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FINAL REPORT

JANUARY 1989

EVT 39-87

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MIL-STD-1660 TEST OF PA116 CONTAINER ON A STANDARD METAL PALLET WITH FORK TINE PROTECTION.

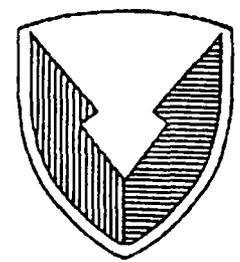
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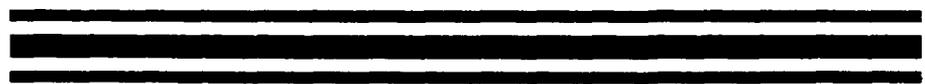
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US ARMY ARMAMENT MUNITIONS CHEMICAL COMMAND



EVALUATION DIVISION SAVANNA, ILLINOIS 61074-9639

US ARMY DEFENSE AMMUNITION CENTER AND SCHOOL

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SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS			
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION / AVAILABILITY OF REPORT			
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) EVT 39-87		5. MONITORING ORGANIZATION REPORT NUMBER(S)			
6a. NAME OF PERFORMING ORGANIZATION Defense Ammunition Center and School		6b. OFFICE SYMBOL (if applicable) SMCAC-DEV	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) Savanna, IL 61074-9639		7b. ADDRESS (City, State, and ZIP Code)			
8a. NAME OF FUNDING / SPONSORING ORGANIZATION U.S. Army Armament, Munitions and Chemical Command		8b. OFFICE SYMBOL (if applicable) AMCPM-AL	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code) Picatinny Arsenal, NJ 07806-5000		10. SOURCE OF FUNDING NUMBERS			
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) MIL-STD-1660 TEST OF PA116 CONTAINER ON A STANDARD METAL PALLET WITH FORKTIME PROTECTION					
12. PERSONAL AUTHOR(S) A. C. McIntosh, Jr.					
13a. TYPE OF REPORT FINAL		13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 1989 July 12		15. PAGE COUNT 47
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP			
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
<p>— The U.S. Army Defense Ammunition Center and School (USADACS) was asked to design a protective system into the Standard Metal Pallet to prevent forklift tines from puncturing the PA116 containers. As a result, a guard plate was added to the PA116 pallet adaptor. The guard plate provides six inches of barrier along the length of the bottom row of the container. In order to verify this modified version of the PA116 metal pallet, it was subjected to the requirements of MIL-STD-1660, Design Criteria for Ammunition Loads. The test specimens, consisting of a standard metal pallet, pallet adaptor with forklift protector, top lift assembly, and inert loaded PA116 containers, weighed 2,423 pounds in a 44 inches W x 40 inches L x 50-1/2 inches high. Tests performed on the specimen were compression, repetitive shock, (vibration), edgewise rotational drop, and inclined impact. As a result of these tests, the test specimen sustained some damage in loosening</p>					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a. NAME OF RESPONSIBLE INDIVIDUAL THOMAS J. MICHELS, Chief, Evaluation Division		22b. TELEPHONE (Include Area Code) AV 585-8080		22c. OFFICE SYMBOL SMCAC-DEV	

DD Form 1473, JUN 86

Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

19. Continued

of the banding straps and lateral load shifting on the pallet. Despite these faults, the pallet is considered acceptable by the criteria of MIL-STD-1660. ( )

U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL  
Evaluation Division  
Savanna, IL 61074-9639

REPORT NO. EVT 39-87  
MIL-STD-1660 TEST OF PA116 CONTAINER ON A STANDARD  
METAL PALLET WITH FORK TINE PROTECTION

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# PART 1

## INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center and School (USASDACS) was tasked by the Office of the Project Manager for Ammunition (PM-AMMOLOG), AMCPM-AL, to add a protective barrier along the lateral side of the standard metal pallet for reducing the number of accidental container punctures from forklift tines. As a result of this request, USADACS modified the PA116 Container Pallet Adaptor assembly with a six-inch-high formed metal plate along the lateral side of the container.

B. AUTHORITY. This test was conducted in accordance with mission responsibilities delegated by the U.S. Army Armament, Munitions and Chemical Command, (AMCCOM), and AR 740-1.

C. OBJECTIVE. The objective of this test is to evaluate the PA116 Standard Metal Pallet with forklift protector in accordance with MIL-STD-1660 design criteria for ammunition unit loads.



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PART 2

ATTENDEES

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## PART 3

### TEST PROCEDURES

The test procedures outlined in this section were extracted from MIL-STD-1660, Design Criteria for Ammunition Unit Loads, 8 April 1977. This standard identifies nine steps that a unitized load must undergo if it is considered to be acceptable. The five tests that were conducted on the test pallet are synopsized below.

1. STACKING TESTS. The unit load shall be loaded to simulate a stack of identical unit loads stacked 16 feet high, for a period of one hour. This stacking load is simulated by subjecting the unit load to a compression weight equal to an equivalent 16-foot stacking height. The compression load is calculated in the following manner: The unit load weight is divided by the unit load height in inches and multiplied by 192. The resulting number is the equivalent compressive load of a 16-foot-high stack.
2. REPETITIVE SHOCK TEST. The repetitive shock test shall be conducted in accordance with Method 5019, Federal Standard 101. The test procedure is as follows: The test specimen shall be placed on, but not fastened to, the platform. With the specimen in one position, vibrate the platform at 1/2-inch amplitude (1-inch double amplitude) starting at a frequency of about 3-cycles-per-second. Steadily increase the frequency until the package leaves the platform. The resonant frequency is achieved when a 1/16-inch-thick feeler may be momentarily slid freely between every point on the specimen in contact with the platform at some instance during the cycle or a

platform acceleration achieves one plus or minus zero point one G. Midway into the testing period the specimen shall be rotated 90 degrees and the test continued for the duration. Unless failure occurs, the total time of vibration shall be two hours if the specimen is tested in one position; and, if tested in more than one position, the total time shall be three hours.

3. EDGEWISE DROP TEST. This test shall be conducted by using the procedures of Method 5008, Federal Standard 101. The procedure for the Edgewise Drop (Rotational) Test is as follows: The specimen shall be placed on its bottom with one end of the base of the container supported on a sill nominally 6 inches high. The height of the sill shall be increased, if necessary, to ensure that there will be no support for the base between the ends of the container when dropping takes place, but should not be high enough to cause the container to slide on the supports when the dropped end is raised for the drops. The unsupported end of the container shall then be raised and allowed to fall freely to the concrete, pavement, or similar underlying surface from a prescribed height. Unless otherwise specified, the height of drop for level A protection shall conform to the following tabulation.

Table 1: Drop Levels

<u>GROSS WEIGHT</u> <u>NOT EXCEEDING</u>	<u>DIMENSIONS ON ANY EDGE</u> <u>NOT EXCEEDING</u>	<u>HEIGHT OF DROP LEVEL</u> <u>A PROTECTION</u>
600 lbs.	72 inches	36 inches
3,000 lbs.	no limit	24 inches
no limit	no limit	12 inches

4. IMPACT TEST. This test shall be conducted by using the procedure of Method 5023, Incline-Impact Test of Federal Standard 101. The procedure for the Incline-Impact Test is as follows: The specimen shall be placed on the carriage with the surface or edge which is to be impacted projecting at least 2 inches beyond the front end of the carriage. The carriage shall be brought to a predetermined position on the incline and released. If it is desired to concentrate the impact on any particular position on the container, a 4x4-inch timber may be attached to the bumper in the desired position before the test. No part of the timber shall be struck by the carriage. The position of the container on the carriage and the sequence in which surfaces and edges are subjected to impacts may be at the option of the testing activity and will depend upon the objective of the tests. When the test is to determine satisfactory requirements for a container or pack, and, unless otherwise specified, the specimen shall be subjected to one impact on each surface that has each dimension less than 9.5 feet. Unless otherwise specified, the velocity at time of impact shall be 7 feet per second.

## PART 4

### TEST EQUIPMENT

1. TEST SPECIMEN.
  - a. Width: 44 inches
  - b. Length: 40 inches
  - c. Height: 50-1/2 inches
  - d. Weight: 2,423 pounds
  
2. COMPRESSION TESTER.
  - a. Manufacturer: Ormond Scientific
  - b. Platform: 60 inches by 60 inches
  - c. Compression Limit: 50,000 pounds
  - d. Tension Limit: 50,000 pounds
  
3. TRANSPORTATION SIMULATOR.
  - a. Manufacturer: Gaines Laboratory
  - b. Capacity: 5,000 pound pallet
  - c. Displacement: 1/2-inch Amplitude
  - d. Speed: 50 to 300 cpm
  - e. Platform: 5 feet by 8 feet
  
4. INCLINED RAMP
  - a. Manufacturer: Conbur Incline
  - b. Type: Impact Tester
  - c. Grade: 10 Percent Incline
  - d. Length: 12-foot Incline Ramp

## PART 5

### TEST RESULTS

1. STACKING TEST. Pallet Weight: 2,423 lbs. Pallet Height: 50-1/2 in. Test Load Weight: 9,200 lbs. The PA116 Standard Metal Pallet with the forklift protector was loaded to a test weight of 9,200 pounds in the compression tester. It remained under compression for a period of 60 minutes. Some loosening of the banding straps was noticed. At the end of the test period, the compression load decreased to 8,500 pounds. When the compression load was removed and the test specimen taken out of the compression test fixture, the banding straps returned to the original tension, and no measurable deformation in the load was recordable.

2. REPETITIVE SHOCK TEST. The PA116 Standard Metal Pallet with forklift protector was subjected to two 90 minute periods in the transportation simulator. During the first 90 minute period, the pallet skids were oriented longitudinally to the direction of motion. The Transportation Simulator was operated at 200 rpm in order to achieve a 1/16 inch displacement between the pallet skids and transportation simulator deck. A rotational speed of 200 rpm induces a 1 g shock into the test specimen.

3. EDGEWISE ROTATIONAL DROP TEST. Each side of the pallet is placed on a beam displacing it 6 inches above the floor. The opposite side is raised to a height of 24 inches above the floor and then dropped. The pallet skids were oriented longitudinally for the first and third impacts and laterally for the second and fourth

impacts. When the pallet was dropped with the sides oriented in the longitudinal direction, the outside truss members deformed from the impact. As a result of this deformation, the ends of the sides became bowed instead of remaining flat. After the second and fourth impacts, the outer sides were bent outward. Also, the pallet deck became bowed.

4. INCLINED IMPACT TEST. The incline impact test consisted of placing the PA116 Standard Metal Pallet with forklift protector on an inclined impact test with two inches of the pallet projecting over the edge of the sled. The sled was raised approximately eight feet up the inclined ramp and release, allowing the sled to accelerate into a solid wall with an optional 6 inch x 8 inch beam at the base. This test was repeated once on each side of the pallet. To impact on the bell end, the containers were oriented longitudinally to the direction of impact. The PA116 container interlocks did not become disengaged nor was there additional damage to the pallet skids or truss post. With the pallet turned 180 degrees and impacting the closed container end, no additional damage occurred to the unitization. For the remaining two impacts, the PA116 containers and pallet skids were oriented parallel to the direction of impact. When impacted in this orientation, the forklift protectors were deformed from the impacting with the optional beam and the lower row of containers. When this occurred, the top row of containers (5 containers) became disengaged from the second row. Also the bell end flats remained in parallel contact with the impact tester wall. The bells on the third row of containers were in partial wall contact. Dynamically, the top four rows of containers made contact

with the impacting surface while the pallet skid was offset by the amount presented by the optional beam.

## PART 6

### CONCLUSIONS AND RECOMMENDATIONS

1. CONCLUSIONS. The PA116 Standard Metal Pallet with forktine protector technically satisfied the requirements of MIL-STD-1660 in that it retained the load after all of the specified tests. However, after testing, the pallet unit was loosened up enough that it would probably fall apart after additional rough handling. This test sequence caused damage to the pallet skid trusses, caused the pallet skids to bend upward, and warped the pallet deck. The pallet adapter with the forktine protector was damaged to a point where the PA116 container had a lateral side slip of two inches. The test specimen was six inches out of square after testing with the first and second rows of container interlocks disengaged.

2. RECOMMENDATIONS. It is recommended that the following design changes be made. The pallet skid should be redesigned to prevent damage to the truss post. The pallet adapter should be modified to reduce the amount of lateral movement. Intermediate dunnage and a better interlocking system of the PA116 container should be developed to eliminate lateral load skewing from bottom to top.

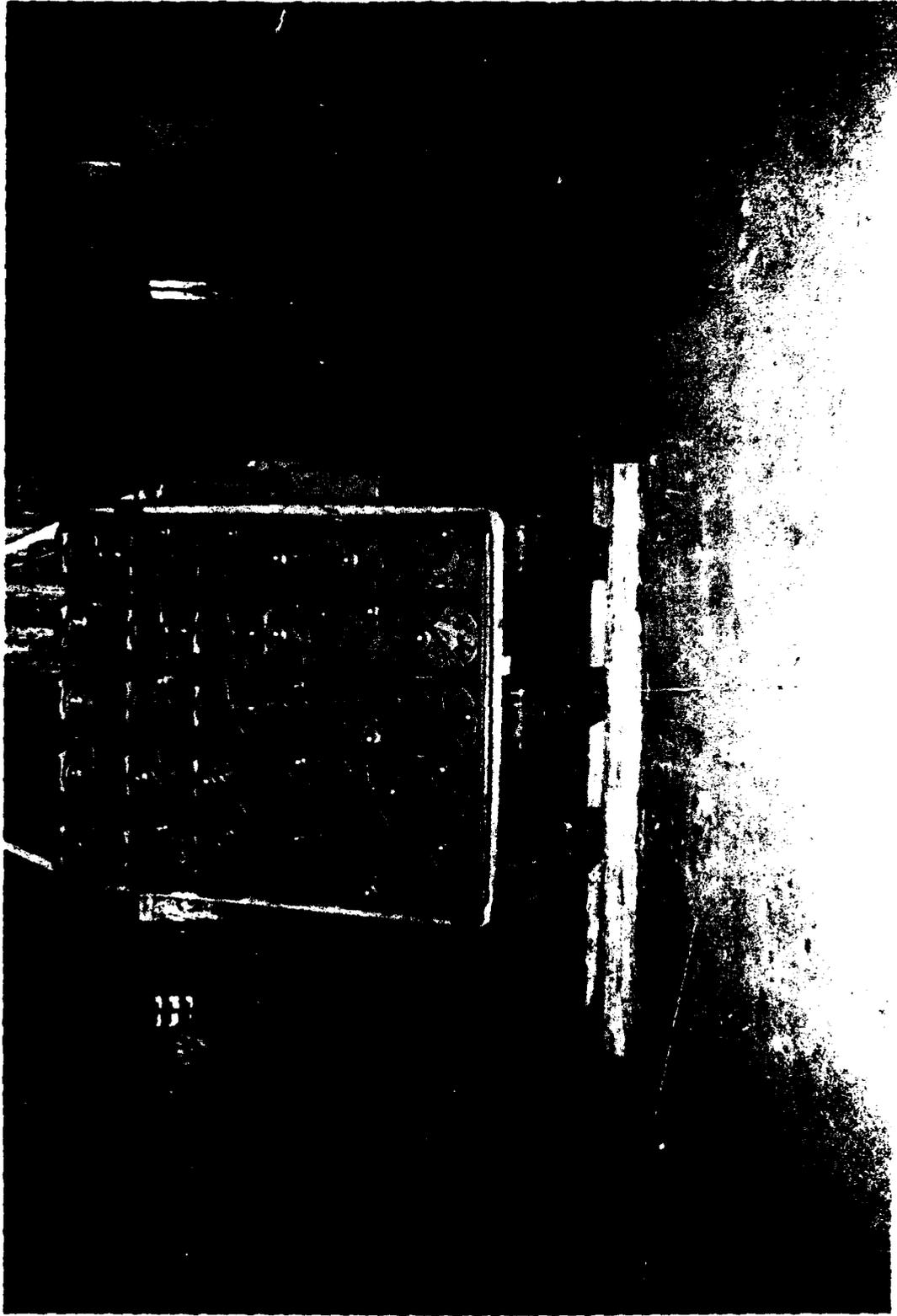
PART 7

PHOTOGRAPHS



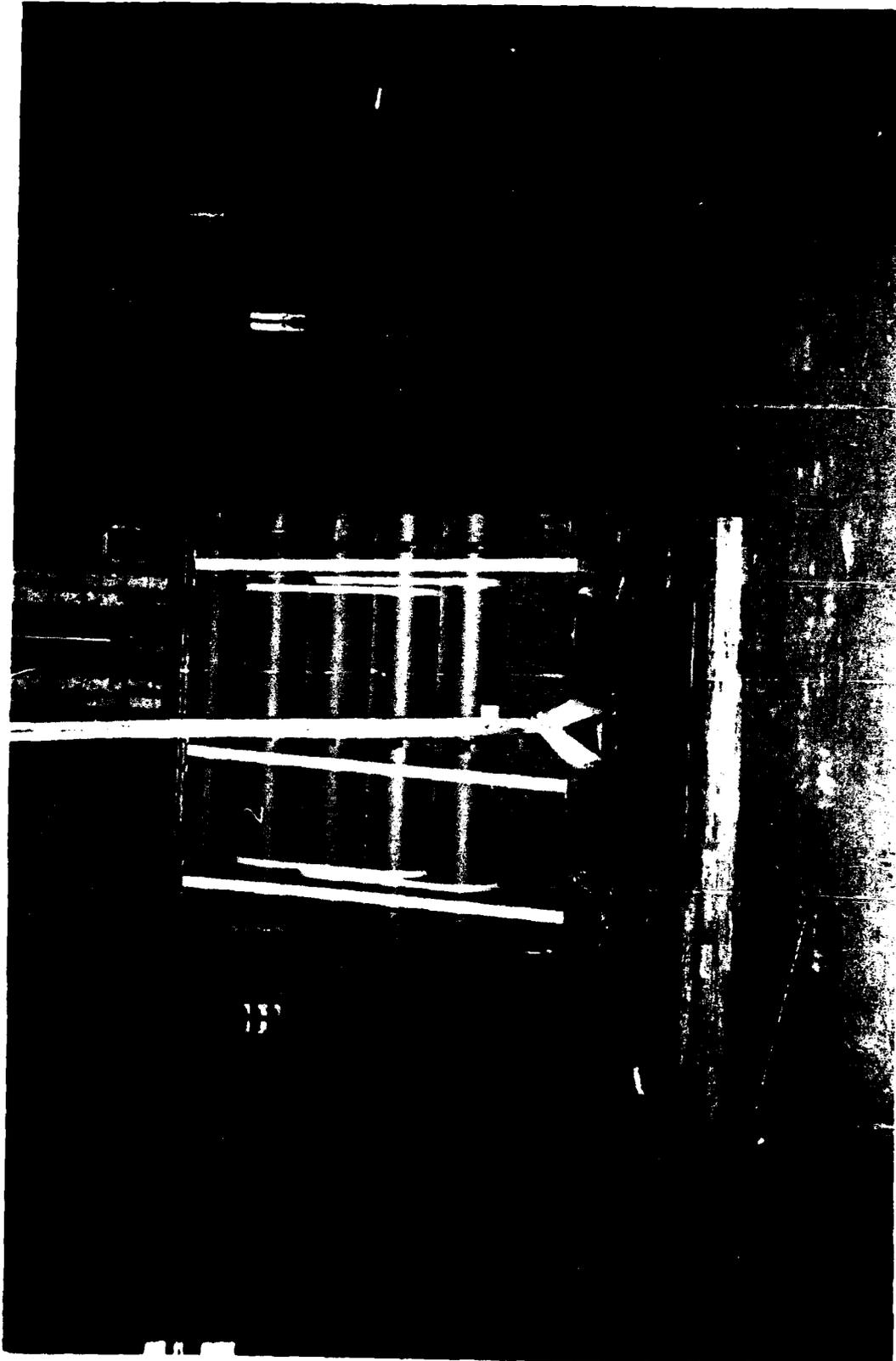
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**Photo No. 1. This photo shows the PA116 Standard Metal Pallet with forklift protector in the Transportation Simulator. Operational speed of the simulator was 20C rpm to produce a 1/16-inch clearance between skids and the tester deck.**



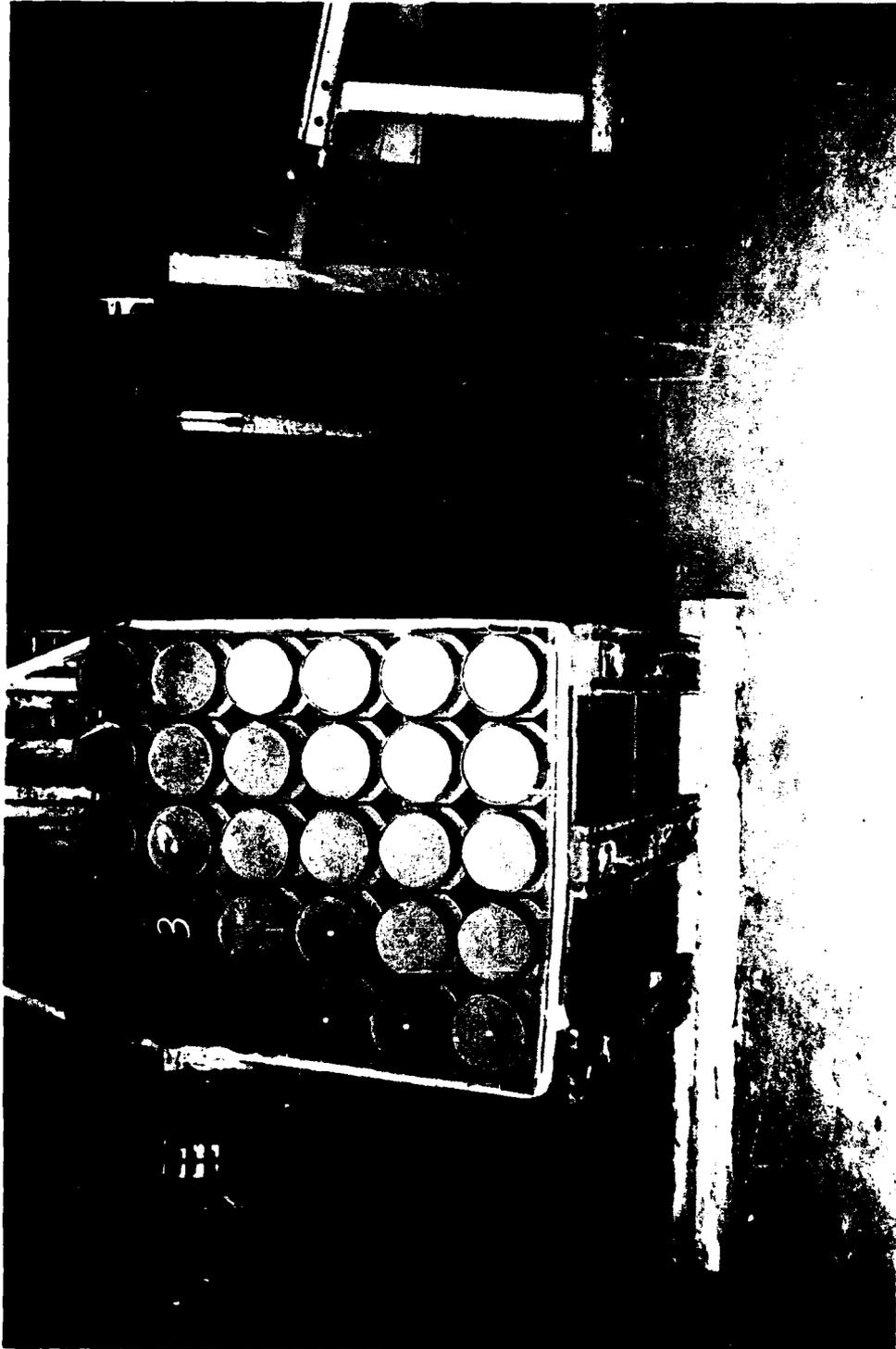
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Photo No. 2. This photo shows the PA116 Standard Metal Pallet with forklift protector positioned for the first edgewise rotational drop test. Drop height is 24 inches.



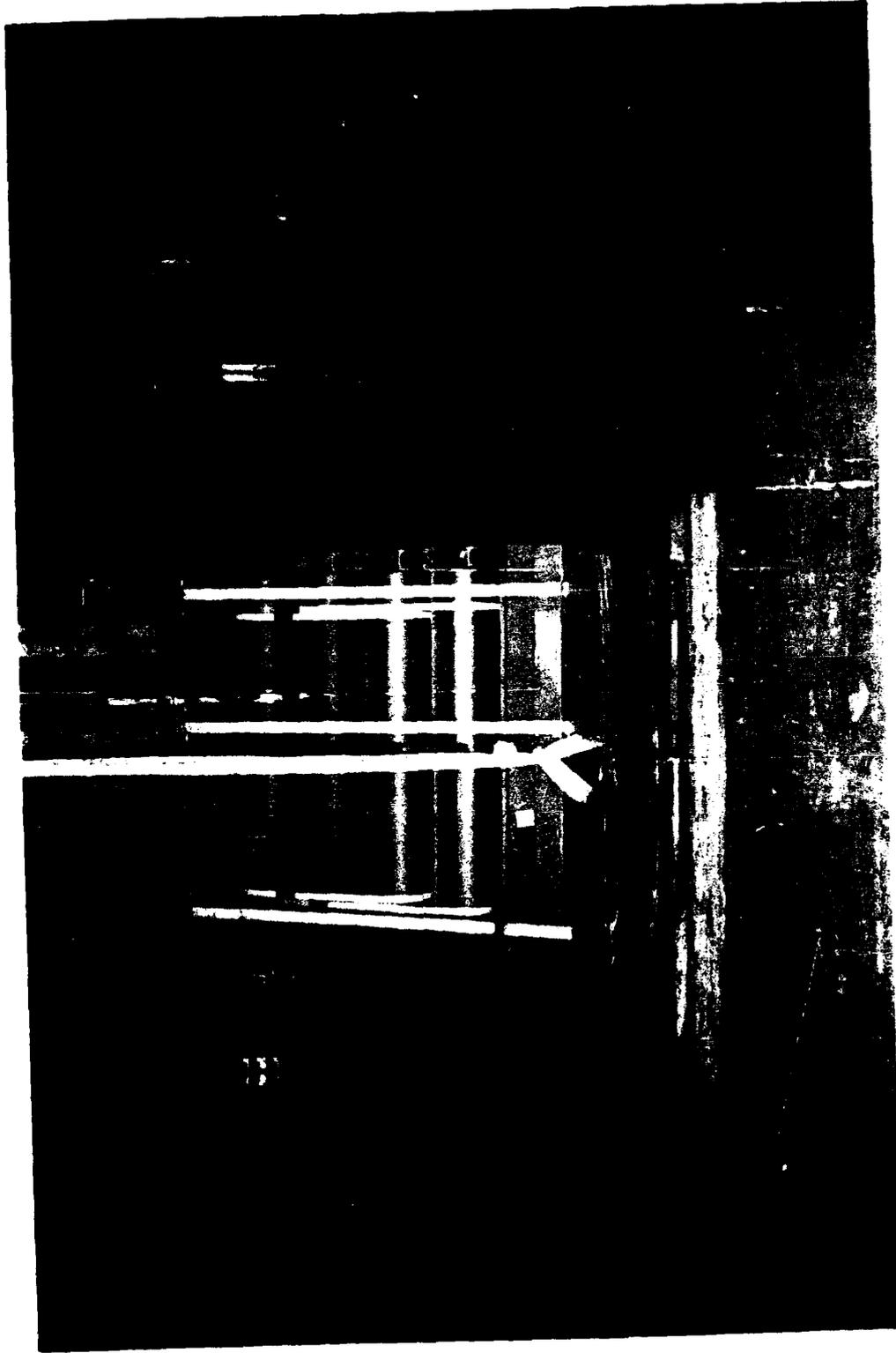
### **DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL**

Photo No. 3. This photo shows the PA116 Standard Metal Pallet with forklift protector positioned for the second edgewise rotational drop test. Note the deformation of the pallet skids on the left. This deformation was caused by the first drop test. Also note that all three outside truss members have been deformed.



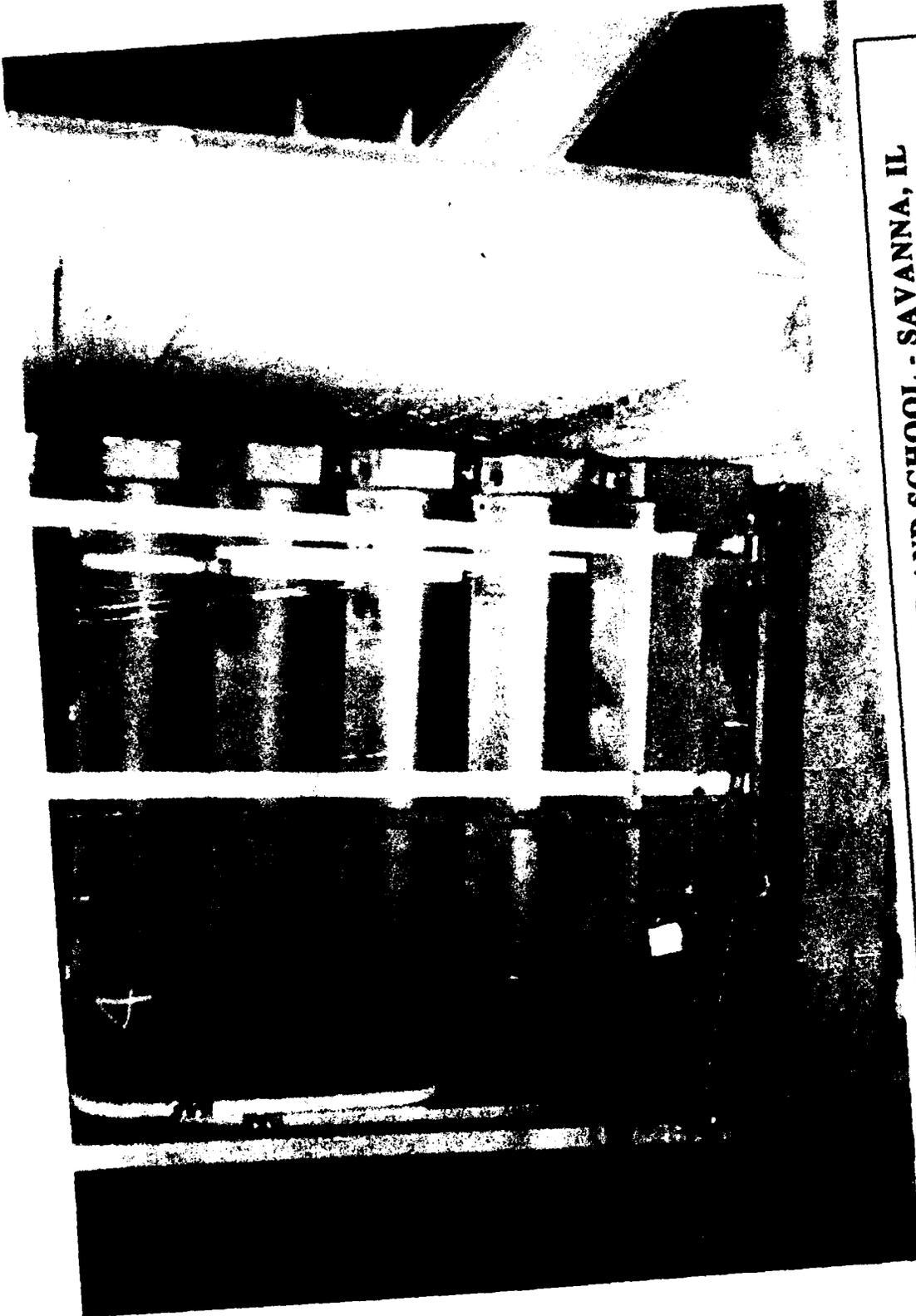
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Photo No. 4. This photo shows the PA116 Standard Metal Pallet with the forklift protector positioned for the third edgewise rotational drop test. Note the skid on the left. It is not in contact with the six-inch beam. The center and right skids are in contact with the beam. Photo 2 shows all three skids in contact with the six-inch beam. The first lateral caused the pallet to deform or warp. This warp allows the pallet to rock side to side.



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Photo No. 5. This photo shows the PA116 Standard Metal Pallet with forklift protector ready for the last rotational drop test. Note damage to skids and truss posts. This damage was caused by the edgewise rotational drop tests. After this test, the pallet deck sustained additional bending.



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**Photo No. 6. This photo shows the PA 116 Standard Metal Pallet with forklift protector after the first inclined impact test.**



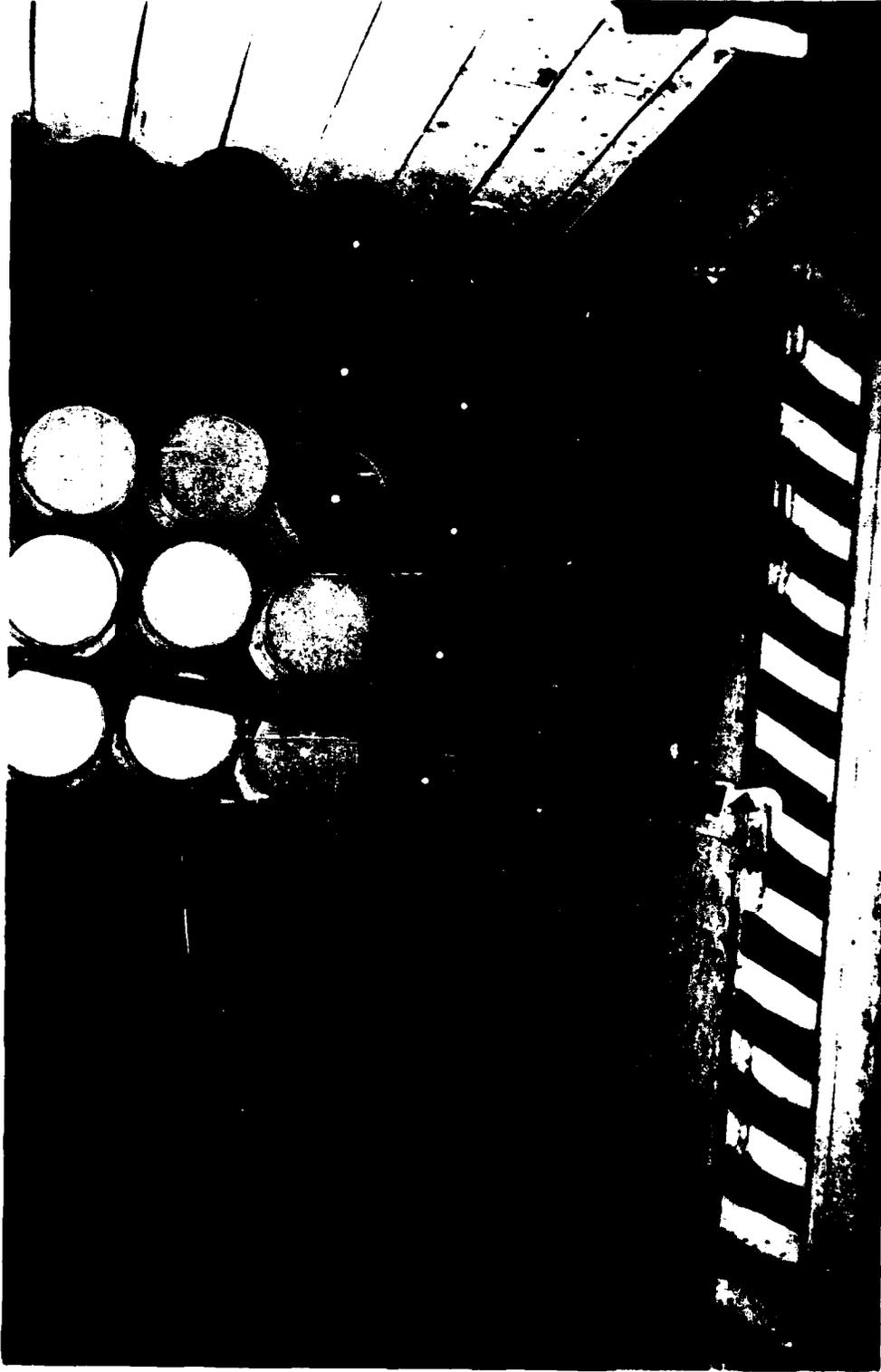
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**Photo No. 7. This photo shows the PA 116 Standard Metal Pallet with forklift protectors after the second inclined impact. Note gap between the bottom row of containers and the pallet adapter. Also note upper pallet skewing as compared to the skid and deformation of the forklift protector on the side of impact.**



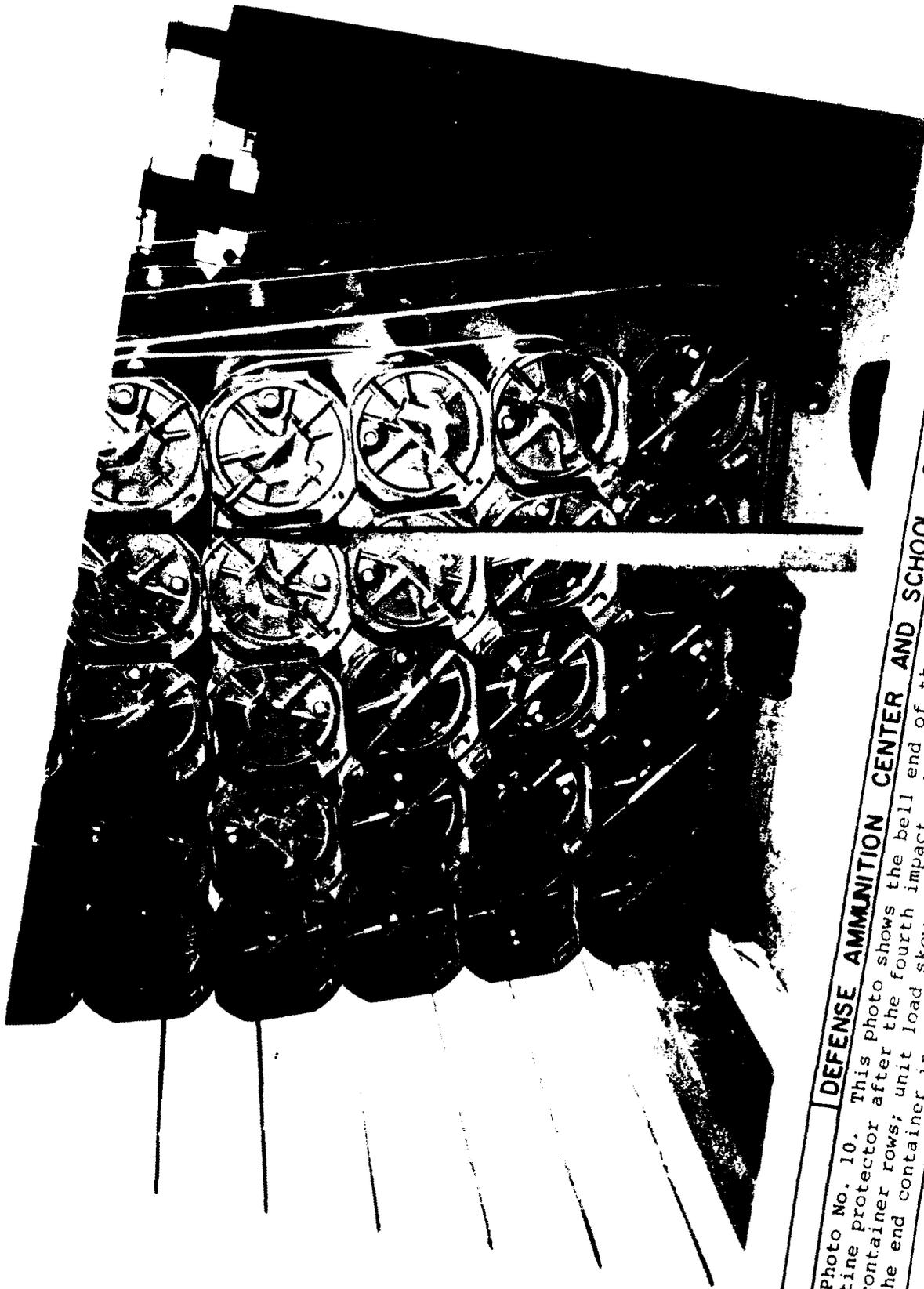
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Photo No. 8. This photo shows the PA116 Standard Metal Pallet with forklift protector after the third inclined impact.



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Photo No. 9. This photo shows the PA116 Standard Metal Pallet with forklift protector after the fourth and last inclined impact. Note: Disengagement of the two container rows from container interlocks; load skew from top to bottom; damage to the forklift protector on the right; and increased displacement of the bottom row of containers and the left forklift protector.



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Photo No. 10. This photo shows the bell end of the PALL6 Standard Metal Pallet with forktine protector after the fourth impact. Note: Interlock disengagement in the top two container rows; unit load skew; damage to the forktine protectors; and disengagement of the end container in the second row.

PART 8

DRAWINGS

PART 8  
PALLET ASSEMBLY DRAWINGS

IDENTIFICATION NUMBER	DRAWING SIZE	DOCUMENT NUMBER	SHEET NUMBER	REV	NOMENCLATURE
28620	C	AC200000423	1 OF 1	A	CHEMICAL AGENT RESISTANT COATING (CARC) FINISHING REQUIREMENTS FOR METAL PALLETS AND/OR PALLET ADAPTORS
28620	D	AC200000427	1 OF 1		STIFFENER - PALLET, SHEET METAL
28620	D	AC200000428	1 OF 1	A	SKID-PALLET, SHEET METAL
28620	D	AC200000429	1 OF 1	A	POST-PALLET, SHEET METAL
28620	D	AC200000430	1 OF 1	A	DECK-PALLET, STANDARD SIZE 44 X 40 SHEET METAL
28620	D	AC200000431	1 OF 1	A	PALLET-STANDARD SIZE 44 X 40 SHEET METAL
28620	C	AC200000448	1 OF 1		LUG-STACKING, METAL PALLET
28620	C	AC200000453	1 OF 1		LUG-ALIGNING, METAL PALLET
28620	D	AC200000460	1 OF 1		BOW-STRAPING, METAL PALLET
28620	D	AC200000462	1 OF 1		RAIL, TOP LIFTING FRAME METAL PALLET
28620	D	AC200000463	1 OF 1		SHIM-TOP LIFTING FRAME, METAL PALLET
28620	D	AC200000464	1 OF 1		STIFFENER, SQUARE BELL, METAL PALLET ADAPTER
28620	D	AC200000465	1 OF 1		STIFFENER, FRONT BELL, METAL PALLET ADAPTER
28620	D	AC200000466	1 OF 1		RAIL, BOTTOM METAL PALLET ADAPTER
28620	C	AC200000468	1 OF 1		RING-LIFTING, METAL PALLET
28620	F	AC200000469	1 OF 1		TOP ASSEMBLY-PALLET ADAPTER, P116 CONTAINER
28620	D	AC200000470	1 OF 1		BOTTOM ASSEMBLY-PALLET ADAPTER, P116 CONTAINER
28620	F	AC200000501	1 OF 1		ADAPTER-PALLET, P116 CONTAINER
28620	C	AC200000501	1 OF 1		PALLET P116 CONTAINER (150 METRIC)
		ANSI Y14.5-82			DIMENSIONING AND TOLERANCING
		ASTM A36			SPECIFICATIONS FOR STRUCTURAL STEEL
		ASTM A306			STEEL, SHEET, CARBON, COLD ROLLED, COMMERCIAL QUALITY
		ASTM A568			STEEL, SHEET, CARBON, AND HIGH STRENGTH, LOW ALLOY, HOT ROLLED, AND COLD ROLLED
		ASTM A569			STEEL, CARBON (0.15 MAXIMUM, PERCENT) HOT ROLLED, SHEET AND STRIP, COMMERCIAL QUALITY
		AWS A2.4-86			STANDARD SYMBOLS FOR WELDING, BRAZING AND NONDESTRUCTIVE EXAMINATION
		FKD-STD-595			COLORS
		MIL-A-2550			AMMUNITION, GENERAL SPECIFICATIONS FOR COATING, ALIPHATIC POLYURETHANE, CHEMICAL AGENT RESISTANT
		MIL-C-46168			COATING, ALIPHATIC POLYURETHANE, SINGLE COMPONENT CHEMICAL AGENT RESISTANT
		MIL-C-53039			FINISHING OF METAL AND WOOD SURFACES
		MIL-STD-171			ARC WELDING PROCEDURES FOR CONSTRUCTIONAL STEELS
		MIL-STD-1261			TREATMENT AND PAINTING OF MATERIAL
		MIL-T-704			PRIMER COATING, EPOXY
		MIL-P-52192			

PART 8  
PALLET ASSEMBLY DRAWINGS (CONT.)

IDENTIFICATION NUMBER	DRAWING SIZE	DOCUMENT NUMBER	SHEET NUMBER	REV	NOMENCLATURE
		MIL-P-53022			PRIMER, EPOXY COATING, CORROSION INHIBITING, LEAD AND CHROMATE FREE
		MIL-P-53030			PRIMER COATING, EPOXY, WATER REDUCIBLE, LEAD AND CHROMATE FREE
		MIL-W-52574			WELDING PROCESS AND WELDING PROCEDURE REQUIREMENTS FOR MANUFACTURE OF EQUIPMENT UTILIZING STEELS
		TT-C-490			CLEANING METHODS FOR FERROUS SURFACES AND PRETREATMENTS FOR ORGANIC COATINGS
		TT-P-636			PRIMER COATING, ALKYD, WOOD AND FERROUS METAL
		TT-P-664			PRIMER COATING, SYNTHETIC, RUST-INHIBITING, LACQUER RESISTING
		TT-P-1757			PRIMER COATING, ZINC CHROMATE, LOW MOISTURE SENSITIVITY

1. DETAIL REQUIREMENTS FOR SURFACE PREPARATION (CLEANING AND PRETREATMENT) TO BARE METAL PRIOR TO PRIMING AND PAINTING.

- 1.1 ALL SURFACES SHALL BE THOROUGHLY CLEANED SUCH THAT THE BARE METAL SURFACES ARE FREE FROM OIL, GREASE, DIRT, SCALE, RUST, FOREIGN MATTER AND WELD SPATTER. THE CLEANING METHOD SHALL BE IN ACCORDANCE WITH ANY METHOD IN TABLE IV OF MIL-STD-171 OR AS SPECIFIED IN PARAGRAPH 3.1 OF MIL-T-704. PARTICULAR CARE MUST BE TAKEN TO REMOVE WELD SLAG AND WELD SPATTER FROM WELDS AND ADJACENT AREAS.
- 1.2 IMMEDIATELY AFTER CLEANING, ANY SOLVENTS OR MOISTURE SHALL BE COMPLETELY REMOVED. THESE CLEAN DRY SURFACES SHALL THEN HAVE A PRETREATMENT APPLIED IN ACCORDANCE WITH MIL-STD-171. FOR STEEL SUBSTRATES THE PRETREATMENTS TO USE ARE ZINC PHOSPHATE, FINISH NO. 5.1.1 OR IRON PHOSPHATE, FINISH NO. 5.1.2 OR WASH PRIMER, FINISH NO. 5.2.
- 1.3 IMMEDIATELY PRIOR TO PRIMING, ALL SURFACES WHICH HAVE BEEN CLEANED AND PRETREATED IN ACCORDANCE WITH PARAGRAPH 1.1 AND 1.2 SHALL BE CHECKED FOR THOROUGH CLEANLINESS. ANY ACCUMULATION OF OIL, GREASE, DIRT, RESIDUES FROM THE CLEANING PROCESS OR ANY FOREIGN MATERIAL SHALL BE COMPLETELY REMOVED. THE USE OF SOLVENTS MEETING THE REQUIREMENTS OF TABLE IV, FINISH NO. 4.3 OF MIL-STD-171 IS ACCEPTABLE. THE COMPLETE DRYING OF ANY SOLVENTS OR MOISTURE IS ESSENTIAL.

2. DETAIL REQUIREMENTS FOR APPLICATION OF ANTI-CORROSIVE PRIMER PAINT.

- 2.1 PRIMER SHALL BE APPLIED ON ALL SURFACES IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND PARAGRAPH 5.2.1 OF MIL-STD-171 (EXCEPT THAT WHEN ACCELERATED DRYING IS EMPLOYED, OVEN TEMPERATURE IS NOT TO EXCEED 200° F.). THE PREFERRED PRIMER FOR FERROUS SURFACES IS MIL-P-52197; HOWEVER, MIL-P-52022 AND MIL-P-53020 MAY BE USED AS A SUBSTITUTE FOR MIL-P-52197.
- 2.2 ONE COAT OF PRIMER SHALL BE APPLIED AS PROMPTLY AS POSSIBLE AFTER THE SURFACES HAVE BEEN PREPARED AND CLEARED BY THE AFOREMENTIONED PROCEDURES. ALL EPOXY PRIMERS SHALL BE PROPERLY DRIED BEFORE TOPCOATING, PRIMER DRY FILM THICKNESS SHALL BE .0008 TO .0038 INCHES (.0203 TO .0965 MM).
- 2.3 DETAIL REQUIREMENTS FOR APPLICATION OF POLYURETHANE TOPCOAT PAINT.

- 3.1 TOPCOAT SHALL BE APPLIED ON EXTERIOR SURFACES ONLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS OR PARAGRAPH 5.2.1 OF MIL-STD-171. UNLESS OTHERWISE SPECIFIED, THE TOPCOAT COLOR SHALL BE GREEN NO. 383 IN ACCORDANCE WITH MIL-C-48188 OR MIL-C-53039.
- 3.2 TOPCOAT DRY FILM THICKNESS OF MIL-C-48188 AND MIL-C-53039 SHALL BE .0018 TO .0098 INCHES (.0457 TO .2500 MM) TOTAL APPLIED IN TWO COATS, THE SECOND COAT MAY BE APPLIED AFTER 15 MINUTES OF THE FIRST AT 75° F. OR ANY TIME THEREAFTER. THERE IS NO MAXIMUM TIME PERIOD LIMIT BETWEEN APPLICATION OF THE FIRST AND SECOND COATS AND NO SURFACE PREPARATION, EXCEPT FOR CLEANING, IS NECESSARY EVEN IF THE SECOND COAT IS NOT APPLIED DIRECTLY AFTER THE FIRST.

- 4. DETAIL REQUIREMENTS FOR APPLICATION TO PREVIOUSLY PAINTED SUBSTRATES.
  - 4.1 ALL PREVIOUSLY PAINTED SURFACES MUST BE CLEAN AND FREE FROM RUST. WHERE RUST EXISTS, MECHANICAL CLEANING IN ACCORDANCE WITH FINISH NO. 4.1 OF MIL-STD-171 (WHERE RUST IS ACCEPTABLE) SHALL BE PERFORMED UNTIL BRIGHT METAL IS EXPOSED. ONE COAT OF POLYURETHANE PAINT PER MIL-C-48188 OR MIL-C-53039 CAN BE APPLIED DIRECTLY OVER EXISTING ENAMEL OR POLYURETHANE COATINGS WITHOUT ANY ADDITIONAL SURFACE PREPARATION EXCEPT CLEANING. IF THE SURFACE IS BROKEN DOWN TO THE SUBSTRATE THAT AREA MUST BE CLEANED, PRETREATED, PRIMED AND TOPCOATED PER PARAGRAPH 1 THROUGH 3. THE POLYURETHANE COATING SHALL NOT HOWEVER, BE DIRECTLY APPLIED OVER LACQUER. THE LACQUER MUST BE REMOVED DOWN TO THE BARE METAL BEFORE POLYURETHANE COATING IS APPLIED PER PARAGRAPHS 1 THROUGH 3.

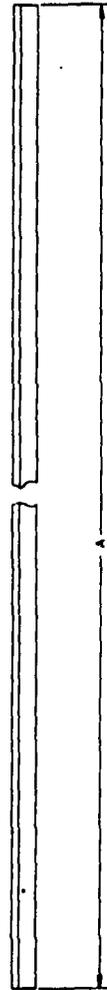
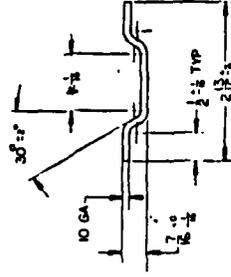
(CONTINUED AT RIGHT)

4. DETAIL REQUIREMENTS FOR APPLICATION TO PREVIOUSLY PAINTED SUBSTRATES (CONTINUED).

- 4.2 WHERE VENDOR PARTS ARE SUPPLIED TO THE PRIME ORIGINAL EQUIPMENT MANUFACTURER (OEM) ALREADY ENAMEL PAINTED, THE PRIME OEM WILL HAVE TO REPAINT PER PARAGRAPH 4.1 BY APPLYING DIRECTLY OVER THE EXISTING ENAMEL COATING. IF THE VENDOR PARTS ARRIVE JUST ENAMEL PRIMED (WHICH IS PREFERRED), WITH SPECIFICATION PRIMERS SUCH AS IT-P-1757, IT-P-464 OR IT-P-434 THEN THE POLYURETHANE PAINT PER PARAGRAPH 4.1 WILL BE APPLIED DIRECTLY OVER PRIMED SURFACES. IF THE ENAMELS ON THE VENDOR PARTS ARE OF A COMMERCIAL OR UNKNOWN TYPE THEY MUST BE TESTED BEFORE THE POLYURETHANE CAN BE APPLIED. THIS ENTAILS APPLYING POLYURETHANE PAINT TO A SMALL AREA OF THE PART AND OBSERVING FOR A PERIOD OF 15 MINUTES FOR ANY DEFECTS SUCH AS BUBBLING, DELAMINATION OR BLEEDING. IF NONE ARE OBSERVED, THE REMAINDER OF THE PARTS CAN BE PAINTED. IF THERE IS A DEFECT, THE PARTS MUST BE CLEANED, RETREATED, PRIMED AND TOPCOATED AS PREVIOUSLY DESCRIBED FOR BARE SUBSTRATES IN PARAGRAPH 1 THROUGH 3.
- 5. TESTING.
  - 5.1 PALLET AND/OR ADAPTERS FINISHED IN ACCORDANCE WITH PARAGRAPH 2.3, AND 4 AS APPLICABLE SHALL BE TESTED FOR PAINT ADHESION USING ACTUAL PRODUCTION ITEMS.
  - 5.2 THE PRIMER AND TOPCOAT SHALL BE ADHESION TESTED IN ACCORDANCE WITH PARAGRAPH 4.2.8 OF IT-C-190.

DATE: 9 MAY 86 OFFICER: [Signature] SPECIALIST: [Signature] SER. [Signature] SGT. [Signature] SGT. [Signature] SGT. [Signature]		US ARMY ARMAMENT, MUNITIONS & CHEMICAL COMMAND AMMUNITION SUPPORT EQUIPMENT	
MILITARY DIVISION WITH WHICH ASSIGNED: [Blank] GRADE: [Blank] BRANCH: [Blank] ADDRESS: [Blank]		CHEMICAL AGENT RESISTANT COATING (CARC) FINISHING REQUIREMENTS FOR METAL PALLETTS AND/OR PALLET ADAPTERS	
PART NO: 28820 QUANTITY: NONE		AC200000423	
APPLICATION		SHEET 1 OF 1	

REVISED

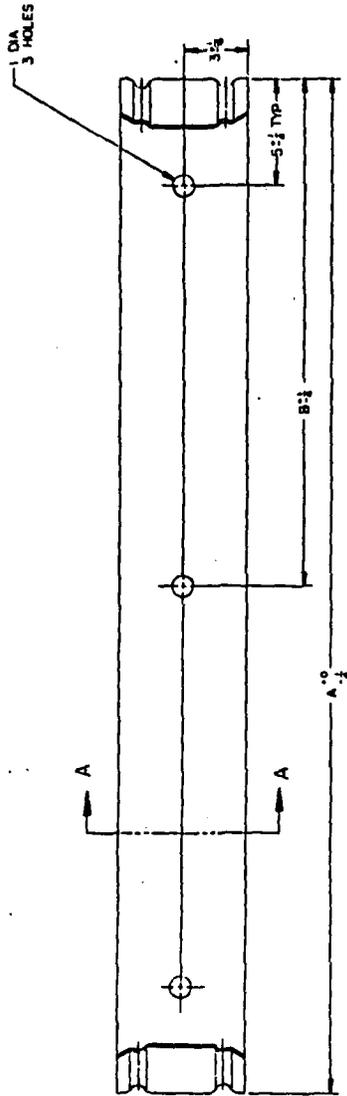


DASH NO.	A
-1	34:1
-2	28:1
-3	36:1

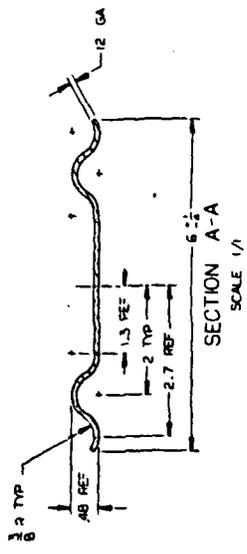
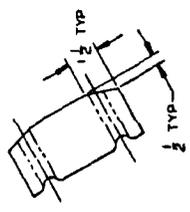
NOTES:  
 1. BEND RADIUS 1/8 INCH MAXIMUM, WHERE NOT NOTED  
 2. MATERIAL SHEET SAE OR ANSI 1010, STEEL CARBON  
 3. COLD OR HOT ROLLED, PER ASTM A568 (ASTM A366 OR A569)  
 4. ALL DIMENSIONS ARE IN INCHES

DATE: 21 NOV 56	ARMAMENT, MATERIALS CHEMICAL COMMUNIC
BY: [Signature]	STIFFENER -
DESCRIPTION: [Signature]	PALLET, SHEET METAL
PROJECT: [Signature]	D 28820 AC200000427
APPLICATION	

REVISION  
 A 1. CHANGED DIMENSION  
 2. ADD NOTE



DASH NO.	A	B
-1	34	22
-2	45 1/2	22 1/2
-3	48	24
-4	53	26 1/2



HIDDEN LINES OMITTED FOR CLARITY  
 SCALE 3/8

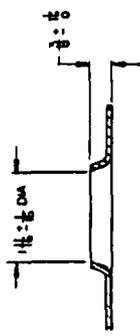
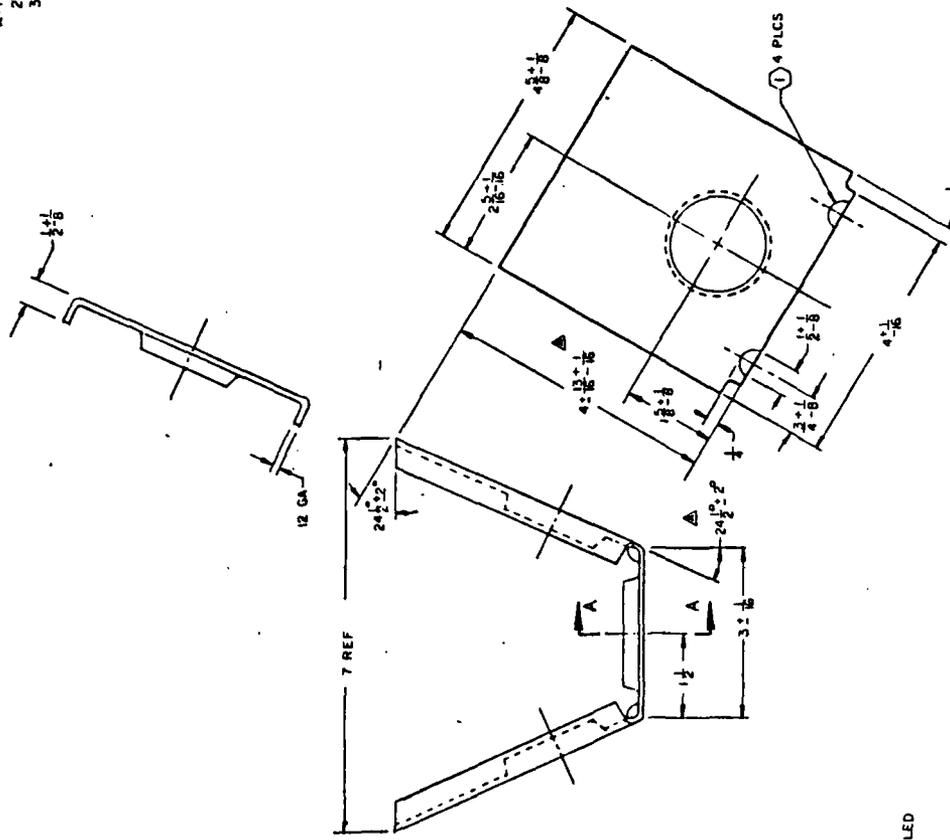
- NOTES:  
 1 BEND RADIUS NOTED  
 2 MATERIAL: 304 SS OR ANS/1010 STEEL, CARBON COLD ROLLED OR HOT ROLLED, PER ASTM A568 (ASTM A366 OR A569)  
 3 ALL DIMENSIONS ARE IN INCHES  
 4 DISTORTION IN THE BEND IS PERMISSIBLE

DATE	28 NOV 86	ARMAMENT, MUNITIONS & CHEMICAL COMMAND
BY	SP-10/10/10	
CHKD	SP-10/10/10	
APP'D	<i>[Signature]</i>	
DESCRIPTION	SKID	
DWG NO.	28820	
REV	AS NOTED	
ISSUE NO.	1	
ISSUE DATE		
ISSUE BY		
ISSUE FOR		
APPLICATION		

REVISION

NO.	DATE	DESCRIPTION
1		CHANGED DIMENSION
2		CHANGED ANGLE
3		ADDED REINFORCEMENT
		DIMPLE DETAIL AND NOTE

1 CHANGED DIMENSION  
 2 CHANGED ANGLE  
 3 ADDED REINFORCEMENT  
 DIMPLE DETAIL AND NOTE



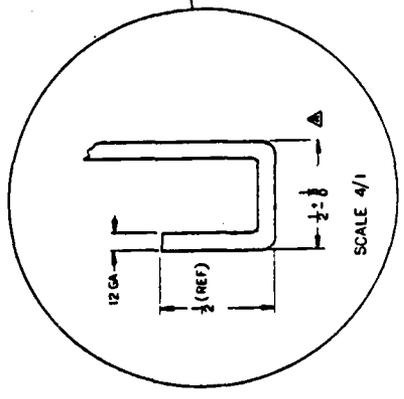
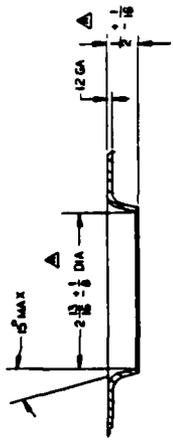
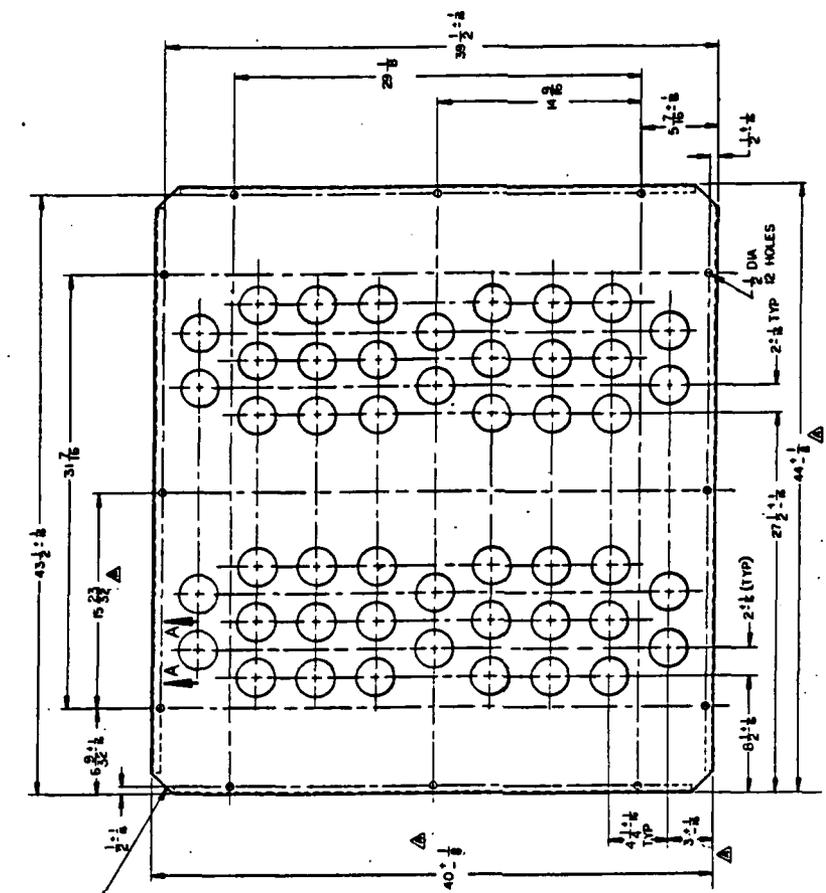
SECTION A-A

- NOTES:
1. BEND RADIUS 1/8 MAX. WHERE NOT NOTED
  2. MATERIAL: SHT SAE OR ANSII 100 STEEL, CARBON, COLD ROLLED OR HOT ROLLED, PER ASTM A366 (ASTM A366 OR A569)
  3. ALL DIMENSIONS ARE IN INCHES
  4. REINFORCEMENT DIMPLE

REV	DATE	DESCRIPTION
1		REVISED
2		REVISED
3		REVISED
4		REVISED
5		REVISED
6		REVISED
7		REVISED
8		REVISED
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19		REVISED
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100		REVISED

ARMAMENT, MATERIALS & CHEMICAL COMMAND  
 PCST-PALLET,  
 SHEET METAL  
 D 28820 AC200000429

REVISION  
 1. CHANGED TOLERANCE CALLOUT  
 2. CHANGED DIMENSION



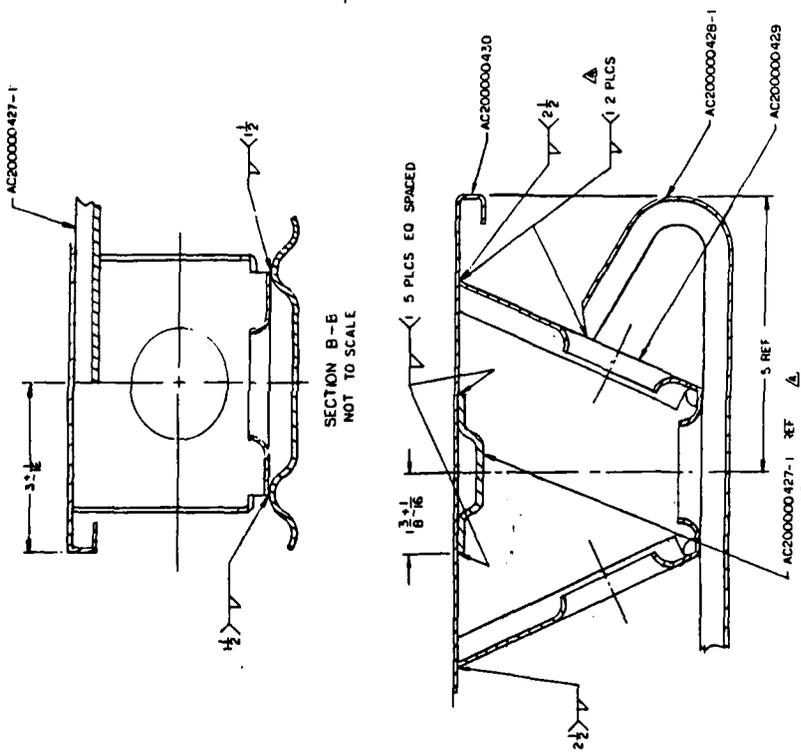
- NOTES:
1. BEND RADI 1/8 IN MAX WHERE NOT NOTED
  2. MATERIAL: SHT SAE OR ANSI 100 STEEL, CARBON COLD ROLLED OR HOT ROLLED, PER ASTM A568 (ASTM A366 OR A569)
  3. ALL DIMENSIONS ARE IN INCHES

DATE: 21 NOV 86		DRAWN BY: [Signature]	
CHECKED BY: [Signature]		APPROVED BY: [Signature]	
1. ALL DIMENSIONS ARE IN UNLESS OTHERWISE SPECIFIED 2. ALL DIMENSIONS ARE IN INCHES 3. ALL DIMENSIONS ARE IN INCHES			
APPLICATION			
ARMAINT, MAINTENANCE & CHEMICAL COMMAND LABORATORY SUPPORT EQUIPMENT DECK-PALLET, STANDARD SIZE 44 X 40, SHEET METAL			
ITEM NO:	AC200000430	REV:	7/4
D:	28620	DATE:	11/81

REVISION

NO.	DATE	DESCRIPTION
1		AS DRAWN

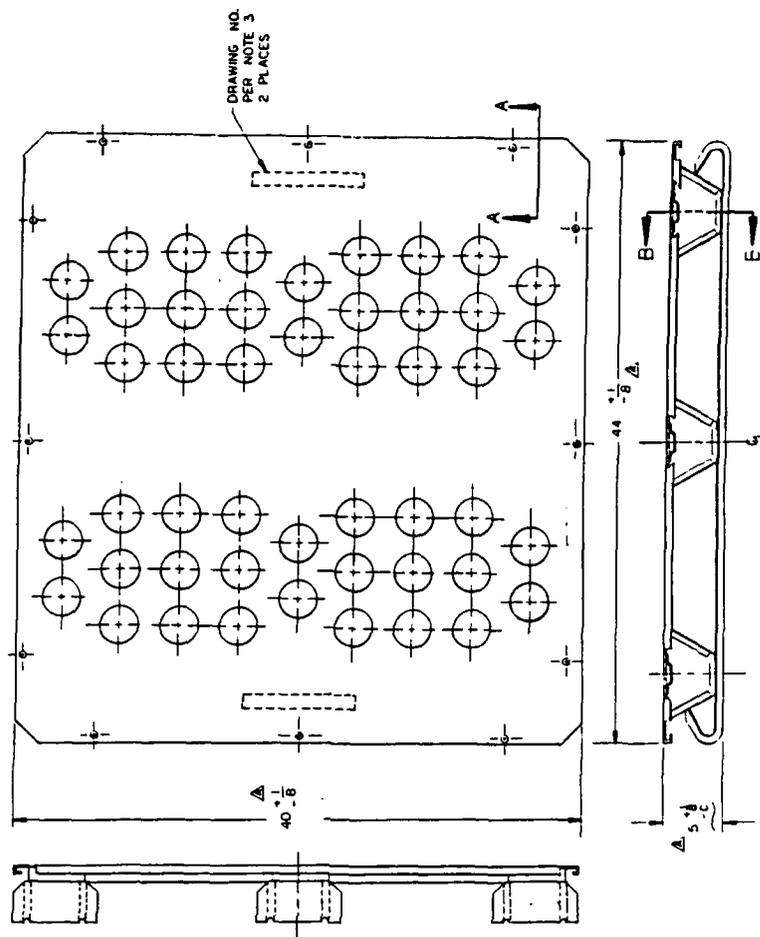
A 1. REDRAW DETAIL  
 2. ADD LENGTHS TO WELD CALLOUTS  
 3. CHANGED DIMENSION  
 4. CHANGED TOLERANCE



SECTION B-B  
NOT TO SCALE

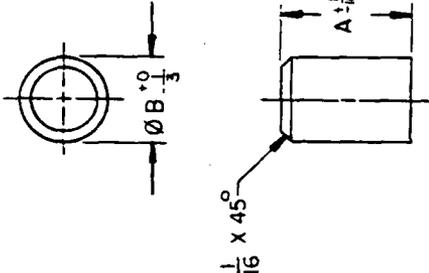
SECTION A-A  
SCALE 1/1

- NOTES:
1. SPEC MIL-A-2550 AMERICAN WELDING SOCIETY STD. A 2.4-49 ASTM Y 14.5 B2 APPLY
  2. PROTECTIVE FINISH SHALL BE IN ACCORDANCE WITH DWG AC200000423  
 COLOR SHALL BE GREEN NO. 363 PER MIL. C-4616B (FED STD 555, NO. 34096)
  3. MARKING SHALL BE IN ACCORDANCE WITH DWG AC200000423  
 COLOR SHALL BE WHITE NO. 37875 1/4 INCH HIGH LETTERS



DATE	14 NOV 68	BY	J. R. [Signature]
DESIGNED BY		CHECKED BY	
DRAWN BY		APPROVED BY	
SCALE			
APPLICATION			
ARMAMENT, MUNITIONS & CHEMICAL COMMAND Pallet - STANDARD SIZE 44 X 40 SHEET METAL			
DWG NO.	28820	REV.	AC200000431

REVISION		DATE	APPROVED

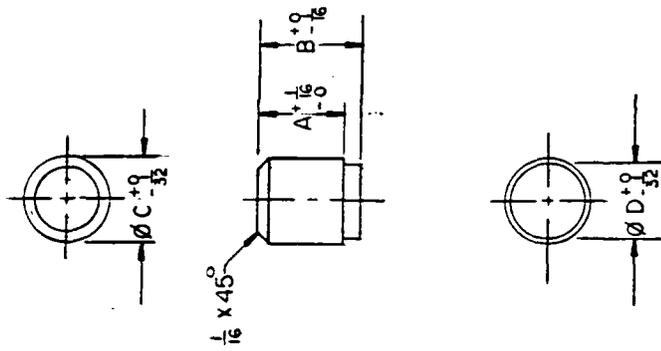


DASH NO.	A	B
-1	.75	.50
-2	.75	.43
-3	.75	.37
-4	.75	.31

- NOTES:
- SPEC ANSI Y14.5M-62 APPLY.
  - MATERIAL: STEEL, MEDIUM CARBON, HOT ROLL, PER ASTM A36.
  - ALL DIMENSIONS ARE IN INCHES.

UNLESS OTHERWISE NOTED DIMENSIONS ARE IN INCHES		DATE 6-5-87		U.S. ARMY ARMAMENT, MUNITIONS & CHEMICAL COMMAND AMMUNITION SUPPORT EQUIPMENT	
DESIGN	ENTERED	DATE	BY	LUG- STACKING, METAL PALLET	
MM	PL	6-5-87	W. J. [Signature]	ITEM	2/1
DRAWN BY [Signature]		CHECKED BY [Signature]		QTY	28620
OFFICE: [Signature]		OFFICE: [Signature]		UNIT	AC200000448
OFFICIAL: [Signature]		OFFICIAL: [Signature]		PAGE 1 OF 1	
APPLICATION					

REVISION		DATE	APPROVED

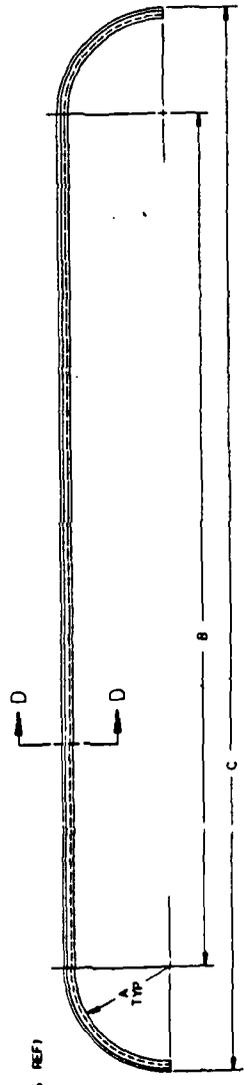
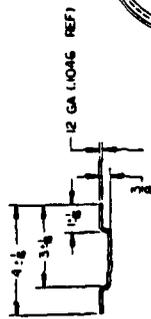
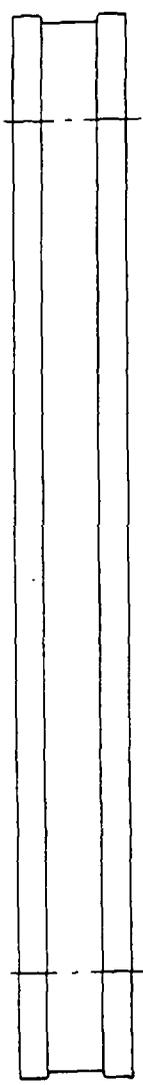


DASH NO.	A	B	C	D
-1	.50	.59	.50	.43
-2	.50	.59	.43	.37
-3	.50	.59	.37	.31
-4	.50	.59	.31	.25

- NOTES
1. SPEC ANSI Y14.5M-82 APPLY.
  2. MATERIAL: STEEL, MEDIUM CARBON, HOT ROLL, PER ASTM A36
  3. ALL DIMENSIONS ARE IN INCHES.

DASH NO. 6-5-87 DATE 3/1/87 DRAWN BY <i>John X/Syd</i> CHECKED BY <i>John X/Syd</i> APPROVED BY <i>John X/Syd</i> TITLE: LUG - ALIGNING, METAL PALLET PROJECT: AMMUNITION SUPPORT EQUIPMENT		US ARMY ARMAMENT, MUNITIONS & CHEMICAL COMMAND AMMUNITION SUPPORT EQUIPMENT LUG - ALIGNING, METAL PALLET DRAWING NO. AC200000453 SCALE 2/1 SHEET 1 OF 1	
TOLERANCES UNLESS OTHERWISE SPECIFIED: DIMENSIONS IN INCHES: FRACTIONS TO .005 ± 1/16 DECIMALS TO .002 ± .002 ANGLES ± .002		APPLICATION	

REVISION

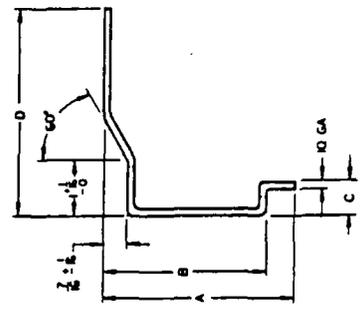
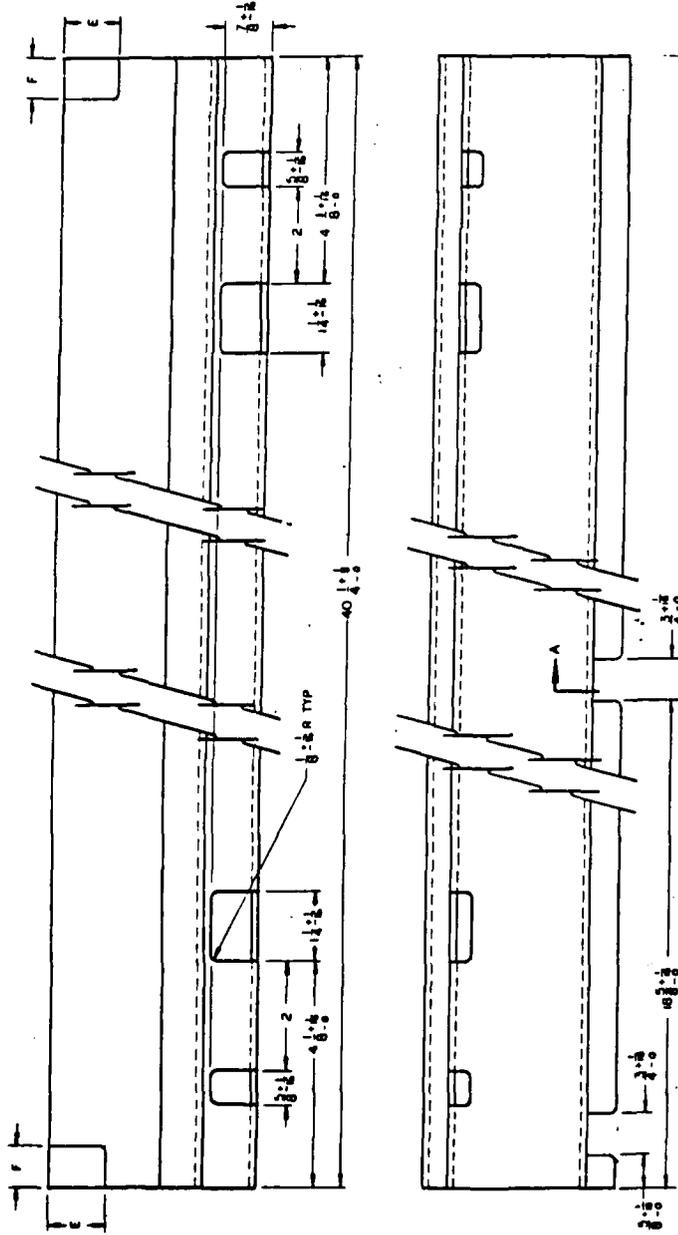


DASH NO.	DIMENSIONS			NEXT ASSEMBLY
	A	B	C	
-1	3 1/8	3 1/8	30 3/8	AC200000469
-2	3 R	3 1/8	4 1/8	AC200000471

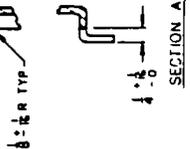
- NOTES:
1. BEND RADIUS: 1/8 INCH MAX. WHERE NOT NOTED.
  2. SPEC ANS: YAS. BOM APPLY.
  3. MATERIAL SHEET SAE OR ANS: 1010 STEEL, CARBON, COLD ROLL OR HOT ROLL, PER ASTM A568.
  4. ALL DIMENSIONS ARE IN INCHES.

6-9-87 MIN. [Signature] [Signature] [Signature]		ARMS, MAINTENANCE & CHEMICAL COMMAND BOW - STRAPING, METAL PALLET
THE PART NO. IS D 28820	THE PART NO. IS AC200000460	THE PART NO. IS 1081
APPLICATION		

REVISION



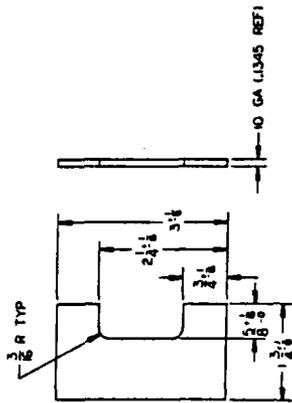
DASH NO.	DIMENSIONS						NEXT ASSEMBLY
	A	B	C	D	E	F	
-1	3 1/8	3	3 1/8	3 1/8	0	0	AC200000469
-2	3 1/8	3	3 1/8	4 1/8	1 1/2	1 1/2	AC200000469



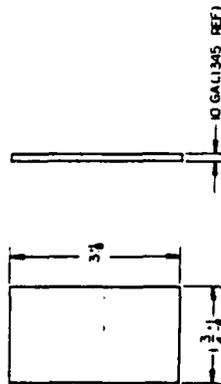
- NOTES:
- BEND RADIUS 1/8-INCH MAXIMUM UNLESS NOTED.
  - SPEC ASSY FIG. 9-92 APPLY.
  - MATERIAL: BENT BAR OR ASSY 1010 STL. GARBOR.
  - ALL DIMENSIONS ARE IN INCHES.

DATE: 6-8-87	BY: [Signature]	FOR: [Signature]	APPROVED: [Signature]
ARMAINT, MAINTENANCE & CHEMICAL COMMAND TOP LIFTING FRAME METAL PALLET			
D	28820	AC200000462	
APPLICATION			

REVISED



- 2



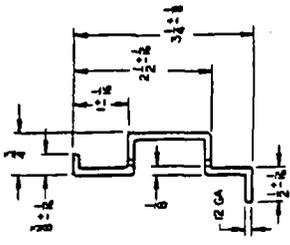
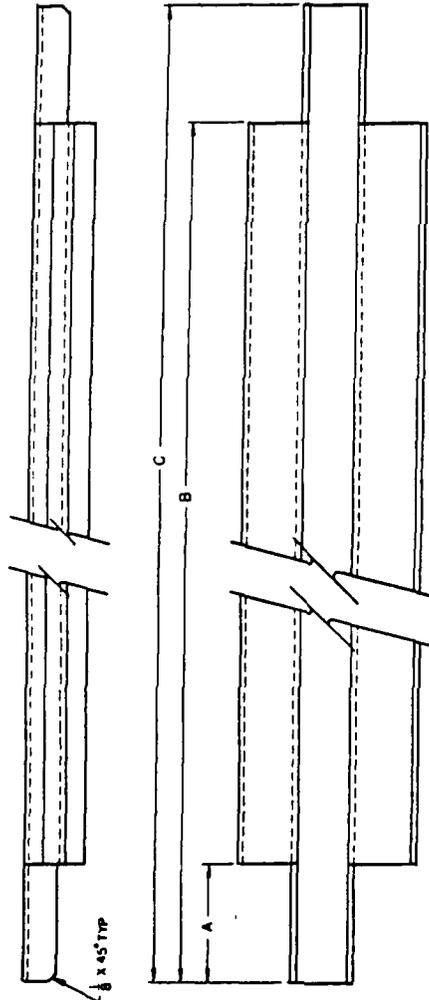
- 1

- NOTES:
1. SPEC ANSI Y14.5 B2M APPLY.
  2. MATERIALS: SHEET SAE OR ANSI 1010 STEEL CARBON, COLD ROLL OR HOT ROLL, PER ASTM A568.
  3. ALL DIMENSIONS ARE IN INCHES.

DATE: 6-5-87		BY: [Signature]	
DRAWN BY: [Signature]		CHECKED BY: [Signature]	
APPROVED BY: [Signature]		DATE: 6-5-87	
PROJECT: SHIM -		DRAWING NO: AC200000463	
DESCRIPTION: TOP LIFTING FRAME, METAL PALLET		SCALE: 1/1	
APPLICATION:		REV: 1 OF 1	



REV	DESCRIPTION	DATE

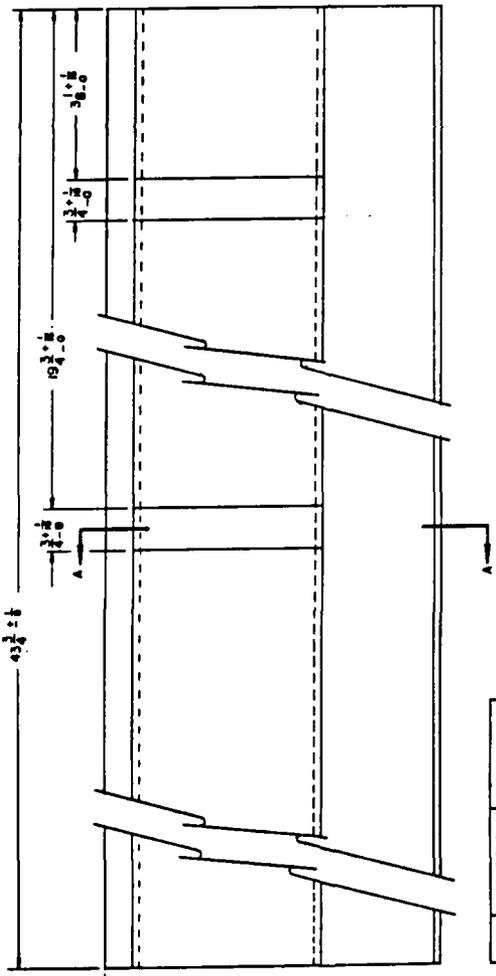
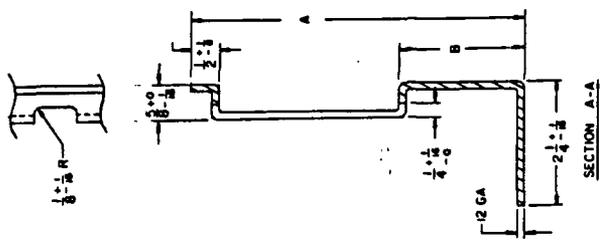


DASH NO.	DIMENSIONS				NEXT ASSEMBLY
	A	B	C	D	
-1	2 1/8	37 1/2	39 5/8	AC200000470	
-2	2 1/8	40 1/2	42 1/2	AC200000472	

- NOTES:
1. BEND RADIUS 1/8-INCH MAXIMUM WHERE NOT NOTED.
  2. SPEC AREA FIG. 8-82 APPL.
  3. COLD ROLL OR HOT ROLL PER ALLOW ASS.
  4. ALL DIMENSIONS ARE IN INCHES.

DATE: 6-8-87 BY: [Signature] CHECKED: [Signature] APPROVED: [Signature]		ARMAMENT, MUNITIONS & CHEMICAL COMMAND INDUSTRIAL SUPPORT DIVISION <b>STIFFENER          FRONT BELL          METAL PALLET ADAPTER</b>
PART NO: 24630 DRAWING NO: AC200000465	SHEET NO: 1 OF: 1	APPLICATION:

REVISION



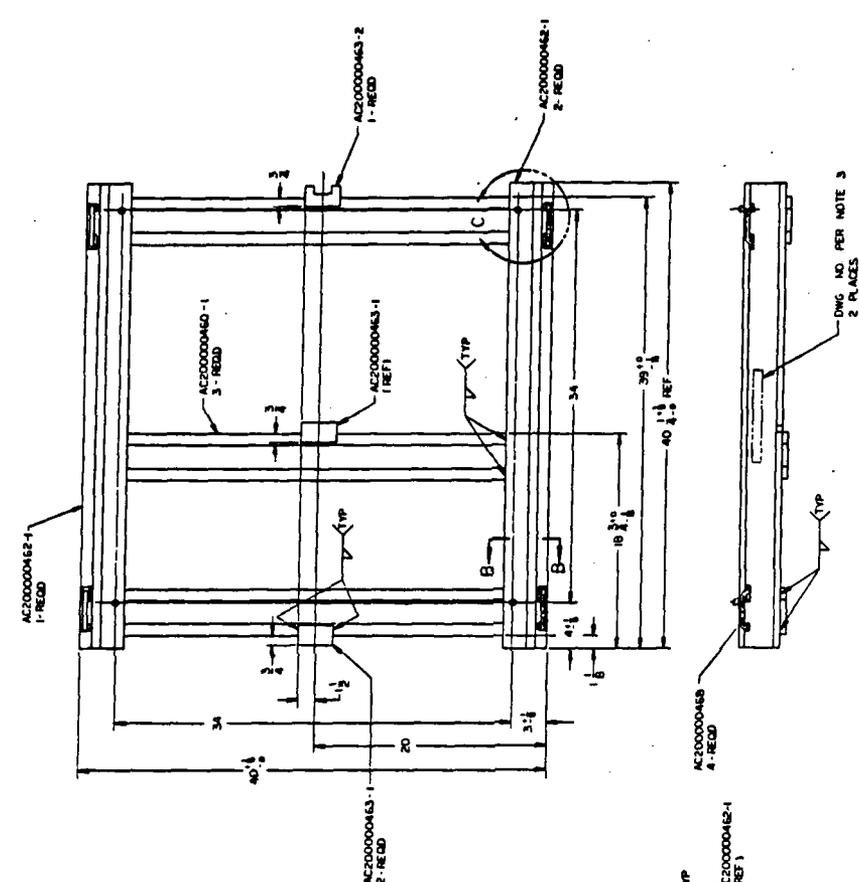
DASH NO.	DIMENSIONS		NEXT ASSEMBLY
	A	B	
-1	6	2 1/4	AC200000470
-2	5 1/8	1 1/8	AL600000472

- NOTES:
1. BEED RADIUS 1/8-INCH MAXIMUM WHERE NOT NOTED.
  2. SPEC ASSY FIG. 8-82 APPLY.
  3. THIS DRAWING IS FOR 1010 REL. CARBON. HOLD BOLL. OR NOT BOLL. PER ASTM ASSY.
  4. ALL DIMENSIONS ARE IN INCHES.

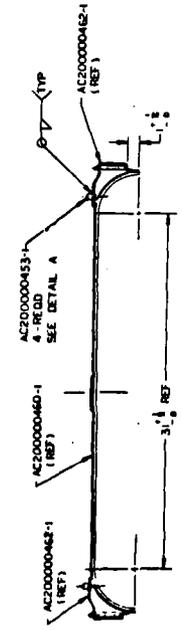
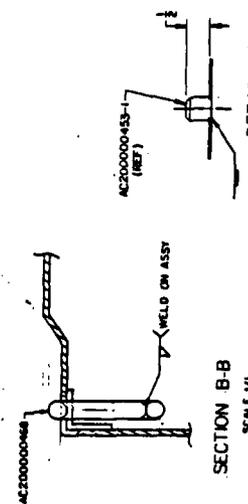
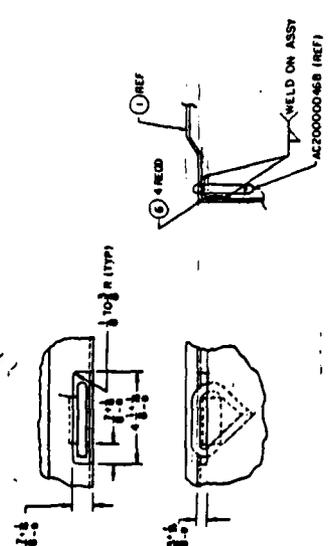
DATE: 7-23-87 DRAWN BY: [Signature] CHECKED BY: [Signature] APPROVED BY: [Signature]	US ARMY ARMAMENT, MUNITIONS & CHEMICAL COMMAND ADMINISTRATION SUPPORT ELEMENT RAIL BOTTOM METAL PALLET ADAPTER D 28820 AC200000466
APPLICATION	PAGE 1 OF 1



REV	DATE	BY	CHKD



DWG NO PER NOTE 3  
2 PLACES



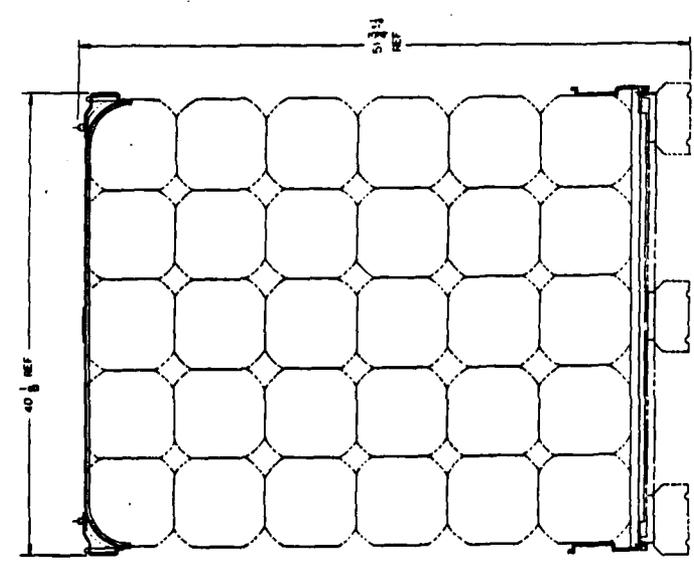
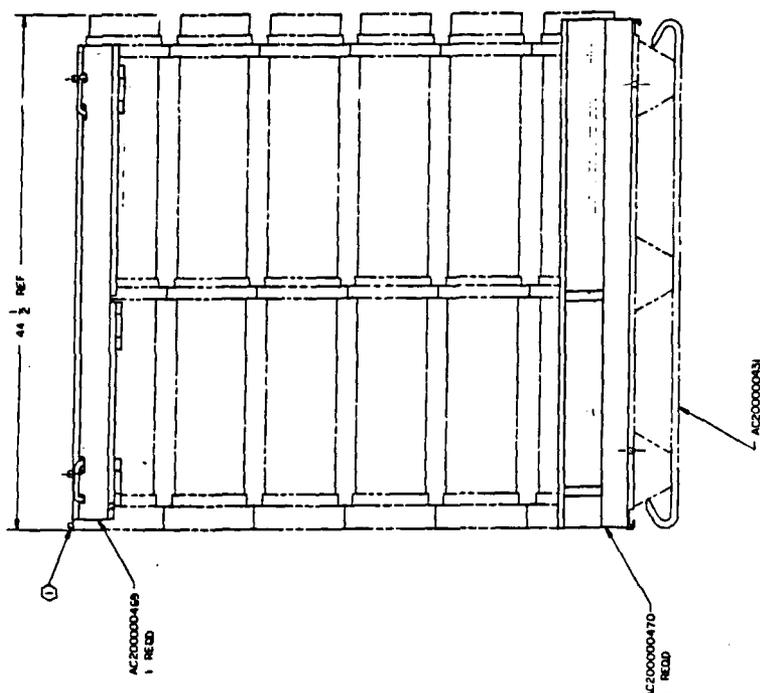
- NOTES:
1. SPEC MIL-B-2650, AMERICAN WELDING SOCIETY STD A2.4-75 AND ANSI V14.3-62 APPLY IN ACCORDANCE WITH
  2. PROTECTIVE FINISH SHALL BE IN ACCORDANCE WITH DWG AC20000423, COLOR SHALL BE GREEN NO. 383 PER MIL-C-46468, (FED STD 595 NO. 34096)
  3. WELDING SHALL BE IN ACCORDANCE WITH DWG AC20000423, COLOR SHALL BE IN ACCORDANCE WITH DWG AC20000423.
  4. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
  5. WELDMENT CONSTRUCTION SPEC MIL-STD-1264 APPLIES.

REV	DATE	BY	CHKD

6-5-87  
MIL 17  
J. J. [Signature]

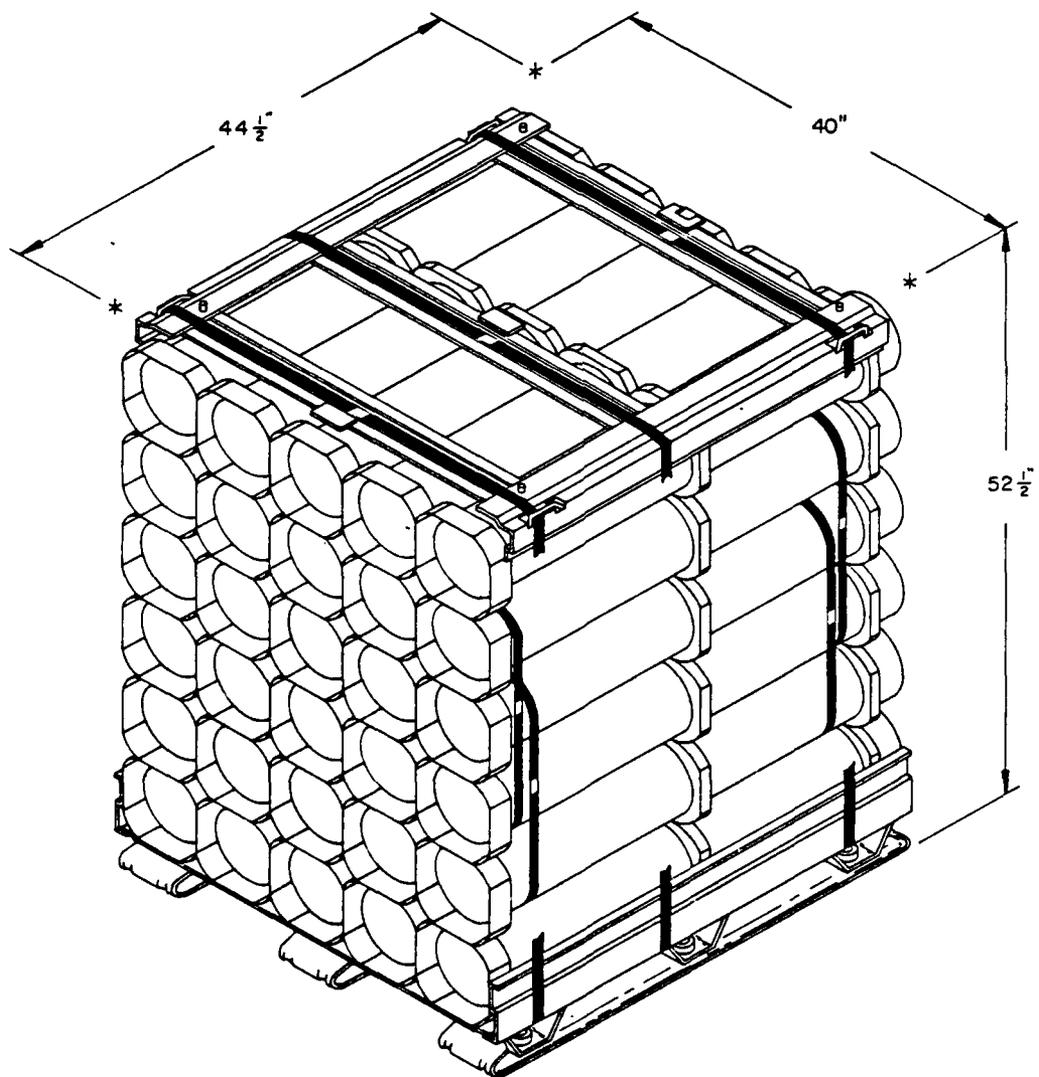
PERMANENT WELDMENTS ELECTRICAL COMMAND  
ASSEMBLY  
PALLET ADAPTER,  
PALLETT CONTAINER  
AC200000469



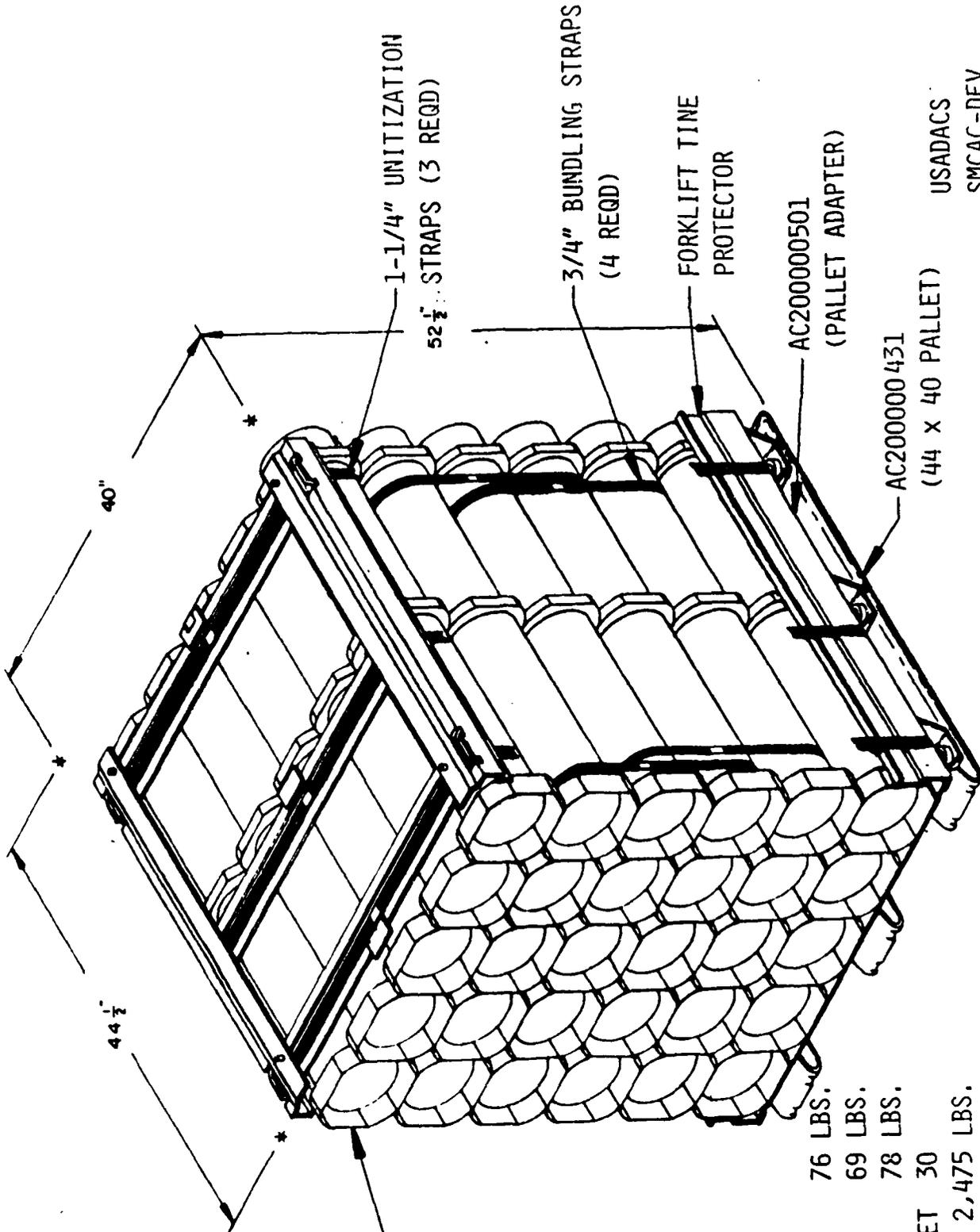


NOTES:  
 ① STAKING LUGS POSITIONED ON TOP OF CONTAINERS.  
 2. ALL DIMENSIONS ARE IN INCHES.

PART NO. 6-5-87 NAME: [Signature] TITLE: [Signature] DATE: [Signature]		ORGANIZATION: MERTONS & CHEMICAL COMPANY DIVISION: [Signature] PROJECT: [Signature]	
DRAWING NO. AC200000501 REV. 1		TITLE: ADAPTER - PALLET CONTAINER PART NO. 21820	
DRAWING SCALE: 1" = 1'-0"		DRAWING DATE: 1/1/81	
DRAWING BY: [Signature]		CHECKED BY: [Signature]	
APPLICATION:		DATE: 1/1/81	



PALLETIZED UNIT LOAD FOR THE PALL16 CONTAINER



PALL16 CNTR  
(30 REQD)

(ESTIMATES)

PALLET WT 76 LBS.  
 ADAPTER WT 69 LBS.  
 UNIT PACK WT 78 LBS.  
 UNIT PACK/PALLET 30  
 UNIT LOAD WT 2,475 LBS.

JULY 1987

USADACS  
 SMCAC-DEV  
 SAVANNA, TI