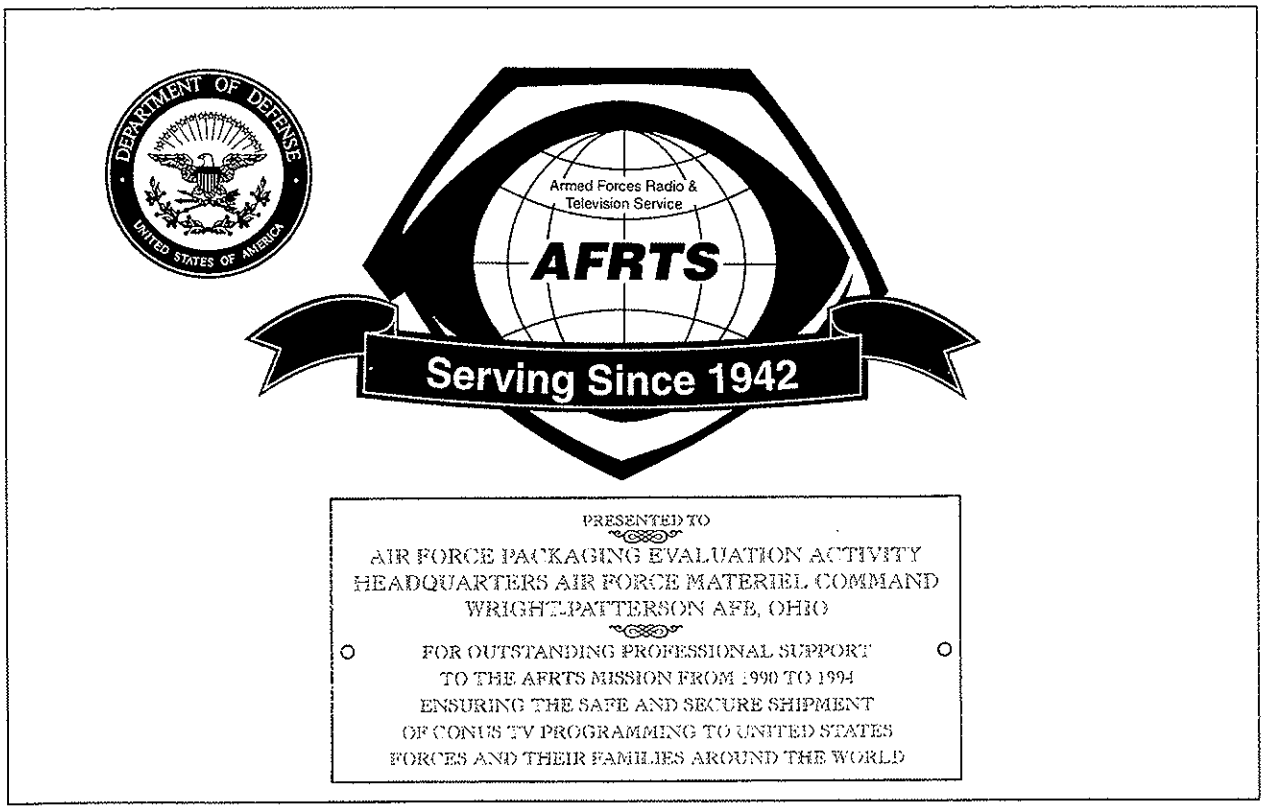

Plaque Presented to AFPEA for a Job Well Done

NF2D FLOODLIGHT ASSEMBLY ENGINE-GENERATOR TESTING

Defense Construction Supply Center (DCSC) working with SA-ALC/LDEA requested the Air Force Packaging Evaluation Activity's (AFPEA) assistance in performing a cold weather start test on a NF2D floodlight assembly engine-generator retrofit mod. The Kubota GL-6500S engine generator set, fueled with Diesel grade 2 with no additives, and two 12 volt optima batteries (one for each test to be performed), were placed in AFPEA's low temperature chamber for a period of 24 hours at a -15º F. The pass/fail criteria was that the engine had to start within 5 minutes with no assistance. The engine started at 4 minutes and 10 seconds into the test. With the items still in the chamber, the chamber temperature was lowered to a -25º F. The engine generator was allowed to soak at this temperature for 3 hours before testing. Again the pass/fail criteria was that the engine had to start within 5 minutes with no assistance. The engine started at 4 minutes and 50 seconds into the test. The tests were deemed successful and procurement of the engine-generators will proceed.

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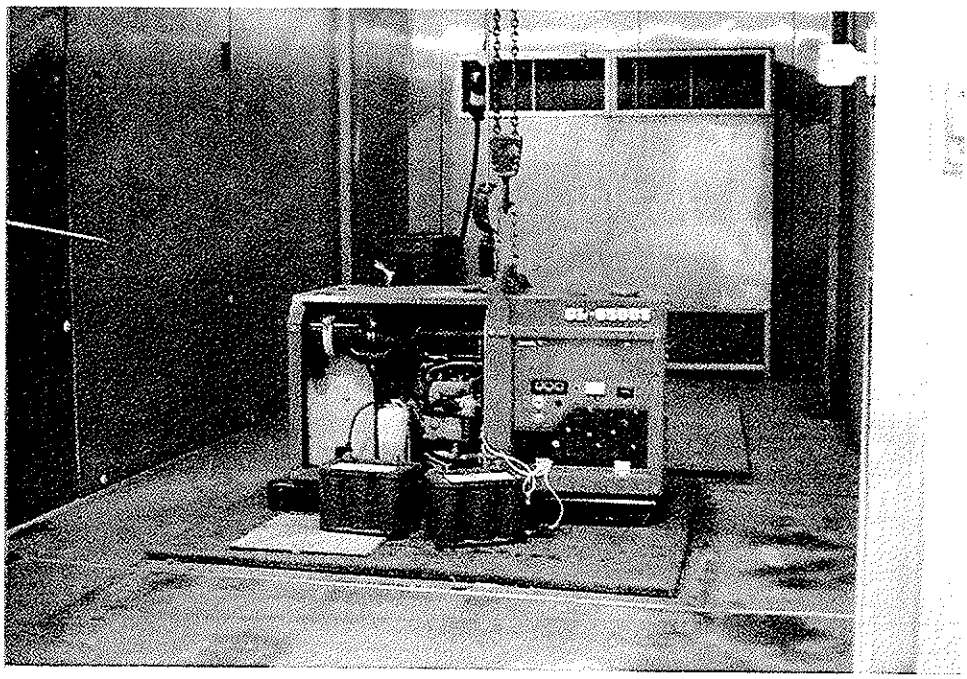

NF2D Engine Generator

MARKETING PROGRAM UPDATE

The Air Force Packaging Evaluation Activity (AFPEA) continues to work diligently to get our name and capabilities out to our potential customers. A few of the highlights our team accomplished this year were the publication of an AFPEA marketing brochure, the development of a container data base listing all AFPEA designed containers, the procurement and design of a marketing display unit complete with photos and bullets depicting AFPEA in action, and the publication of a standard AFPEA briefing presentation with view graphs and handouts.

AFPEA can provide our packaging services to any Air Force or DOD program office. Our experience in the packaging arena ensures that our customers obtain the optimum level of packaging protection at the most economical cost. If your office needs packaging support or would like more information on the services we can provide, please contact us.

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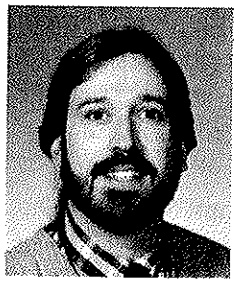
Marketing Display Unit

AF SPECIAL PACKAGING INSTRUCTION (SPI) DEVELOPMENT AND DISTRIBUTION SYSTEM, (SPIDDS)



The Special Packaging Instruction (SPI) Development and Distribution System, SPIDDS started as an AF initiative to support the AF and/or DoD customer in getting critical packaging information (see AFPEA Annual Report 1993, pg 27) in a timely fashion. The process of SPI development is constantly being improved, however, the typical mechanism for customers to obtain a SPI still is by standard/conventional means; mail or fax. The customer must call the ALC responsible for the item to be packaged and then request a SPI to be faxed manually or mailed by a person. As reported last year "SPI Distribution" was going to be the prime focus of SPIDDS and many alternatives were found over the past year as computer technology also changed.

The existing SPI Storage and Retrieval System (SPISRS), computer server supporting the "development" process, will be enhanced to support an "automated distribution process". Identified as the current most feasible means of SPI distribution today, faxing will become an automated process. Customers will be able to call one central phone number to access SPISRS and simply by using their touch tone phone will obtain a SPI through the fax. Prompted for some basic information (like fax number) the SPISRS will fax a copy of the latest SPI to the caller automatically, 24 hours a day.

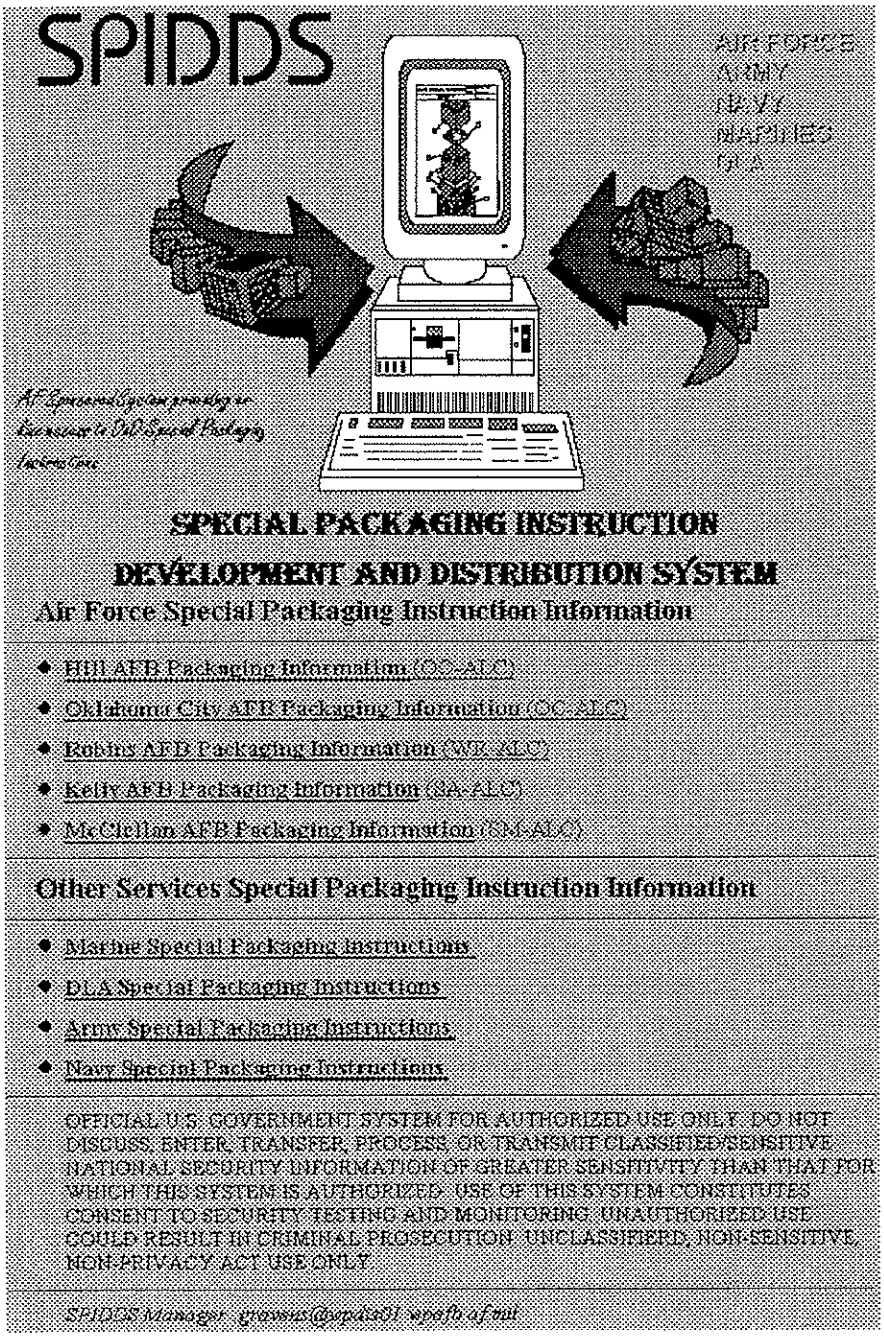
Other alternatives identified require the customer to have a little more knowledge of "computer" operations and "connectivity" over the Defense Data Network (DDN). Currently, the SPISRS can accept "anonymous log in" where the customer can use basic file transfer protocol or FTP to copy SPIs from SPISRS to their computer. Additionally, the SPISRS has been set up to support "GN Gopher" and "Mosaic" query software packages on the customers' computer when accessed over the DDN. Recognized more easily with recent talk of the "information super-highway", Mosaic and Gopher are software packages that when placed on a customers computer having Internet (DDN) connectivity can access SPIs easily.

The SPISRS currently is being updated to provide AF SPIs in MS Word 2.0 format so the customers may download an AF SPI and use the capabilities offered from MS Word, e.g. pan, zoom, default print, etc. This new AF SPI format, MS Word 2.0, will support the automated fax, anonymous FTP, and the basic internet access via Mosaic or Gopher.

All of the alternatives have been implemented with the exception of the automated fax which is expected to be "on-line" by the end of Jan 95. And as AF SPIs are updated into MS Word format access to such SPIs will be available as well.

This AF initiative has sparked much interest by the other services since they too have SPIs needing a better way of "distribution". As an attempt to show the potential of such a system the AF offered to take SPIs from the other services in attempt to make them available in the same manner as the AF SPIs. The Marine Corp, Army, Navy and DLA through the Defense Packaging

Policy Group, DPPG, has agreed to send 50 SPIs in hard copy to the AF. These SPIs will be scanned and incorporated into the SPI Storage and Retrieval System. "AF SPIDDS" now considered "SPIDDS" can be accessed over the internet with Mosaic; URL = http://wpdis10.wpafb.af.mil/SPIDDS which will take you to the SPIDDS "home page":



Access to specific SPIs is relative to the provider or service responsible for the SPI. Clicking on the appropriate service will take you into a listing of available SPIs which can be "clicked on" to look at using Mosaic.

This system is "under construction" and may change as the need comes about. Basic access through Mosaic will do nothing but improve.

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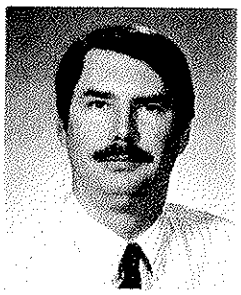
PACKAGING POLICY



Our office continues to strive to provide better communications and service to our customers. To further this goal our office has completed the revisions of AFI 24-202 and AFJMAN 24-204. We are also currently working on a packaging and hazardous materials bulletin board that will provide information 24 hours a day. This bulletin board should be up and running by early 1995. Also, based on your feedback we will continue to publish and distribute our packaging information letter "PACKYACK." Everyone in our office is committed to improving communication and providing better service to our customers.

Our office will only be able to continue improving through customer communication and feedback. Our office is available to provide expertise on packaging policy, hazardous materials policy, packaging data systems, and training requirements. If you have any questions or comments please contact myself or anyone in our office.

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BUDGET ACTIVITY

Fiscal Year 1994 provided reimbursable funds in the form of Military Interdepartmental Purchase Requests (MIPR), Project Orders, and direct funds (paid directly by the issuing activity) to apply towards on-going and new projects. Ammunition packaging-related items, containers, testing equipment, and software were among items funded from this support. Those resources allowed the Air Force Packaging Evaluation Activity to advance its mission by providing the opportunity to expand its technical and mechanical resources for testing purposes. The funds helped provide the means to more quickly produce new container designs for development of packaging requests by providing the means to upgrade and buy new equipment. The result of using these resources has increased AFPEA's visibility among the Air Force community, as well as through out the DoD, by exposing the various packaging services we provide. We continue to receive funds from all these sources.

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304 CUSHIONING PROGRAM MODIFICATION

The Air Force has completed making its 304 Cushioning Program, referenced in MIL-HDBK-304, more user friendly and to provide more information. The revised program is IBM PC computer compatible, but requires a 486 processor for speed and versatility. The program modification has been contracted out and includes the following: video display of data in Peak G vs Static Stress on a semi-log x-y plot for use in selection of material, the ability to save information to a file for later retrieval and/or modification, option to easily revise data files and input updated data including more cushioning materials and prices, on-line help instructions, keep the data in a user friendly database, and display screens at program start-up to explain what each program option does, what inputs are required for each option and what outputs are available from each option.

The current program is now available to industry and foreign customers through the Federal Computer Products Center, National Technical Information Service, (703) 487-4650, FAX (703) 321-8547. The order number is PB95-500369GEI. All U.S. government agencies can still request the program directly from AFPEA.

This Cushioning Program is a valuable asset to any organization designing, testing or teaching packaging protection.

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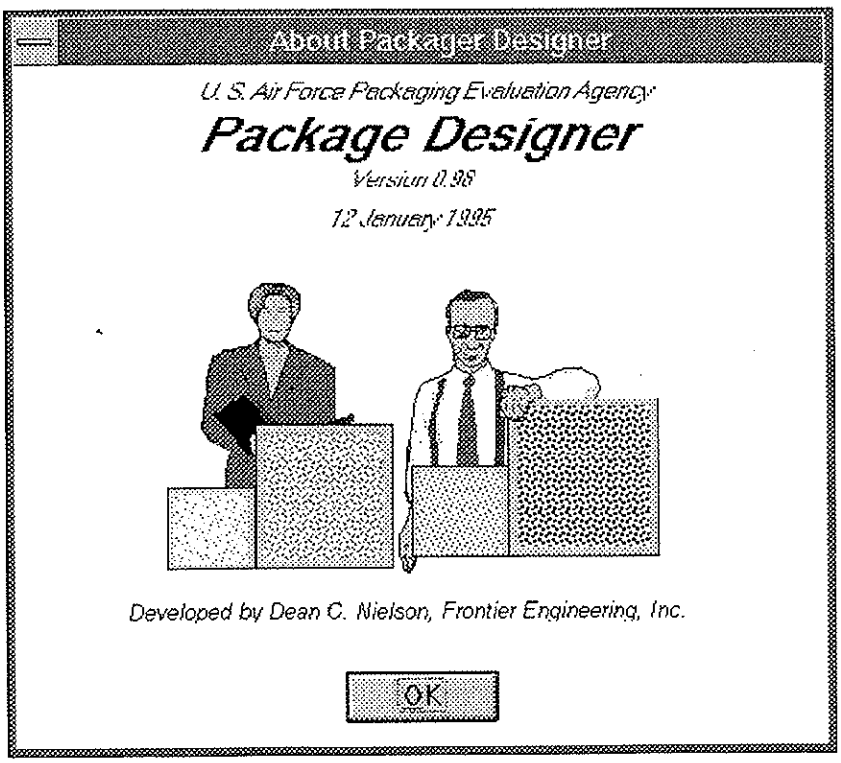
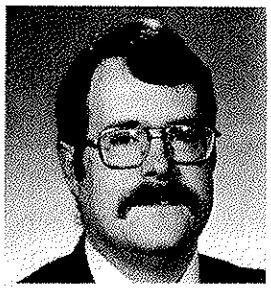


POLYETHYLENE CUSHIONING IN SEALED CONTAINERS



We have been investigating Polyethylene (PE) Cushioning Material in sealed shipping containers since October 1993. A container incident occurred at Thiokol in UT in Oct 93 allegedly due to improper welding practices. This incident alerted packaging people to the potential hazard of three flammable gases used as blowing agents in the process of producing Military Specification Polyethylene (PPP-C-1752). These gases can remain inside sealed containers for extended time periods, perhaps the life of the container depending on how often it is opened and allowed to ventilate. No incident has occurred to date in packaging, storage, or transportation of these products.

Several joint DOD meetings to coordinate both long and short term solutions to this potential problem have been hosted by both the AF and Navy (White Oak Det.). The following actions have been taken by the Air Force:

- Container design engineers (AF, NAVY and ARMY) have agreed to discontinue the use of foam manufactured with the flammable blowing agents in new container designs.

- AFPEA has taken the lead in identifying non-flammable substitute materials for use in new designs and also for retrofitting fielded containers during the normal refit schedule. Also in process is an amendment to PPP-C-1752 to prohibit the purchase of the flammable materials. A list of suitable materials is available upon request, also, the AF test lab is available for specific properties analysis.

- AGMC/MAEL (Newark AFB) has tested and analyzed the possibility of static electricity (ESD) as an ignition source. The resulting report recommendations were incorporated into AF Safety messages.

- Coordinated LG/XR/SE Safety messages have been issued to field activities alerting them to possible dangers when opening containers. The messages contain ventilation and grounding recommendations that, if followed, eliminate any known danger to personnel or equipment.

- Container searches have been undertaken to identify the magnitude of the problem. To date over 45,000 containers are fielded that may contain some level of the flammable gas. Because of multiple contracts to sub-contractors and an extensive list of government and industry container refurbishment activities, we have been unable to define an exact list.

- A joint Air Force Material Command LG/XR/SE field study was completed. The intention was to identify containers that pose a potential risk. Results are that fielded containers exist with gas levels above LEL. Joint LG/XR/SE meeting concluded that current Air Force safety procedures are sufficient to control these conditions.

Current Efforts:

- GSA will process the PPP-C-1752 amendment to prohibit government purchase of the offending material
- ASC/YHA (Eglin Pkg.) is conducting long-term outgassing studies.
- The DOD will continue joint meetings on an as needed basis to assess the risk and progress made on this condition.

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AIR FORCE REUSABLE CONTAINER PROGRAM

The Air Force Reusable Container Program it is one of the most effective ways to reduce packaging material. This program was designed to support Air Force reparable assets by providing a container that can be reclaimed and reused throughout the asset life cycle. The success of this program is totally dependent of the program participants capacity to reclaim and reuse these containers. To this point, we conducted an Air Force-wide survey to determine the average reusable container return ratio.

Two containers categories were surveyed (1) Long-life Reusable Containers (LRCs) or containers with a life expectancy greater than 100 round trips and (2) Short-life Reusable Containers (SRC) or containers with a life expectancy greater than 10 but less than 100 round trips. The results of this survey were as follows:

Container	Return Ratio
LRC	98%
SRC	94%

In this survey we also requested we be provided with the major reasons for not recuperating or reusing these containers. Data provided showed container attrition (normal wear/tear plus other type of damage) accounted for over 75% of the containers not returned.

We appreciate the participation of the Air Force Traffic Management Offices in the LRC/SRC Return Ratio Survey. The data provided clearly illustrate that the Air Force activities to be commended for how well they managed their LRC/SRC, thereby saving the government a significant amount of resources.

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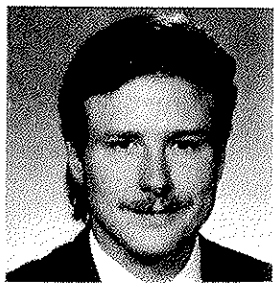
HAZARDOUS MATERIAL POLICY AND PROCEDURES



The Packaging Policy Office provides hazardous material guidance for the safe packaging and transportation of hazardous materials. This mission includes issuing overall policy and specific procedures designed to safeguard against an incident that may damage personnel, DoD assets, or the environment while facilitating efficient movement of material. This policy affects a wide scope of functions including procurement, shippers and military airlift carriers (for example, publishing AFR 71-4, Preparing Hazardous Materials for Military Air Shipments, and distributing Performance Oriented Packaging guidance and clarification's). However, assistance with individual shipments or programs is also part of the mission (such as military airlift waivers for satellites in support of NASA, or review of hazardous materials contained in new weapons systems during the development phase).

The hazardous material arena is constantly evolving. Our primary concern is to ensure hazardous cargo required to support today's Unit needs is safely transported in a serviceable condition to meet required delivery dates. This requires providing expansive dissemination of detailed information in a timely manner. To reach this goal, we are pursuing more efficient means of distribution such as the establishment of Service and Agency focal points. These focal points distribute information concerning clarifications and Department of Transportation rulings to their respective activities. The purpose of this process is to expedite transfer of information by sharing the responsibility and maintaining a high level of expertise among the focal points. We are also pursuing future actions such as developing a bulletin board computer system to allow immediate access to the most updated information available. Another important effort is increased joint Service actions to promote continuity and decrease repetition of efforts. One example is our participation and Chair of the DoD Performance Oriented Packaging (POP) Working Group, designed to facilitate POP implementation.

The last two years have brought about the most massive conversion in hazardous material requirements in the history of published regulations. Growing public concern and interest in standardization by domestic and international governing bodies have driven major changes in hazardous material classification, communication, and packaging. The environment we all operate in today poses many new and unique challenges. We are here to assist you with any hazardous material questions and encourage you to call for guidance. Our goal, as I'm sure is yours, is to ensure hazardous material shipments, in support of Air Force and DoD customers, reach the required destination to accomplish the mission by the safest means possible.

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FINITE ELEMENT ANALYSIS UPGRADE

The Air Force Packaging Evaluation Activity (AFPEA) utilizes COSMOS/M; a finite element analysis program developed by Structural Research and Analysis Corporation (SRAC). COSMOS/M is a program organized into a system of interrelated modules, which can be either menu or file driven.

COSMOS/M can handle problems with up to 32,000 nodes and 100,000 degrees of freedom. Structures to be examined can be drawn either in AutoCad or directly in COSMOS/M. AutoCad drawings can be transferred into COSMOS/M where the structure is meshed, constrained and material properties applied. AFPEA has enhanced their finite element analysis from the present version running on a 386 PC system to a HP9000 engineering workstation. The upgrade will allow AFPEA to do larger and more finite analysis problems in less time. The new format purchased by AFPEA is able to work problems in linear and nonlinear statics, linear and nonlinear dynamics, advanced dynamic problems and fatigue problems. The program can be easily upgraded to work problems in heat transfer, fluid flow and electromagnetic, capabilities which at the present time there is no need.

AFPEA has and will be benefited greatly by having the capabilities of COSMOS/M. AFPEA can now better their ability to research and design containers, cradle/handling systems or piece parts related to packaging. The whole design can be tested, redesigned and tested again without ever being built. This capability will save valuable fabrication time and money.

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PACK YACK INFORMATION LETTER

We are very proud to announce that we have distributed our information letter, PACK YACK, for over two years. PACK YACK first began in September 1992, and has been published quarterly since that time. PACK YACK is disseminated worldwide and offers a broad range of articles that include packing policy, hazardous materials, container design, materials testing, and logistical information. The continuing success of PACK YACK is not possible without the cooperation of many activities, and we would like to take this opportunity to thank everyone who has participated in PACK YACK. We encourage other activities to think of PACK YACK in the future when significant events occur so that we may continue to report timely information and share meaningful articles throughout the Department of Defense.

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OFFICE AUTOMATION (O/A) and COMPUTER SYSTEM UPDATE

AFPEA personnel have been a part of the Office Automation (O/A) Network System for approximately two years now. It has allowed us to take a giant step in the direction of a paperless office. The O/A network and "Microsoft Office" software such as Word, Excel, and Powerpoint allows us to prepare our own letters, briefings, and reports with ease and increased accuracy. We can even perform the most simplest of tasks, such as transferring documents between office personnel, without ever leaving our desks. This year due to the Defense Ammunition Packaging Council (DAPC) J6 project, we had the funds and opportunity to upgrade some of our more non-productive computer systems with the latest technology and buy new equipment to increase productivity and save on resources.

AFPEA purchased five notebook computers complete with O/A software packages for personnel to take to off-site meetings, briefings, and on TDY. The notebooks are small and lightweight and allow users the independence of working while on an aircraft or in a hotel room. The notebooks also have fax/modem cards allowing the users to maintain communication capability as required.

AFPEA purchased an LCD Projection Panel; which will used for group training, meetings and briefings. The projection panel is designed to connect to a computer and project the computer monitor image onto a pull down screen using an overhead projector. The panel saves resources by eliminating the printing of view graphs and individual handouts. The charts, graphs, etc. are created only once on the computer and their images are projected right from the computer. The projection panel is small and lightweight, so it can actually be taken to off-site meetings as well.

Our Technical Library Computer System was upgraded to a 486/66 which now allows us to view specifications and standards at a speed and clarity that is productive. The previous system took approximately 1 minute to change from one page of the specification to the next page and had such poor resolution that the document had to be printed to be read. The upgraded computer changes pages in approximately 2 seconds and has a resolution that allows the document to be read from the screen, therefore, saving time and resources. We also added a software package called PartsMaster to the system. PartsMaster provides technical and logistical information on parts used by AFPEA in the design and fabrication of containers. The hands-on availability of this information saves hours of research time.

We also upgraded six of our CAD stations to 486/66 computers and increased the video capability. The previous CAD systems took approximately three minutes to regenerate a 225,000KB ACAD. DWG file. The new systems can regenerate the same file in seven seconds. The increased video capability allows a larger and more defined work space on the screen as well. The increase in productivity the new CAD systems have provided is quite obvious. Also in the realm of CAD design, a new "E" size pen plotter was purchased. This plotter prints our CAD drawings ten times faster than the plotter it replaced and is considerably more quite when it operates. This decreased noise level was an added plus for our office environment.

Air Force reductions has forced our office to perform the same and in some cases even more duties with fewer people. To accomplish this task and maintain the high quality level our customers are used to, we have become dependent on computers. The computers allow us to perform our daily routines faster and easier than ever before.

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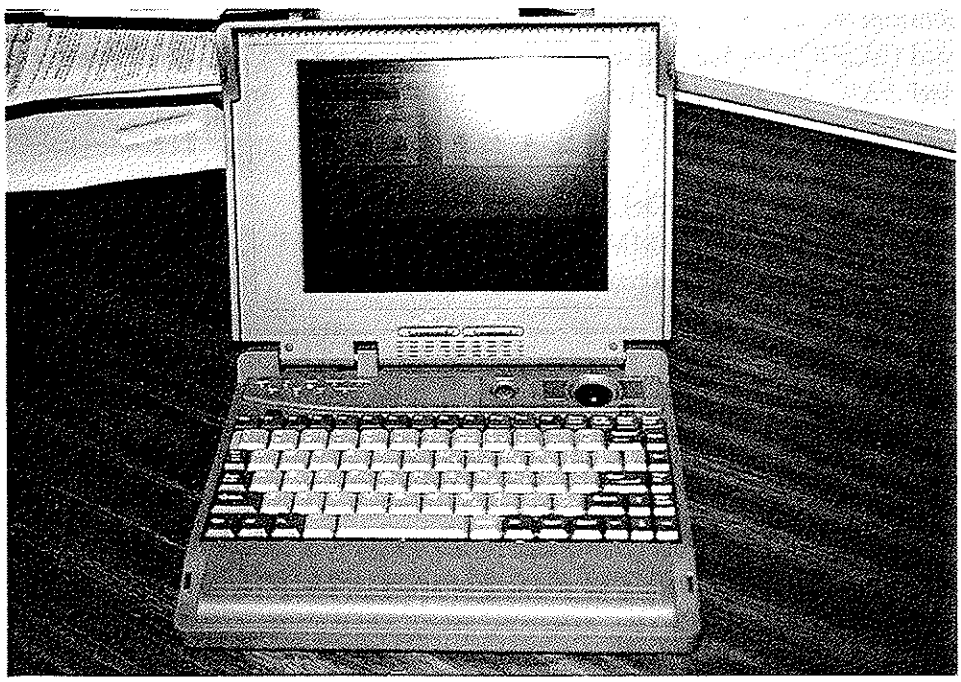
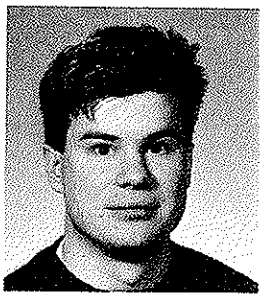


Laptop Computers

FAMILY OF MUNITIONS CONTAINERS



Ogden Air Logistics Center, Air Munitions Program Management Division (OO-ALC/MMW), requested engineering assistance on their PRAM Project OO-237. The Idea of a Family of Munitions Containers came form an OO-ALC/MM Process Action Team (PAT), headed by OO-ALC/MMW. This PRAM Project was approved 18 September 1989 and actually started 18 October 1989. It is scheduled for completion in the winter of 1994. The goal of the project is to find suitable replaces for more than 200 current munitions containers the Air Force presently uses with a family of four to six containers. The exterior of the container would stay the same but the interior dunnage would change depending on the item placed in the container. OO-ALC/LIWDT, formerly MMW, the Pram Project Manager have put the two largest containers on hold, we are designing, prototyping, and testing the three smallest containers.

We have completed a Preliminary Design Review, a Critical Design Review for all three containers, container #1 and #2 have also been completed, and Container #3 is in an Engineering Change Proposal (ECP)Cycle due to a mix up in the assignment of CNU numbers. Once the ECP has been signed FMC #3 will also be completed. Following are the descriptions for these containers.

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FAMILY OF MUNITIONS CONTAINER #1 UPDATE

Container #1 is the smallest of the Family of Munitions containers. It has inside dimensions of 305mmL x 152mmW x 229mmD (12" x 6" x 9"), a tare weight of approximately 6.8 Kg (15 Lb.) and a gross weight of approximately 19.0 Kg (42 Lb.). This was designed as a sealed container with cam over center latches, pressure/vacuum relief, and air filling valves. The sealing gasket (silicon) is located in the cast aluminum lid. The container body is a two-piece double wall aluminum extrusion made from a single extrusion die. The container is designed to accommodate small munitions items like fuses and boosters.

After redesigning of the lid solved a cracking problem it was discovered that there is a sealing problem in the container body gasket interface. The redesign has been completed and while the sealing problem has improved the sealing interface of this container has still proven to be unreliable during several test cycles. The data package and testing of the container was

completed in November 94 (AFPEA report No. 92-P-114). The final report was completed in December 94 with all information being delivered to OO-ALC/LIWDT.

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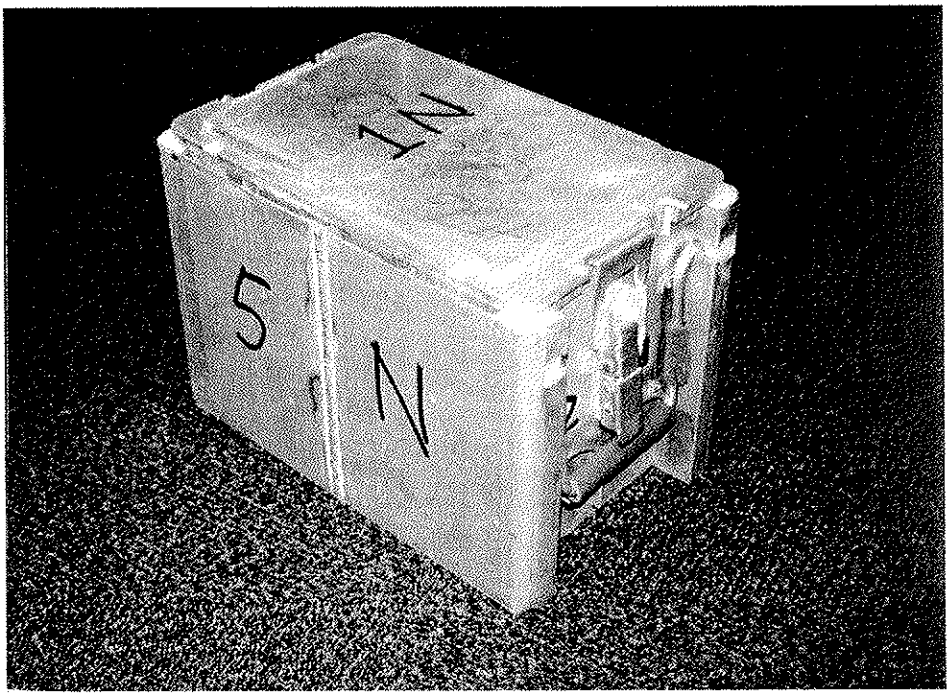

FMC #1 Container

FAMILY OF MUNITIONS CONTAINER #2 CLOSED OUT

The Family of Munitions Container #2 is a small, sealed, generic, multi-use, two-person carrying container. The container will be used to carry fuses, boosters, etc., for a maximum gross weight of 68 Kg (150 pounds). The containers internal dimensions are 522mm L x 429mm W x 356mm H (20" x 16" x 14") and a tare weight of 28.0 Kg (60 pounds).

The container is constructed out of two aluminum extrusions and sheet aluminum for the top and bottom. The container will have a cam-over-center latch, desiccant port, pressure relief valve, humidity indicator, and air filling valve. Stacking pads will be located on top of the container for easy lock-in-place stacking. Palletized loads will be made easier with this container's size and stackability. The containers external finish will be bare aluminum. This will cut cost in painting

and maintaining the container and reduce adverse environmental impact caused by painting. Life cycle of this container will be 20 years.

The container has passed qualification testing in Nov 93. Manufacturing drawings have been generated and ready for procurement of the container. Copies of the drawing package maybe obtained from AFPEA or the Container Design Retrieve System, Eglin AFB. A copy of the test report maybe obtained here at AFPEA, reference report number 94-R-01.

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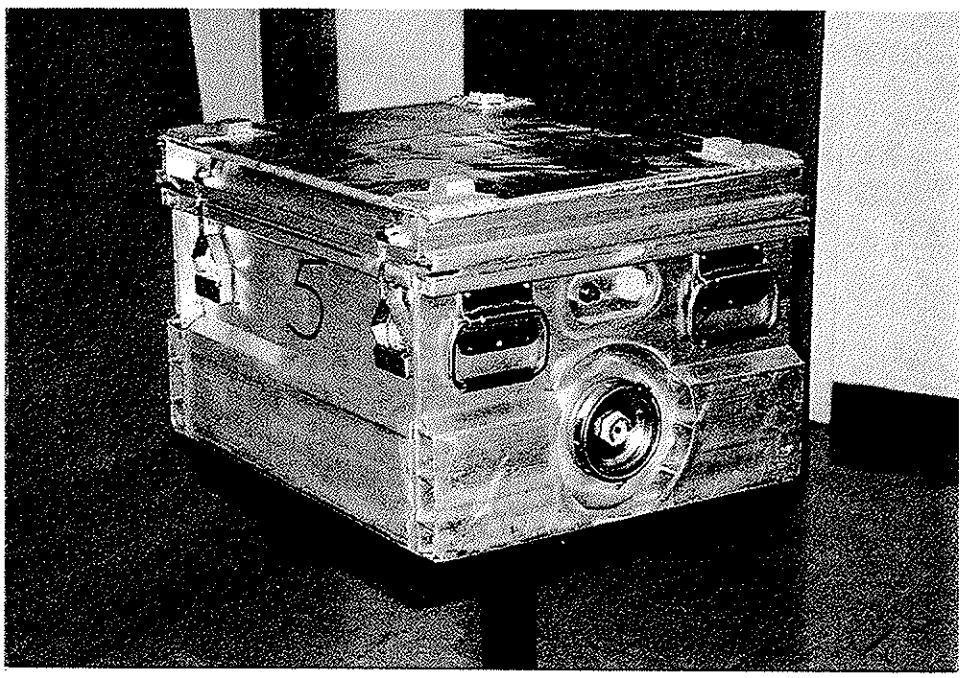

FMC #2 Container

FAMILY OF MUNITIONS CONTAINER #3 UPDATE

The Family of Munitions Container #3 is a medium sized, sealed container. It was designed specifically for the BSU 49, CNU 335B/E, drawing number 9095210; BSU 50, CNU 336B/E, drawing number 9095220; and MXU-650 fins, CNU 505/E, drawing number 9095230. The container will be manufactured exclusively from aluminum with internal dimensions of 1244 mm X 965 mm X 838 mm (49" X 38" X 33"). The empty container is CNU 534/E, drawing number 9095074.

The major feature of this container is its short base, only 203 mm (8") of internal height. This short base allows for easy removal and preparation of the fins. The fins will be stored just the opposite of the current method. The aft end of the fins will be placed in the base of the container. This allows the open end of the fin to be readily accessible to the user to prepare them for usage. The bottom aluminum extrusion includes the base and the skid of the container. This extrusion greatly simplifies the manufacture of the container. Standard hardware includes cam-over center quick release latches, pressure/vacuum relief valves, air filling valves, and tie down rings. Instead of being painted, the container will be left bare. This will greatly reduce the long term maintenance costs and reduce adverse environmental impact caused by painting. With bare aluminum the stenciling can be applied using the standard stenciling ink, A-A-208.

The prototype container has passed all the qualification testing. The manufacturing drawings and project report are being finalized. The container is now ready for multi-program utilization, by simply adapting the shock attenuation system to a specific program.

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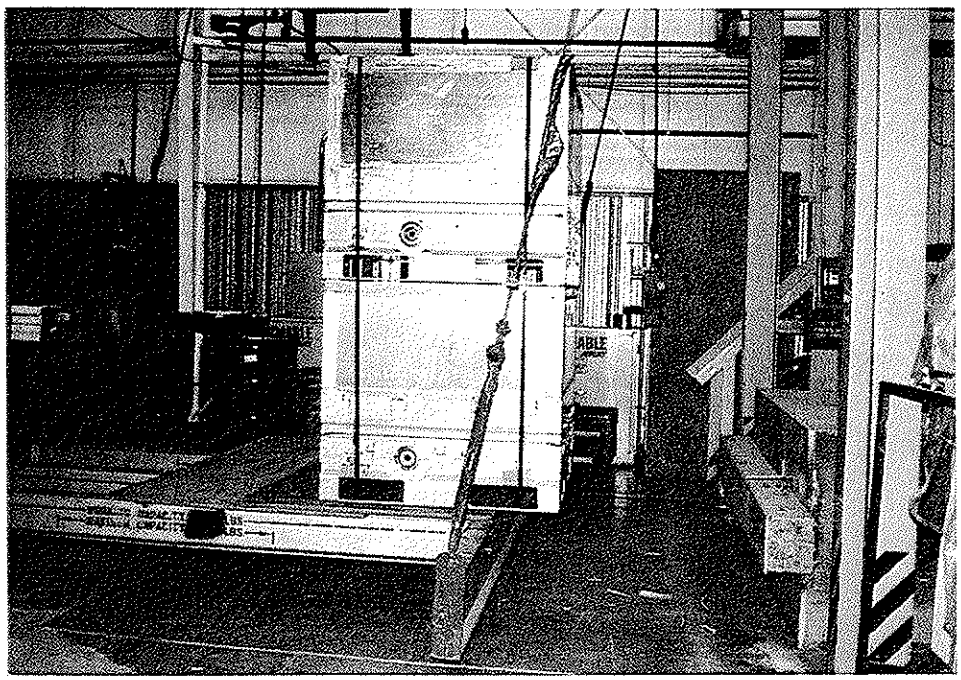

FMC #3 Container, Stacked Pendulum Impact

COMBAT TALON II
NOSE RADOME CONTAINER CLOSED OUT

The Air Force Packaging Evaluation Activity (AFPEA) provided engineering support to the Combat Talon II (CTII) program office this past year. CTII is a modified C-130 aircraft designed for special operations. Through 1993 calendar year, AFPEA supported the CTII program by developing an overseas shipping and storage container for the nose radome. The container is a pressure treated lumber design with an aluminum structural frame to support the nose radome during shipping and storage. The container also houses two aluminum pallets for handling the nose radome. One pallet is used for removing the nose radome from the container and the other is used for handling the damaged nose radome and placing it back in the container. The damaged nose radome can then be shipped for repairs. AFPEA and the 4950th Test Wing co-worked the development of the container. AFPEA built pallets and the frame assembly for the containers and the 4950th Test Wing built the wood container.

This year 4950th Test Wing is producing a limited amount of containers including aluminum frame and pallets for the CTII program. AFPEA has completed the manufacturing drawings for procurement of the container. Copies of the drawing package maybe obtained from the Container Design Retrieve System, Eglin AFB.

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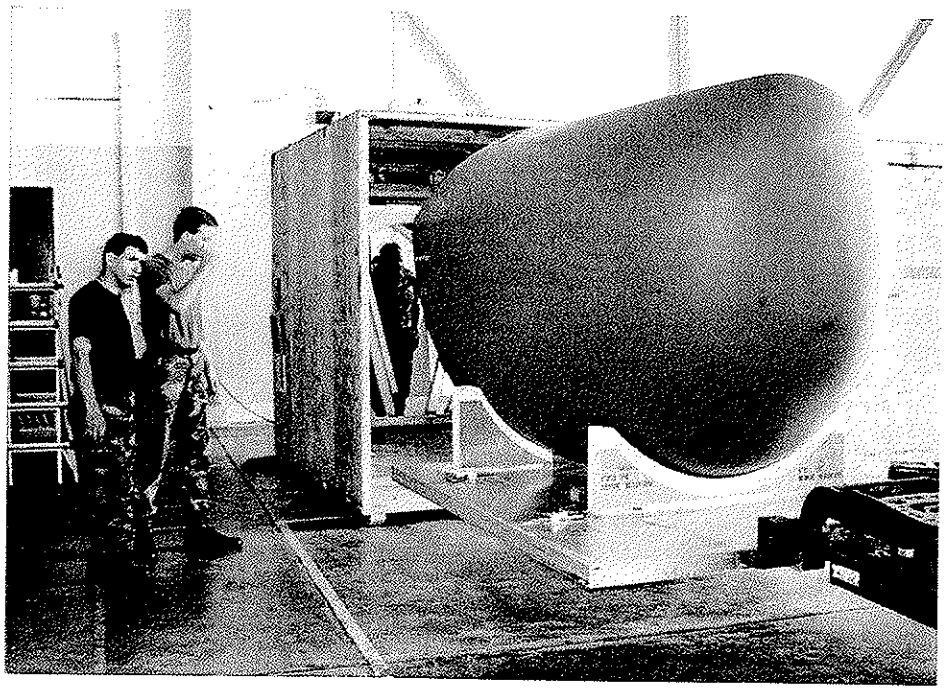

Nose Radome Container, Bomb Loader Placing Radome in Container

DOD STANDARDIZATION

AFPEA is actively engaged in the DOD standardization program, including the responsibility of Lead Standardization Activity for standardization actions in Federal Stock Class (FSC) 8145, Specialized Shipping Containers. AFPEA is a participant in the PACK Area and in Federal Stock Group 81 (except FSCs 8120, 8130, and 8140); serves as preparing activity of 40 documents; and is Air Force custodian of approximately 350 documents.

We are actively working our specifications and standards into performance specifications and standards or into industry standards per the Secretary of Defense Memorandum - Specifications & Standards - A New Way of Doing Business.

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SPECIFICATION CONVERSION

AFPEA and the Army's Packaging Storage Containerization Center (PSCC) have been assisting the Steel Shipping Container Institute (SSCI) developing an updated American National Standards Institute (ANSI) specification MH2. ANSI MH2 is a general industry specification for common size, old Department of Transportation (DOT) specification, metal shipping drums. The SSCI working committee is made up of metal drum manufacturers, user organizations, and others. Once a final ANSI specification has been accepted and printed; related federal/military drum specifications will be recommended for cancellation.

MIL-B-26701, a polymer bottle for mildly corrosive liquids, was revised to comply with DOT's hazardous material requirements. To comply with these regulations and known usage history, with support from the Defense Logistics Agency's Defense General Supply Center, the specification was divided into 2 different specifications, a regulated and non-regulated usage bottle. MIL-B-26701 is now only for regulated shipments and A-A-58030 for non-regulated ones. MIL-B-26701 bottles became a component in a combination container. This combination container must comply with DOT's Packing Group II and air eligibility requirements. The Commercial Item Description (CID) bottles must comply with the Federal Drug Administration requirements for human food and drink containers.

The general humidity specification, MIL-I-26860, was transferred to our office from SA-ALC. The specification was revised to include two major items; the incorporation of a reversible humidity indicator element, and the conversion of the gasket material to a silicone gasket material. The final version has been completed and should be available now.

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ASTM COMMITTEE D-10.12 SUBCOMMITTEE ON SHIPPING CONTAINERS AND PALLETS

The Container Design and Engineering Branch, LGTPD, is currently involved in the American Society for Testing and Materials, ASTM, D-10 Committee on Packaging with representation chairing the recently formed Subcommittee D-10.12 on Shipping Containers and Pallets.

DoD participation within ASTM D-10 began many years ago when it was recognized that "industry" specifications and standards could be used by the DoD if there were a few exceptions specific to DoD requirements. The ASTM D-10 Committee on Packaging comprised of many different interests, concerns and talents through its ongoing membership has been very receptive to allow DoD participation into the Committee as guests and voting members. So much so a DoD/Fed/ASTM Liaison Group was formed to help address specific DoD/Fed concerns. ASTM considers new membership, whether DoD or commercial, as a way of incorporating new ideas, concerns, interests and talents into the growing Committee membership. A way to allow for a growing and natural balance of perspectives and opinions.

Today, with the DoD being directed to use "industry" standards/specifications when ever at all possible, a greater emphasis is being placed on DoD members to bring "Mil/Fed" standards and specifications into ASTM as a way to "convert" to them to "industry" format. This technique allows for the incorporation of new topics into ASTM and has been successfully proven to provide the mechanism for the DoD to "convert" to "industry" standards and specifications as directed. The only requirement to start the process is that topics (DoD specs/stds) of conversion must prove to be acceptable and beneficial to all ASTM members.

The Subcommittee D-10.12 was primarily formed as a result of such mutual needs. ASTM had not ventured into the "wood containers" area and the DoD has many specifications that could prove beneficial if converted into "industry" specifications. The Subcommittee is broken down into active "Task Groups" and "Subtask Groups" which are the fundamental groups addressing the elements of the Subcommittee scope. The "doing" functionality. Currently, the Subcommittee D10.12 has been limited to a few Task Groups because of the conversion interests and are as follows:

New and approved, the scope of subcommittee D10.12, Shipping Containers and Pallets, "shall be the development of standard practices, specifications, guides, and classifications intended to address the construction of shipping containers, crates, pallets and skids (except drums, pails, cans and fiberboard boxes)."

D10.12 Marking of Pallets Task Group- Already with much activity is intended to address the development of uniform marking practices for pallets and related structures.

D10.12 Cleated Containers Task Group - This TG is working the incorporation/conversion of several DoD/Fed specifications into one ASTM Standard Specification with the intent of addressing the fabrication of cleated panelboard shipping boxes. The specifications to be

incorporated/converted include PPP-B- 576, PPP-B-591, PPP-B-601, and Mil-P-9902 box and panel specifications.

D10.12 Crates - New TG with the intent to address the conversion Mil-C-104 Crates, Wood: Lumber and Plywood Sheathed, Nailed and Bolted. Due to the size of this specification the groups primary focus will be on Mil-C-104 later to take other potential specifications into consideration.

D10.12 Pallets - New TG intended to address the conversion of existing DoD/Fed pallet specifications into ASTM format.

D10.12 Solid Shipping Boxes - Proposed as a TG will look into the potential conversion of PPP-B-621 Boxes, Wood, Nailed and Locked Corner and associated specifications.

The conversion process is not an easy task and the above undertakings are the first major effort placed forward in "converting" DoD packaging specification information. Success of this task will prove the ability for a "industry" specification to provide the DoD a mechanism to ensure that DoD requirements are addressed.

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WORK GROUP ON CUSHION TEST SYSTEMS STANDARDIZATION

On 29 Sep 93, the first Work Group on Cushion Test Systems Standardization was held at AFPEA. The goal of this group is to clarify and define the testing and certification process and publish a guideline with recommendations and operating procedures.

This working group has been established under the National Institute of Packaging, Handling and Logistics Engineers (NIPHLE) and consists of both government and industry representatives.

As part of the standardization process, AFPEA has been conducting round-robin tests utilizing a four pyramid polyurethane cushion. The cushion is first tested at AFPEA, then sent to a participating organization for testing, and data collection and test set-up information. The cushion is then returned to AFPEA for re-testing. All results are sent to AFPEA for direct comparisons and to ensure the information is kept proprietary. So far, testing has been completed by over half of the twenty-two participating organizations.

In addition to AFPEA's round-robin tests, Dow Chemical is also conducting round-robin tests on a spring apparatus, with all results being sent to AFPEA for evaluation.

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TRI-SERVICE COORDINATION

The AFPEA is participating in a multi-service effort to improve packaging coordination among the services. Some of the areas which will be addressed are the identification and cataloging of the technical expertise and facilities available for design, fabrication of prototypes, testing and evaluation as they relate to containers within each of the services. An effort will be made to analyze packaging philosophy, requirements, designs, testing and acceptance criteria with an emphasis placed on standardization where ever possible.

Container Design Working Group: The services have joined together in forming the container design working group (CDSG) team in an effort to standardize the way we do container design and the hardware used. Each of the services that have input into container design are invited to participate. Currently, we have approximately twelve organization/bases participating in the meetings and about thirty-five on the mailing list for the minutes. The container design working group meetings are being held every three months with the hopes that we can facilitate change and meet the basic requirements established to eliminate military specifications and standards. So far we have made substantial progress. Hardware currently used on engineered containers will have a commercial item description (CID) written for it, after the group has agreed upon what item to standardize upon. Then each CID will be presented to the Society of Automotive Engineers (SAE) for adoption into an Aerospace Recommended Practice (ARP) or Specification. The primary thrust of the meeting is to develop a sense of unity among the services in an effort to stop the proliferation of drawings and national stock numbers used to identify the same part. One example of this effort would be the humidity indicator which has numerous configurations. In our efforts to standardize, the team has agreed to go with a 20, 30, 40 % pie shape indicator card with the standard housing that fits through either a 1.06 or a 1.56 inch diameter hole. Once the CID has been written and the industry adoption process has been started, then the services will attempt to adopt those items DOD wide as the only acceptable hardware. Each of the services has the ability to participate in open discussions and have a direct input into the decision making process of what all the services should use. The team is working extremely well together with each team member responsible for a different piece of hardware or evaluation of other requirements.

The hardware and container topics currently being addressed are:

Humidity Indicator
Pressure / Vacuum Relief Valve
Drain Plug
Air Filling Valve
Handles
Cost Data Base
Record Receptacle
Latches
Desiccant Port
Lifting/Tie Down Rings
Viewing Port

Container topics we will be addressing in the future are:

Testing
Extrusion Design and Availability
Goals of the Team
Stacking Pins and Sockets
Mission of the Team
Adhesives and Cleaning Information

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AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The Air Force Packaging Evaluation Activity is an active participant in the ASME Y14.100 subcommittee, DOD/Industry Drawing Practices and the military counterpart DOD/Industry Drawing Practices Group (DRPRG). The purpose of the ASME subcommittee and the military group is the conversion of MIL-STD-100 to the non-government standard ASME Y14.100. AFPEA's main deliverable to their container design customers are production level drawing packages. These drawing packages are prepared in accordance with MIL-STD-100. Our participation in this committee ensures our military customers requirements are incorporated into the new non-government standard.

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SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

The AF Packaging Evaluation Activity (AFPEA) participates in the EG-1D subcommittee on Propulsion Transportation Equipment which includes containers, trailers, stands, shock mounts, etc. The subcommittee has been ask to consider the development of Aerospace Recommended Practices or Standards for engineered container hardware components and have agreed to work the issues. Each individual working with the tri-service container design working group will be identified as the primary sponsor for their item, in their absence I will act as the alternate. Work during the past year has focused on Inspection and testing criteria for shock mounts, and a specification for the pressure equalizing valve. AFPEA solicits your assistance in the identification of projects that would provide a benefit to both DOD and private industry.

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DEVELOPMENT OF IMPROVED ANTI-STATIC CUSHIONING MATERIALS FOR AMMUNITION CONTAINERS

(Ms. Buckey)

In response to the Defense Ammunition Packaging Council (DAPC), AFPEA commenced DAPC Project J3, "Development of Improved Anti-static Cushioning Materials and Dynamic Performance Testing for Ammunition Containers" for fiscal year 1994. This is a joint-service project managed by the Air Force Packaging Evaluation Activity, Wright-Patterson AFB, OH, and coordinated with the US Army, Packaging Division, Picatinny Arsenal, NJ, the Packaging, Handling, Storage and Transportability Center at Naval Weapons Station Earle, NJ, and the US Marine Corps, Naval Surface Warfare Center, Crane, IN.

The original intent of this project was to research only anti-static cushioning materials for use in ammunition containers and to develop dynamic tests along with a performance database for use in cushion design. This project was expanded to include non-ozone depleting and non-flammable blowing agents to protect the environment along with ensuring safe to shipment, storage, and handling of sealed ammunition containers, due to foam suppliers production of cushioning with flammable blowing agents which may create an unsafe condition in a sealed container.

This year's research of cushioning materials included development of cushion curves on anti-static and non-ozone depleting cushioning materials, and non-flammable blowing agents used to produce cushioning materials. Container designers will use the cushion curves to determine the cost, type, and amount of cushioning needed in the containers to protect the item. Other properties of the cushions were also tested and studied to determine which materials are the most suitable for further study. These studies will include non-flammable blowing agents, shortened dynamic cushion testing studies, compressive creep study, cold temperature performance tests, and finite element analysis and cushioning.

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"SMART" SENSOR PACKAGING TECHNOLOGY FOR MUNITIONS PACKAGING

The Defense Ammunition Packaging Council, DAPC, Project J4 "Smart Sensors for Packaging" is a tri-service project jointly managed by the AF Packaging Engineering and Technology Facility, Wright-Patterson AFB, OH, and the US Army, Packaging Division, Picatinny Arsenal, NJ, coordinated with the Packaging, Handling, Storage and Transportability Center at Naval Weapon Station Earle, NJ.

The objectives of this project are to gather existing and future humidity/temperature data from within sealed containers while set in world wide shipping, handling and storage conditions as well as to develop an interchangeable indicator for the current existing "color change" reversible humidity indicator.

Research of humidity/temperature data will include the actual placing of instrumented containers for a known period of time in various world-wide conditions. Development of an interchangeable humidity indicator will be through the use of newer micro technologies to include the actual prototyping of physical alternatives.

Advertisement in the Commerce Business Daily, CBD, for any potential and associated interests to the area of "smart sensors", "humidity and/or temperature indicators", in piece parts or as a completed unit/item has been completed along with obtaining information from internal DoD sources. Temperature/humidity data loggers have been identified for the world-wide study to include a one year recording life capability. Several commercial and university operations have been found to have the potential for supporting the development and physical prototyping of a humidity sensor.

Benefits expected from this project are simple. Through the combination of both the documentation of "unknown" internal container information and the increased reliability of the current humidity indicator, degradation and potential loss of packaged assets will be significantly reduced if not eliminated. Additionally, as a tri-service coordinated project benefits will also include the future centralized status upgrade capabilities.

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AMMUNITION CONTAINER SECURITY SEAL DEVELOPMENT

This is a joint-service project managed by the Air Force Packaging Evaluation Activity, Wright-Patterson AFB, OH and coordinated with the US Army, Packaging Division, Picatinny Arsenal, NJ, the Packaging Handling, Storage and Transportation Center at Naval Weapons Station Earle, Colts Neck, NJ, and the US Marine Corps, Naval Surface Warfare Center, at Crane, IN.

This project originated with a requirement from the Air Force Special Operations Command, HQ AFSOC/LGMW, for a security seal that will not create a Foreign Object Damage, FOD, on the flight line.

We have combined this project with the current DoD Locks, Safes, Vaults Seals and Containers Program to define what are the users requirements, what seals are available, how the seals should be tested, test the currently available seals, and determine which security seal should be used on which application.

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AUTOMATED CONTAINER DESIGN/DRAWING

The purpose of this section of the DAPC - J6 project is to automate the container design process by using a three dimensional solid modeling program on a UNIX based computer work station.

The choice of hardware and software is Parametric Technology's Pro/Engineer (Pro/E)for software and Hewlett Packard 9000 series model 725/75 for the hardware. Pro/E was chosen for its two way parametric link which allows a user to make a change to a part in one drawing and it is automatically updated throughout the entire design/drawing package. This two way link along with the automation of the design process should reduce the design time of a new project by at least 50%.

The new hardware systems have been procured and installed with the software loaded. The systems are almost fully operational, there is only configuration setup work to be completed. Six AFPEA personnel have received initial training on the Pro/E software and the system is being populated with design information. Currently the extrusions and hardware for Family of Munitions Container #3 is being input. This input of historical data provides for two positive

benefits. First it provides an excellent training tool, and secondly it populates the data base with design information that AFPEA will use on future container design projects. This is especially true with the FMC #3 data package since this set of extrusions has been used two other times in the past.

The next stage is to get the systems both hardware and software completely configured. This is currently under way and meetings between LGTPD and 88th Communications Group which will be working the configuration of the hardware and networking issues. Configuration of the software has started and will continue by the users as the systems are used and familiarity increases. The configuration of the software includes menu customization, setup of user defined hot keys, screen and view orientations, and many other such items. This software configuration will be a continuous process that improves the speed and efficiency of the software.

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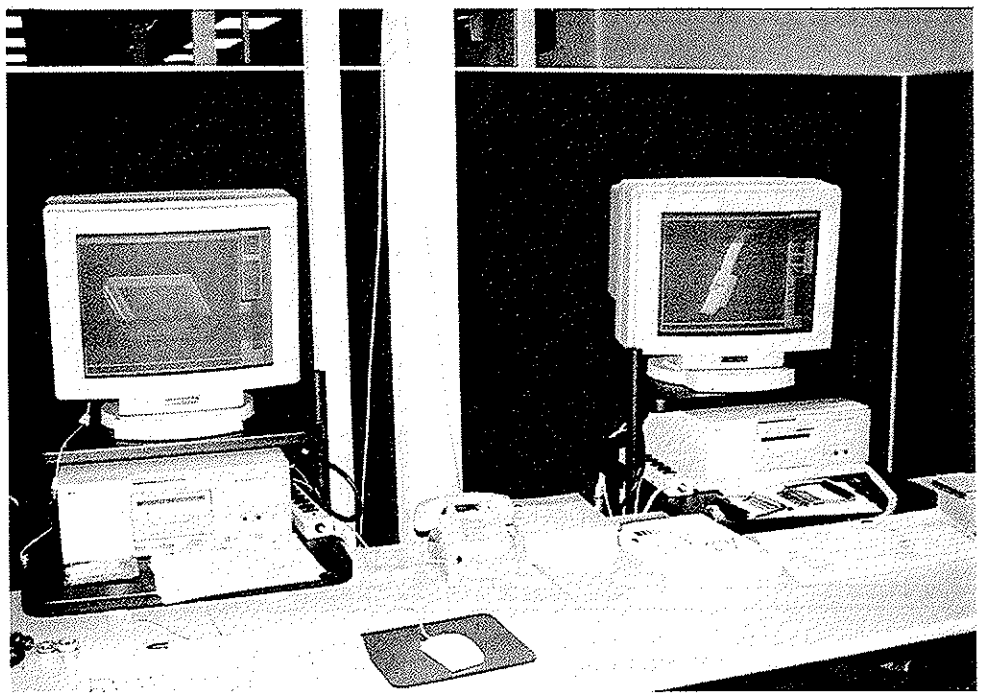


HP Engineering Workstations, Showing Pro-E Designs

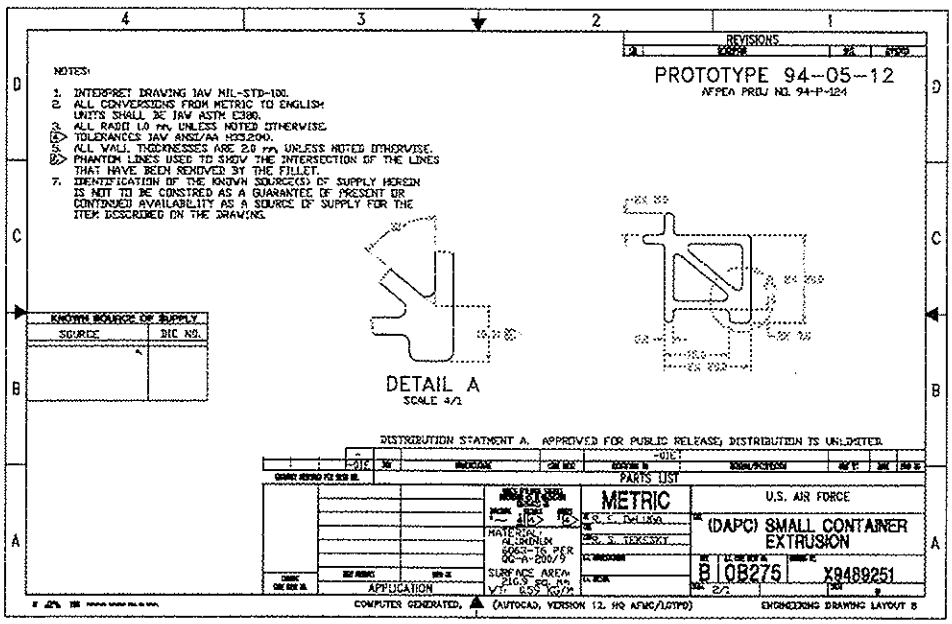
SMALL MUNITIONS CONTAINER

The Defense Ammunition Packaging Council (DAPC) established a project on aluminum and aluminum extrusion technology. The focus of this part of the DAPC project is to improve the design of small munitions/ammunition containers. The focus will be on the users trying to incorporate as many of the features they need to meet there job requirements while still producing a design that is both easily manufactured and economically feasible.

The Project will investigate two possible design applications. First it will strive to improve the small munitions containers that are fabricated using aluminum and aluminum extrusions. The goal will be to improve the sealing of these small containers, reduce the tare weight, simplify the fabrication process while also making the container more user friendly and increasing reliability.

Secondly, AFPEA will research other areas in the fabrication and manufacture of these small munitions containers. These areas may include alternate materials like composite materials, other aluminum alloys, other metals, plastics, and recycled materials. Other areas to be investigated are alternate manufacturing methods and processes on any or all of the current or alternate materials.

The current design shown below is the thinnest and smallest extrusion ever designed by AFPEA. The design will be a post and ring type allowing for flexibility in size. The current plan is to prototype two containers; 0.5 ft^3 and 2.0 ft^3. These containers will be tested at either 42 Lb. or 84 Lb. a one or two person carry. This is the start of phase one, the improvement of containers fabricated from aluminum and aluminum extrusions.



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LONG-TERM CORROSION TESTING

Another aspect of the Defense Packaging Council (DAPC) project on aluminum and aluminum extrusion technology is to conduct long-term corrosion testing. Currently, new aluminum containers that enter the DOD inventory are largely unpainted sheet and extruded aluminum in form. While aluminum generally does not corrode in a significant manner, there are several corrosion processes that do occur on these unpainted aluminum containers which are exposed to the environment.

Pitting corrosion along with general corrosion testing will be conducted on aluminum samples. The samples will be small coupon type that are representative of materials currently used, used in the past, and other possible candidates. These samples will be tested together in a general corrosion solution and also in a salt fog environment, which induces pitting. This testing will be designed to simulate accelerated environmental exposure.

The samples will be evaluated an ranked in such a manner as to there comparative benefits and limitations. The final report will be to describe the best choice of material relative to corrosion, material, and fabrication properties. The recommendation will also take into consideration cost and availability since several aluminum alloys are available but hardly ever produced by the mill, thus making them extremely costly.

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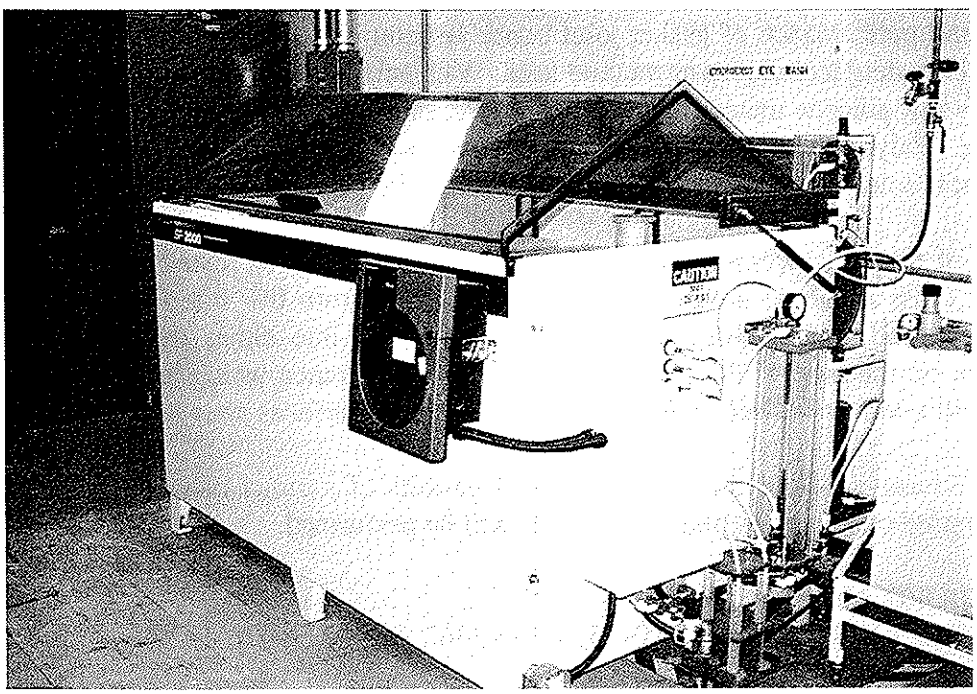

Salt-Fog Cabinet

RESEARCH OF GASKET SHAPES AND MATERIALS UPDATE

The Defense Ammunition Packaging Council (DAPC) established this tri-service project for the research and development of new gasket materials and shapes. AFPEA divided the project into five research tasks; new materials , new shapes, fabrication techniques, bonding techniques, and seal repeatability. AFPEA has made considerable progress on this project to date.

The research results reinforced the good to excellent properties of materials the military presently uses. The new material chosen for evaluation, fabrication, and testing was a solid polyurethane. Using polyurethane as a gasket material can be considered a viable option, however, it's properties do not warrant use over the present gasket materials of silicone and neoprene.

The most commonly used gaskets in the military are either round or flat in cross sectional shape. AFPEA has found that by combining features of the flat and round gasket designs, a gasket that is more reliable in seal repeatability and functionality can be obtained. It has been determined that designing/fabricating a gasket with 90° corners, creates a sufficient sealing surface for the corners for a repeatedly sealed container. AFPEA has designed approximately a dozen different shaped gaskets for testing.

Gasket fabrication techniques were investigated by speaking to and visiting gasket manufacturers. Most materials used to make gaskets can either be extruded or molded, however the processes may effect the properties of the materials differently. The fabrication processes of extruding vs. molding will have to be evaluated for each type of material, shape, durometer, and usage. AFPEA will test both molded and extruded gaskets.

The quality and performance of gasket joint bonds is determined by the gasket material, type of adhesive, and bonding techniques or method used. Vulcanization of silicone gaskets using a small amount of the raw silicone material is a very effective, reliable, and economical process for gasket joint bonding. Polyurethane gaskets lend themselves to chemical bonding. However, choice of bonding agent is solely dependent on the plasticizer used in the material manufacturing.

The old rule of thumb concerning ideal compression of 30% will be tested by acquiring gaskets with varying cross sectional areas. The areas will range from 0% interference at the sealing surface, meaning all of the gasket area can be compressed into either the gasket itself or the gasket groove on the base of the container. To 30% interference which means that 30% of the gasket area will interfere between the base and cover sealing surfaces after full compression.

Once AFPEA receives all of the newly designed gaskets of various cross-sectional shapes and areas, the required compression and sealing tests will be performed.

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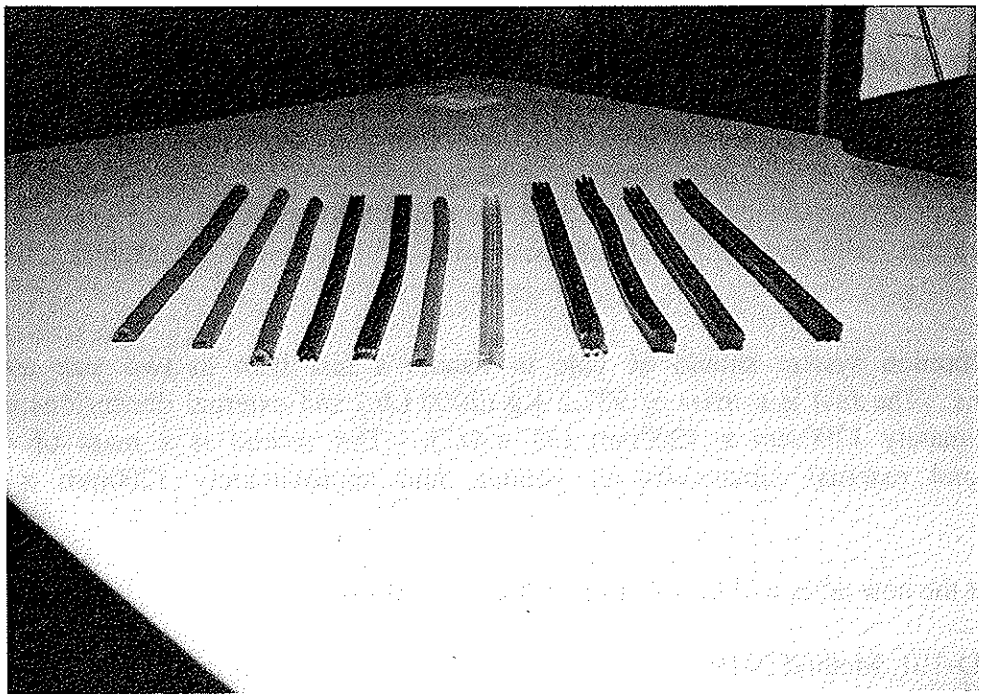
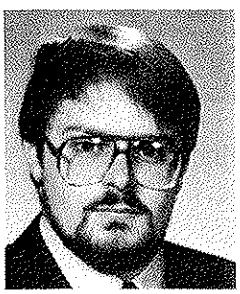


Gasket Samples, Showing Different Shapes and Materials

WATER TANK



AFPEA recently purchased a 36 x 48 x 36 inch water tank. The tank's purpose is to perform U.S. Department of Transportation's Hydrostatic Pressure and Leakproofness Test on drums and containers of up to 85 gallons. The tank's body is made primarily of High Density Polyethylene with large Polycarbonate windows, which allow ease of viewing the test specimen.

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VIBRATION TABLE PROCUREMENT

The procurement of a single axis vibration table to replace the small (4' x 4') LAB vibration table in the conditioning room has been undertaken. The contract for the new system has been awarded to Team Corporation. The time table is approximately as follows; 6 months for design and manufacture of the specialized system, 60 days for removal of the old system and installation of the new system, and finally 30 to 60 days for operational training and verification of the systems operation. The new system should be available for customer use around September of 1995.

The new vibration system should be able to handle a test item in two size and weight configurations. The first is a mass of 907.2 Kg (2000 Lb.) and external dimensions no greater than approximately 1200mm x 1200mm (48" x 48"). The second is a mass of 453.6 Kg (1000 Lb.) and external dimensions no greater than approximately 1200mm x 3000mm (48" x 120").

The tests that the new table will be able to perform are as follows:

- FED-STD-101, Method 5019.1, Vibration (Repetitive Shock) Test.
- FED-STD-101, Method 5020.1, Vibration (Sinusoidal Motion) Test.
- MIL-C-5584, Paragraph 4.7.7.1, Vibration.
- MIL-C-5584, Paragraph 4.7.7.3, Repetitive Shock (Superimposed Loads).
- MIL-STD-648, Paragraph 5.2.2, Repetitive Shock Test.
- MIL-STD-648, Paragraph 5.3.2, Resonance Strength and Dwell Test.
- MIL-T-28800, Paragraph 3.7.4.1, Vibration Sinusoidal.
- MIL-T-28800, Paragraph 3.7.4.2, Vibration Random.
- MIL-STD-810, Method 514.4, Vibration, Transportation Vibration. Test Condition I-3.3.1, Category I - Basic Transportation. Paragraphs I-3.3.1 through and including I-3.3.1.3.
- ASTM Standard Test Methods pertaining to container testing and vibration/shock testing.
- ASTM D999, Standard Practice for Vibration Testing of Shipping Containers, Methods A1, B, and C.
- ASTM D3580, Standard Practice for Vibration (Vertical Sinusoidal Motion) Test of Products.
- ASTM D4728, Standard Practice for Random Vibration Testing of Shipping Containers, Method A, Paragraph 5.2.1.
- ASTM D4169, Standard Practice for Performance Testing of Shipping Containers and Systems, Elements E, F, and G.

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NEW and UPGRADED LABORATORY TESTING CAPABILITIES

AFPEA now has the capability to perform the water absorption test requirements of PPP-C-1752. The basic pressure vessel is a five gallon paint pressure pot intended for spray painting. To avoid possible pressure loss during the two day test, compressed air is supplied through a pressure regulator capable of maintaining the required 4.35 psi to within 0.02 psi. The pressure value is monitored with a digital manometer and saved to a computer file.

Temperature measurement capabilities have been upgraded with the installation of a sixteen module computerized data acquisition system. The system will digitize and store the analog signals from up to sixteen type J thermocouple probes at rates ranging from milliseconds to days. With this system it has been possible to monitor the temperature gradient developed across cushioning material when the material is exposed to sudden changes in ambient temperature. This capability proved essential to the "LOW TEMPERATURE DYNAMIC CUSHIONING TESTING" project previously described.

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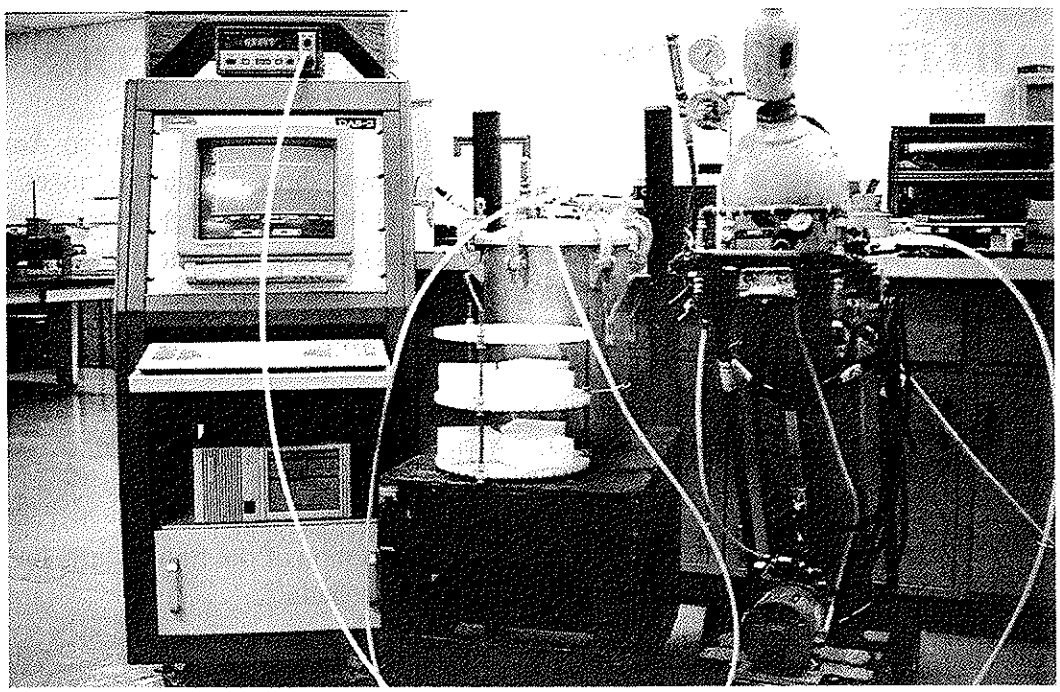
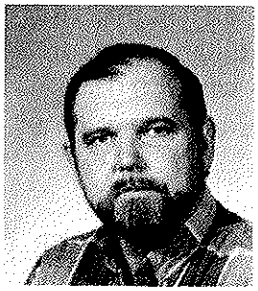


Pressure Pot, For Water Absorption Tests

COMBAT TALON II
KU-BAND ANTENNA CONTAINER
RETRACTABLE WHEEL PRODUCTION



The Air Force Packaging Evaluation Activity (AFPEA) provided engineering support to the Combat Talon II (CTII) program office, reference article "Combat Talon II KU-Band Antenna Container Wheel Modification". From the wheel modification design, CTII requested AFPEA to modify all existing KU-Band Antenna containers. With AFPEA's unique prototyping shop and two highly skilled model makers, we were capable of excepting the work request. Our flexibility allows us to change along with the CTII schedule for modifying the containers. The small quantity and time frame that is required by CTII would not be cost or time effective to contract out. Another advantage CTII will see by having AFPEA complete this production is if any changes or problems encountered, they can be corrected on the spot without delay in scheduling. Nine containers are scheduled to be modified this winter with an additional five in late spring.

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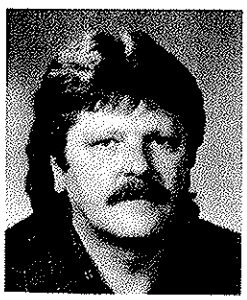
250AH LITHIUM BATTERY FIXTURE FABRICATION



When this project came to the Air Force Packaging Evaluation Activity, there was a lot of work to do with a very short deadline to meet. The fixture is constructed with a combination of Lexan, a high strength plastic, and aluminum. Its purpose is to protect a very delicate Lithium battery from being punctured during shipment from Poitiers, France.

Many parts with hundreds of fastener holes needed to be fabricated. Our computer controlled spindle cutting system played a vital role in producing these parts in a very short time, while holding the critically tight tolerances.

Several design changes and additions of parts followed the completion of the first fixture, but with everyone's cooperation the project was completed well ahead of schedule.

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TESTS AND TEST FACILITIES AVAILABLE AT AFPEA

CONTAINER TESTS:

EXAMINATION OF PRODUCT
HOISTING STRENGTH TEST (SINGLE RING)
HOISTING STRENGTH TEST (FOUR RING)
COVER PULL TEST
FORKLIFT HANDLING TEST
HIGH TEMP/HUMIDITY STACKING TEST
ROUGH HANDLING TEST (HOT & COLD)
VIBRATION RESONANT DWELL
VIBRATION REPETITIVE SHOCK (STACKED)
PENDULUM IMPACT (STACKED)
STRUCTURAL PRESSURE TEST
U.N. DROP TESTS (ALL FIVE)
U.N. STACKING TEST (HIGH TEMP)
INSTRUMENTATION
TIE-DOWN TEST
STACKING TEST
COVER LIFT TEST
PUSH TEST/TOW TEST
LATCH STRENGTH TEST
CONDUCTIVE TEST
LEAK TEST
FORM/FIT TEST
WEIGHT TEST
STAND-OFF TEST
GASKET PULL TEST

CUSHION MATERIAL TESTS:

ELECTRO STATIC DECAY (ESD)
COMPRESSIVE SET
DYNAMIC CUSHIONING
WATER ABSORPTION
LOAD DEFLECTION/COMPRESSIVE STRENGTH
CREEP
COMBUSTIBILITY
PLIABILITY
HYDROLYTIC STABILITY

FACILITIES:

1. LOW TEMPERATURE WALK-IN ENVIRONMENTAL CHAMBER:

TEMPERATURE RANGE: Ambient to +170 to –100 degrees Fahrenheit (F)
(ambient to +76 to –72 degrees Celsius (C)
INSIDE DIMENSIONS: 90 width x 182 length x 96 height
(229 cm width x 462 cm length x 244 cm height)
DOOR OPENING: 70 width x 82 height (178 cm width x 183 cm height)
DROP TEST CAPACITY INSIDE OF CHAMBER: 4000 pounds (1814 kg)

2. VIBRATION EQUIPMENT:

a. VIBRATION TEST MACHINE (MECHANICAL):

TABLE SIZE:	98 length x 96 width (249 cm length x 244 cm width)
FREQUENCY RANGE:	0 to 40 Hertz
AMPLITUDE RANGE:	.02 to 1.0 Double Amplitude (DA)
MAXIMUM LOAD:	5000 pounds (2268 kg)
MAXIMUM ACCELERATION:	3 Gs peak
FIXTURE SIZE:	127 length x 98 width (323 cm length x 249 cm width)
ENVIRONMENTAL CHAMBER:	–40 to +140 degrees F (–40 to 60 degrees C)

b. VIBRATION TEST MACHINE (ELECTROHYDRAULIC):

TABLE SIZE:	48 length x 48 width (122 cm length x 122 cm width)
FREQUENCY RANGE:	1 to 200 Hertz
AMPLITUDE RANGE:	0 to 6 DA
MAXIMUM FORCE RATING:	6000 pounds peak sine (2722 Kg)
ENVIRONMENTAL CHAMBER:	–40 to +140 degrees F (–40 to 60 degrees C)

c. VIBRATION TEST MACHINE (ELECTRODYNAMIC):

FREQUENCY RANGE:	5 to 3000 Hertz
AMPLITUDE RANGE:	0 to 1.0 DA
MAXIMUM FORCE RATING:	4000 pounds peak sine (1814 Kg)
FIXTURE SIZE:	25 length x 25 width (64 cm length x 64 cm width)
ENVIRONMENTAL CHAMBER:	–40 to +140 degrees F (–40 to 60 degree C)

3. TEMPERATURE/HUMIDITY WALK-IN ENVIRONMENTAL CHAMBER:

TEMPERATURE RANGE:	–65 to +185 degrees F (–53.9 to +85 degrees) C
HUMIDITY RANGE:	20 to 95 percent (Limited by +68 degree F (+20 degree C) dry bulb temperature and +40 degree F (+4.5 degree C) dew point
INSIDE DIMENSIONS:	10 feet (3.05m) width x 16 feet (4.88m) depth x 9 feet 6 inches (2.90m) height
DOOR OPENING:	10 feet (3.05m) x 9 feet 6 inches (2.90m) height
DROP TEST CAPACITY INSIDE OF CHAMBER:	5000 pounds (2268 Kg hoist)

4. PENDULUM IMPACT TESTER:

CAPACITY:	5000 pounds (2268 kg)
CONTAINER MAXIMUM SIZE:	104 width x 216 length x 144 height (263 cm width x 549cm length x 366 cm height)

5. RAIN/SALT-FOG/WIND WALK-IN ENVIRONMENTAL CHAMBER:

TEMPERATURE RANGE:	Ambient
RAIN CAPABILITY:	2 or 5 inch (5 or 13 cm) rain/hour
SALT-FOG CAPABILITY:	5 percent salt solution by weight
WIND VELOCITY:	40 miles per hour (64 km/hour)
INSIDE DIMENSIONS:	76 width x 160 length x 78 height (193 cm width x 432 cm length x 198 cm height)
DOOR OPENING:	62 width x 79 height (157 cm width x 201 cm height)

6. ALTITUDE CHAMBER:

TEMPERATURE RANGE:	–100 to +350 degrees F (–73.3 to +177 degrees C)
ALTITUDE:	Site Level to 100,000 feet (30,667m)
INSIDE DIMENSIONS:	48 width x 48 length x 48 height (122 cm width x 122 cm length x 122 cm height)

7. THERMAL OVEN:

TEMPERATURE RANGE:	+100 to +500 degrees F (+40 to +260 degrees C)
INSIDE DIMENSIONS:	48 width x 117 length x 60 height (122 cm width x 297 cm length x 152 cm height)
DOOR OPENING:	48 width x 60 height (122 cm width x 152 cm height)

8. DYNAMIC CUSHION TESTER (HARDIGG TYPE):

CUSHION SIZE:	8 x 8 (20 cm x 20 cm)
DROP HEIGHT:	90 maximum (229 cm)
STATIC STRESS RANGE:	065 to 1.6 pounds per square inch
LIFT SYSTEM:	Variable speed electric motor
GUIDE BEARINGS:	Linear ball and radial ball

9. DYNAMIC CUSHION TESTER (LANSMONT MODEL 23):

CUSHION SIZE:	8 x 8 (20 cm x 20 cm)
DROP HEIGHT:	60 (150 cm)
STATIC STRESS RANGE:	.065 to 1.6 pounds per square inch
LIFT SYSTEM:	Electric motor
GUIDE BEARINGS	Linear ball
BRAKES	Air operated

10. PROGRAMMABLE SHOCK TESTER:

TABLE SIZE:	24 x 24 (61 cm x 61 cm)
TABLE WEIGHT:	235 pounds (107 Kg)
SPECIMEN WEIGHT:	600 pounds maximum (272 Kg)
LIFT SYSTEM:	Hydraulic
GUIDE BEARINGS:	Bronze
WAVE FORM LIMITS:	Half sine - 600 Gs at 2 ms Sawtooth - 100 Gs at 4 ms Square wave - 200 Gs at 2 ms Trapezoid - 200 Gs at 5 ms

11. CONTAINER DROP TESTER:

CONTAINER SIZE:	20 x 24 maximum (51 cm x 61 cm)
CONTAINER WEIGHT:	80 pounds maximum (36 Kg)
DROP HEIGHT RANGE:	12 to 84 (30 to 213 cm)

12. XENON ARC, WATER-COOLED, LIGHT-EXPOSURE APPARATUS

LIGHT SOURCE:	3500 Watt Water Cooled Long Arc Xenon Lamp
TEMPERATURE CONTROLS:	Automatic, Digital Set Point Black Panel/Dry Bulb
HUMIDITY CONTROLS:	Automatic, Digital Set Point Wet Bulb Depression/Condition Water

Meets the requirements for ASTM G-26, Standard Practice for Operating Light- Exposure Apparatus (Xenon Arc Type) with and without water for exposure of nonmetallic materials.

13. UVCON ULTRAVIOLET/CONDENSATION SCREENING DEVICE

TEMPERATURE RANGE:	50 to 95 degree C
LIGHT SOURCE:	8-40 Watt Fluorescent Lamps
SAMPLE SIZE:	26 Holders for Samples Up to 3" x 12" (8 cm x 30 cm)

Meets requirements for ASTM G53, Recommended Practice for Operating Light and Water-Exposure Apparatus, and ASTM D4329, Operating Light and Water-Exposure Apparatus.

14. CONSTANT TEMPERATURE/HUMIDITY CABINET

TEMPERATURE RANGE:	18 to 93 degree C (O to 200 degree F)
HUMIDITY RANGE:	5% to 99% RH
INNER CHAMBER DIMENSIONS:	26 x 25 x 18

15. ELECTROSTATIC DECAY (ESD) TEST AREA:

a. TEST CHAMBER:

TEMPERATURE RANGE:	Ambient
HUMIDITY RANGE:	8 to 15 percent
DIMENSIONS:	36 length x 24 width x 18 height (91 cm length x 61 cm width x 46 cm height)
DOOR OPENING:	12 x 12 (30 cm x 30 cm)
CONTROL:	Passive and active "Desiccant" systems

b. STATIC DECAY METER:

PEAK CHARGE:	±5Kv
DECAY TIMER:	0.01 to 99.99 seconds
SAMPLE SIZE:	3 x 5 (8 cm x 13 cm)
TEST METHOD:	Federal Test Method Standard 101C, Method 4046

c. KEITHLEY ELECTROMETER:

RANGE:	100 ohms full scale to 10^{14} ohms in twenty-five linear 1x and 3x ranges
ACCURACY:	±3 percent of full scale on 100 to 10^{10} ohm ranges using the largest available multiplier setting; ±5 percent of full scale on 3 x 10 ohm ranges.

16. DIGITAL PRESSURE/VACUUM MANOMETER

RANGE:	–15 to +30 PSI
ACCURACY:	±0.03% of reading +0.01% of full scale

17. CFC-FREE LEAK DETECTOR

18. UNIVERSAL TENSILE/COMPRESSION TESTING MACHINE (new machine installation)

19. TIE DOWN/HANDLE PULL TESTER

MAXIMUM FORCE RATING:	6,500 pounds per Actuator (4 Actuators)
ELECTRONIC READOUTS:	Forces from 100 to 10,000 +/- 10 pounds
CONTAINER SIZE:	Tester adjustable, Maximum 10 feet x 20 feet without special adaptation

20. PORTABLE HIGH/LOW TEMPERATURE CHEST

TEMPERATURE RANGE:	–85°F to +140°F (–65°C to +60°C)
INSIDE DIMENSIONS:	13 width x 25 length x 14 depth

21. SALT/FOG CABINET

INTERNAL VOLUME:	68 ft^3
TEMPERATURE RANGE:	–80° F to +160° F (–26° C to +71° C

PROGRAMABLE
EXTERNAL COLLECTION PACKAGE AND MIXING TANK FOR UNINTERUPTED TESTING

Air Force Materiel Command
Logistics Support Office
****AFMC LSO Organizational Directory**

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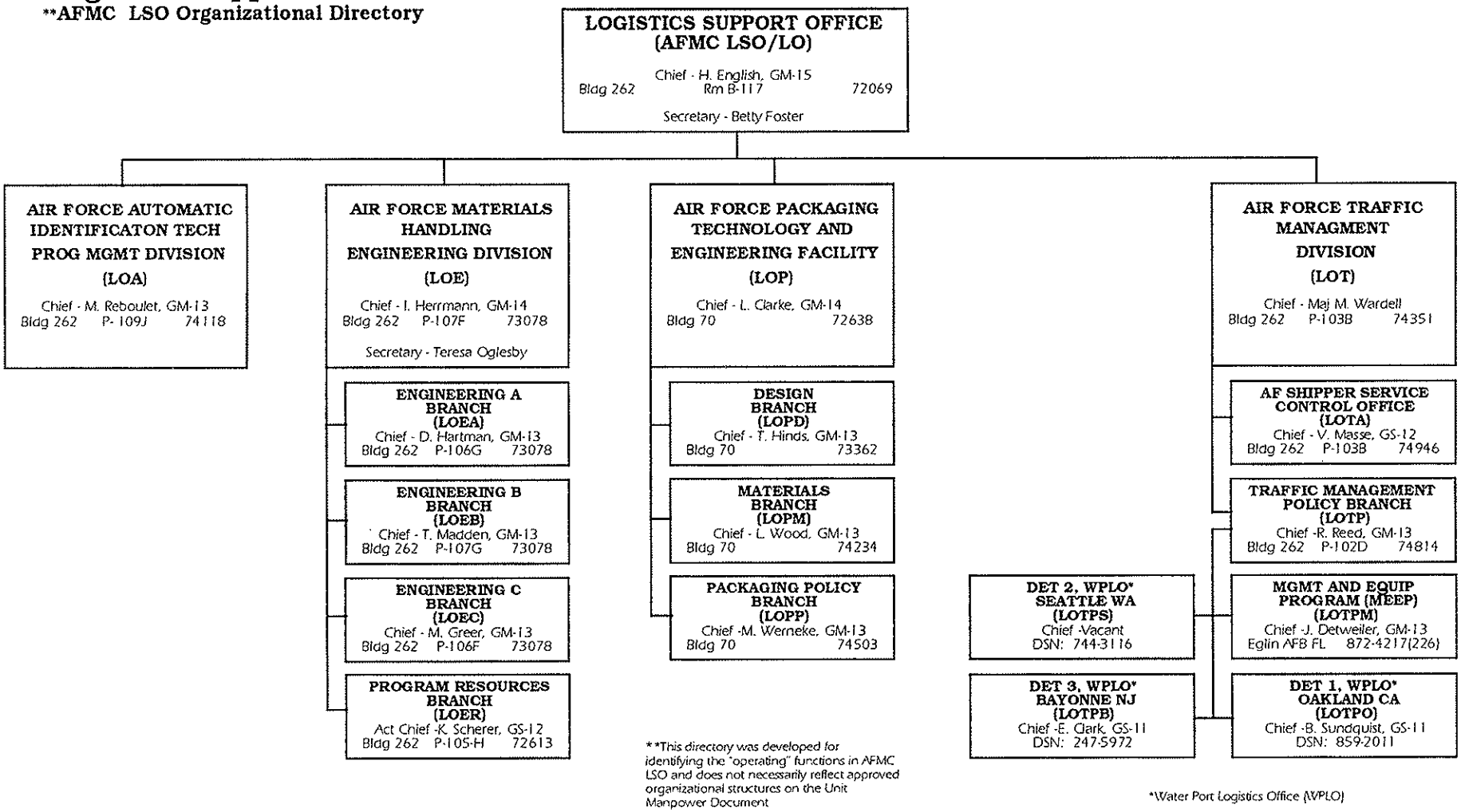
Wright-Patterson Air Force Base, Ohio 45433-5006
Commercial (513) - 257 - (plus last four digits) DSN 787 - (plus last four digits)



**This directory was developed for identifying the "operating" functions in AFMC LSO and does not necessarily reflect approved organizational structures on the Unit Manpower Document

*Water Port Logistics Office (WPLO)

PRESENTED TO

AIR FORCE PACKAGING EVALUATION ACTIVITY
HEADQUARTERS AIR FORCE MATERIEL COMMAND
WRIGHT-PATTERSON AFB, OHIO

FOR OUTSTANDING PROFESSIONAL SUPPORT
TO THE AFRTS MISSION FROM 1990 TO 1994
ENSURING THE SAFE AND SECURE SHIPMENT
OF CONUS TV PROGRAMMING TO UNITED STATES
FORCES AND THEIR FAMILIES AROUND THE WORLD


AIR FORCE PACKAGING TECHNOLOGY & ENGINEERING FACILITY
PACKAGING POLICY
MATERIALS ENGINEERING
PROTECT THE ITEM THE NATION AND THE ENVIRONMENT
QUALITY
COST
CONTAINER ENGINEERING
AFPTEF