

AD-A207 142

FINAL REPORT

DECEMBER 1987

EVT 13-88

MIL-STD-1660 TEST OF
UNITIZATION PROCEDURES FOR
VOLCANO MINE SYSTEM
PACKED IN PA113 CONTAINERS

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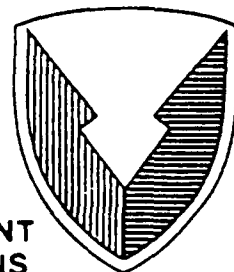
Prepared for:
U.S. Army Armament, Munitions and
Chemical Command
ATTN: SMCAR-ESK
Rock Island, IL 61299-7300

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FIELD	GROUP	SUB-GROUP	MIL-STD-1660 PAl13 ammunition container	
			volcano mine system	
			unitization	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)				
<p>→ The U.S. Army Defense Ammunition Center and School (USADACS), Evaluation Division (SMCAC-DEV), has been asked by the Storage and Outloading (SMCAC-DEO), to test a unitization procedure for the Volcano Mine System as packed in PAl13 cylindrical metal containers. Test criteria is based on MIL-STD-1660, Design Criteria for Ammunition Unit Loads. This report contains the results of the test delineated in MIL-STD-1660 as performed by SMCAC-DEV. It was found as a result of these tests, that subject unitization procedures are acceptable. <i>... work: packaging; unitization; pallets; (K+)</i></p>				
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22a. NAME OF RESPONSIBLE INDIVIDUAL THOMAS J. MICHELS			22b. TELEPHONE (Include Area Code) (815) 273-8928	22c. OFFICE SYMBOL SMCAC-DEV

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

REPORT NO. EVT 13-88

MIL-STD-1160 TEST OF UNITIZATION PROCEDURES FOR

VOLCANO MINE SYSTEM

PACKED IN PA113 CONTAINERS

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PART 1

INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center and School (USADACS), Evaluation Division (SMCAC-DEV), was asked by the Storage and Outloading Division (SMCAC-DEO) to test the unitization procedure for the Volcano Mine System. This unitization procedure consists of unitizing PA113 cylindrical metal containers on a 40' X 58' wood pallet base configured seven containers high and six containers wide.

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

C. OBJECTIVE. The objective of this test is to determine if the subject unitization procedures will satisfy the test requirements of MIL-STD-1660.

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PART 2

ATTENDEES

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PART 3
TEST PROCEDURES

The test procedures outlined in this section are 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. These tests 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 of 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 force of a 16 foot high load.
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. If 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.

GROSS WEIGHT NOT EXCEEDING	DIMENSIONS ON ANY EDGE NOT EXCEEDING	HEIGHT OF DROP LEVEL A PROTECTION
Pounds	Inches	Inches
600	72	36
3,000	no limit	24
no limit	no limit	12

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.

5. TIP OVER TEST. This test shall be performed only if the weight and balance of the specimen are such that the unit load will tip over when an edge is lifted significantly to form a 20 degree angle with the floor. The procedure for this test is Method 5018 of Federal Standard 101.

The procedure for the Tip Over Test is as follows: The specimen shall be placed on its bottom and slowly tipped until it falls freely (by its own weight) on its side to a smooth level concrete slab or similar unyielding surface. Unless otherwise specified, two of these tip overs shall be made, one on each side or 180 degrees apart on a cylinder. A record shall be made of any changes or breaks in the container, such as apparent racking, nail poke, or broken parts and their locations. The packing (blocks, braces, cushions, or other devices) and the contents shall be examined carefully and a record made of their condition.

6. FORKLIFTING TEST. This test shall be conducted by using the procedures of Method 5011 of Federal Standard 101, Procedure 6.2, Lifting and Transporting

by Forklift Truck. The forklift hazard course that will be used is shown in Figure 1. The procedure for the lifting and transporting by forklift truck test is as follows. The specimen shall be lifted clear of the ground by a forklift truck at one side of the specimen and transported on the forks in the level or back tilt position across the alternate hazard course. The forklift must carry the specimen over the hazard course in about 23 seconds and then shall be brought to a stop. The specimen shall be carefully observed during the traverse and while the forklift is at a stop for any damage, evidence of inadequacy, or deflection of the specimen that might cause damage or displacement of the contents. The specimen shall be then lowered onto the ground. The forklift shall be moved from the side to the end of the specimen. The forks shall be run under the specimen as far as possible and then operated to lift the end 6 inches. Observe the specimen, particularly in the vicinity of the ends of the forks and record observations. If the specimen can thus be lifted clear of the floor, transport on the forks over the same hazard course and record observation. If it cannot be thus lifted, report the length of forks used and state that the specimen could not be carried on the forklift truck at either end.

PART 4.

TEST EQUIPMENT

1. TEST SPECIMEN.

- a. Drawing Number: Unitization Procedures, FSA 63/12-66 (or 19-48-4079/12)
- b. Width: 44-1/2"
- c. Length: 59"
- d. Height: 40-3/4"
- e. Weight: 2,675 lbs.

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: 6,000 pound pallet
- c. 1/2-inch Amplitude
- d. Speed: 50 to 3000 cpm
- e. Platform: 5 foot by 8 foot

4. INCLINED RAMP.

- a. Manufacturer: Conbur Incline
- b. Impact Tester
- c. 10 Percent Incline
- d. 12-Foot Incline

PART 5

TEST RESULTS

1. STACKING TEST.

Pallet Weight: 2,675 lbs.

Pallet Height: 44-1/2 in.

Test Load Weight: 12,000 lbs.

The subject unitization procedure was loaded to 13,000 lbs compression for a period of one hour. At the end of this period of time, the compressive load decreased to 11,700 lbs. When the compression load was removed from the test specimen, no measurable deformation in the load was evident.

2. REPETITIVE SHOCK TEST. The subject pallet successfully passed longitudinal transportation simulation test for 90-minute period. Rotating the pallet 90 degrees and subjecting it to a second 90-minute period in the transportation simulator caused no damage to the pallet or strapping. In order to achieve a 1/16" clearance between the pallet and the transportation simulator bed, the equipment was operated at 200 rpm.

3. EDGEWISE DROP TEST. Each side of the Volcano pallet base was placed on a beam displacing it 6" above the floor. The opposite side was raised to a height of 24" above the floor and then dropped. This process was accomplished on all four sides of the pallet. When the pallet was dropped in a longitudinal orientation, the center skid had a tendency to separate from the center post. This skid did not, however, become completely disengaged from the unitization. No other significant observations were noted.

4. IMPACT TEST. The inclined impact test consists of placing the Volcano mine pallet on an inclined sled with 2' of the pallet projecting over the edge of the sled. The sled is then raised approximately 8' up the inclined ramp and allowed to accelerate and impact into a solid wall. This test is repeated once on each side of the pallet. After impacting on each side, the Volcano Mine System unitization procedure exhibited no damage to external packaging or unitization materials.

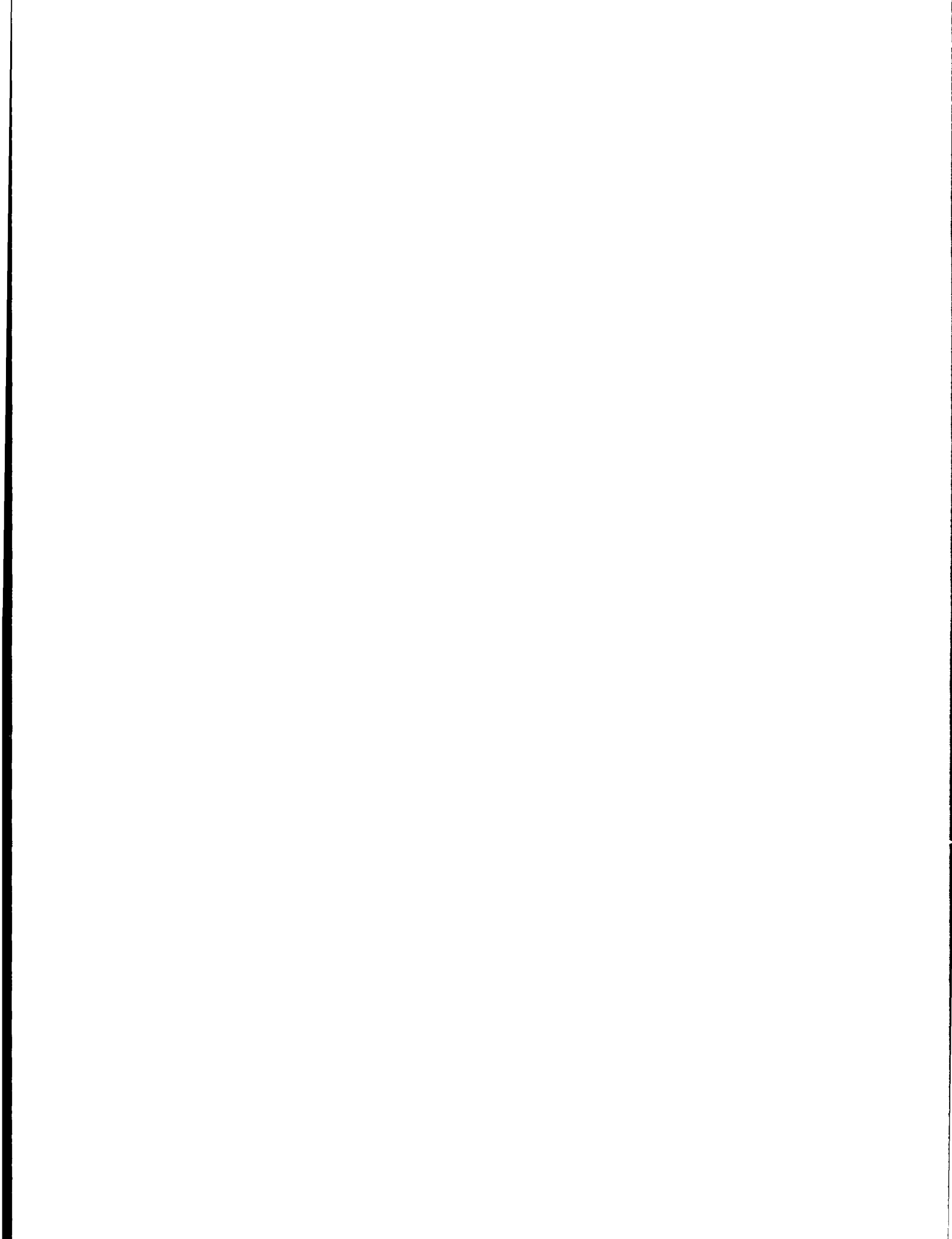
5. TIP OVER TEST. This test was not performed because of the weight and balance of the specimen; in that this unit load will not tip over when an edge is lifted significantly to form a 20 degree angle with the floor.

6. FORKLIFTING TEST. The Volcano Mine System unit load was transported by forklift over gravel roads and between test stations in the laboratory. During movements of the pallet, it was observed and noted there was no damage evidence of inadequacy or deflection of the specimen that could cause damage or displacement to the contents.

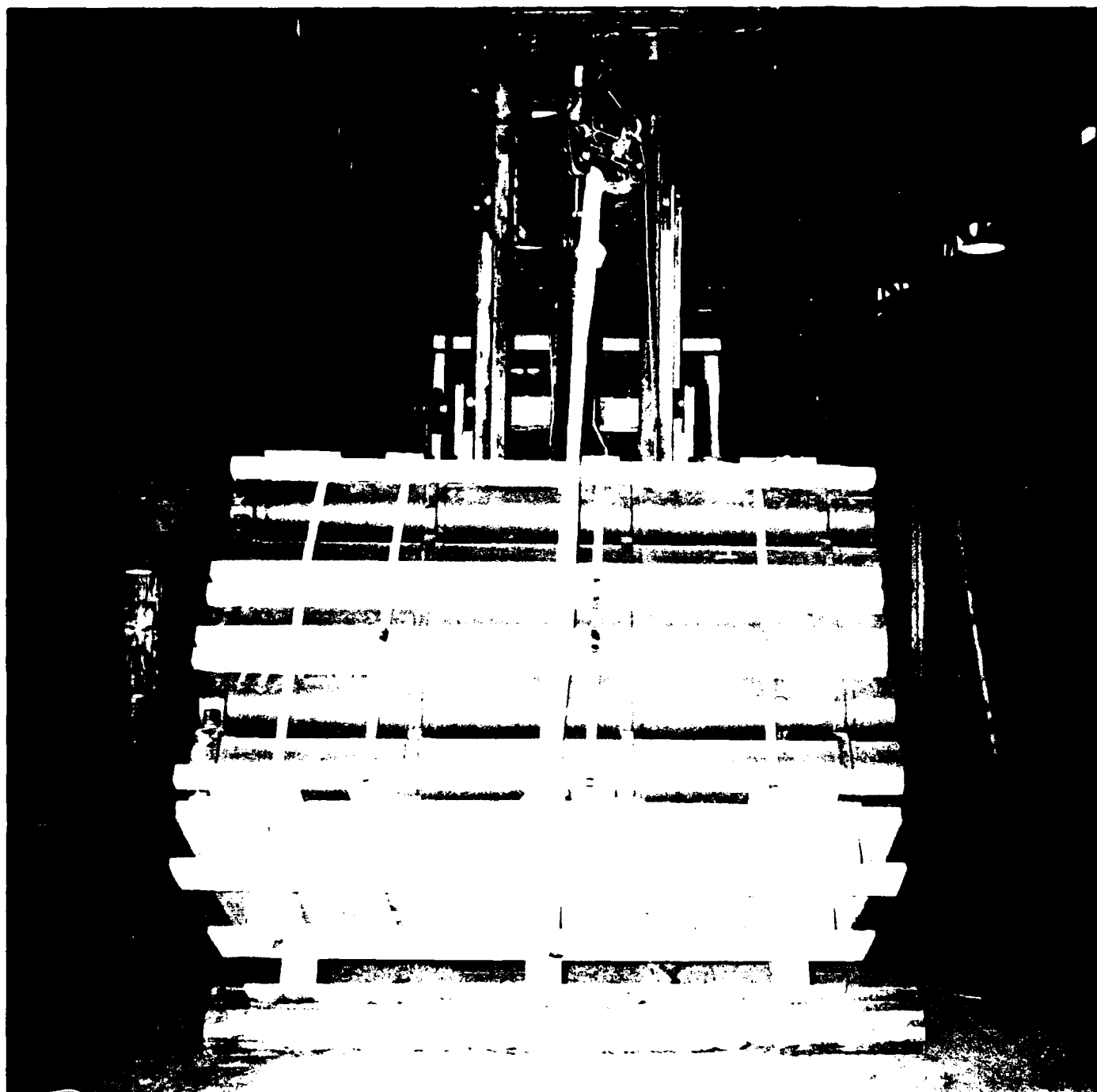
PART 6

CONCLUSIONS AND RECOMMENDATIONS

1. CONCLUSIONS. The Volcano Mine System unitization procedure as tested passed a compression test, transportation simulation test, drop test, inclined impact test, and forklifting test.
2. RECOMMENDATIONS. The unitization procedures for Volcano Mine System with Volcano mines packed in PA113 containers have met the requirements set forth in MIL-STD-1660 and should become an official Army Materiel Command 19-48 series unitization drawing.

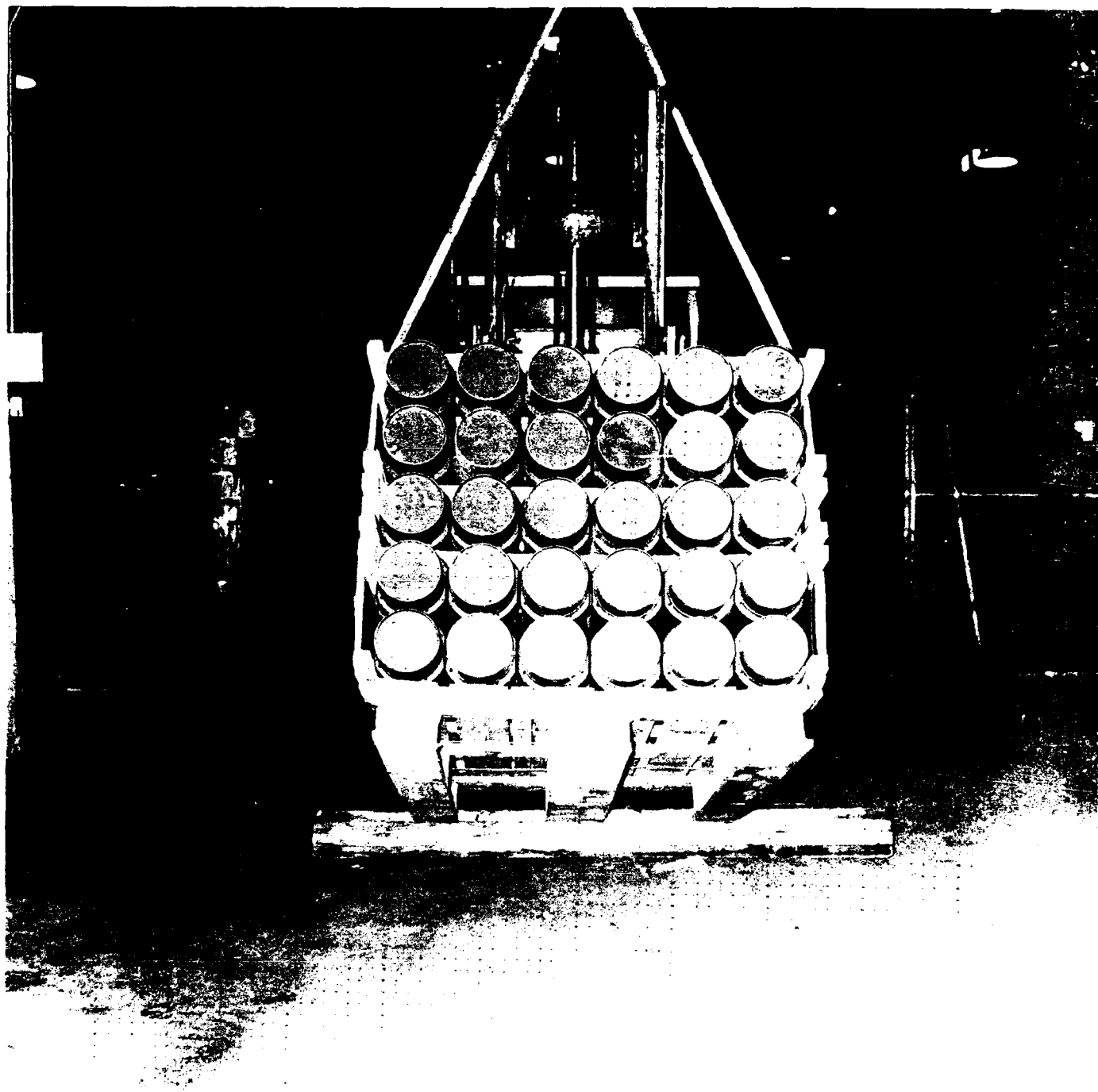


PART 7
PHOTOGRAPHS



DEFENSE AMMUNITION CENTER AND SCHOOL- SAVANNA, IL

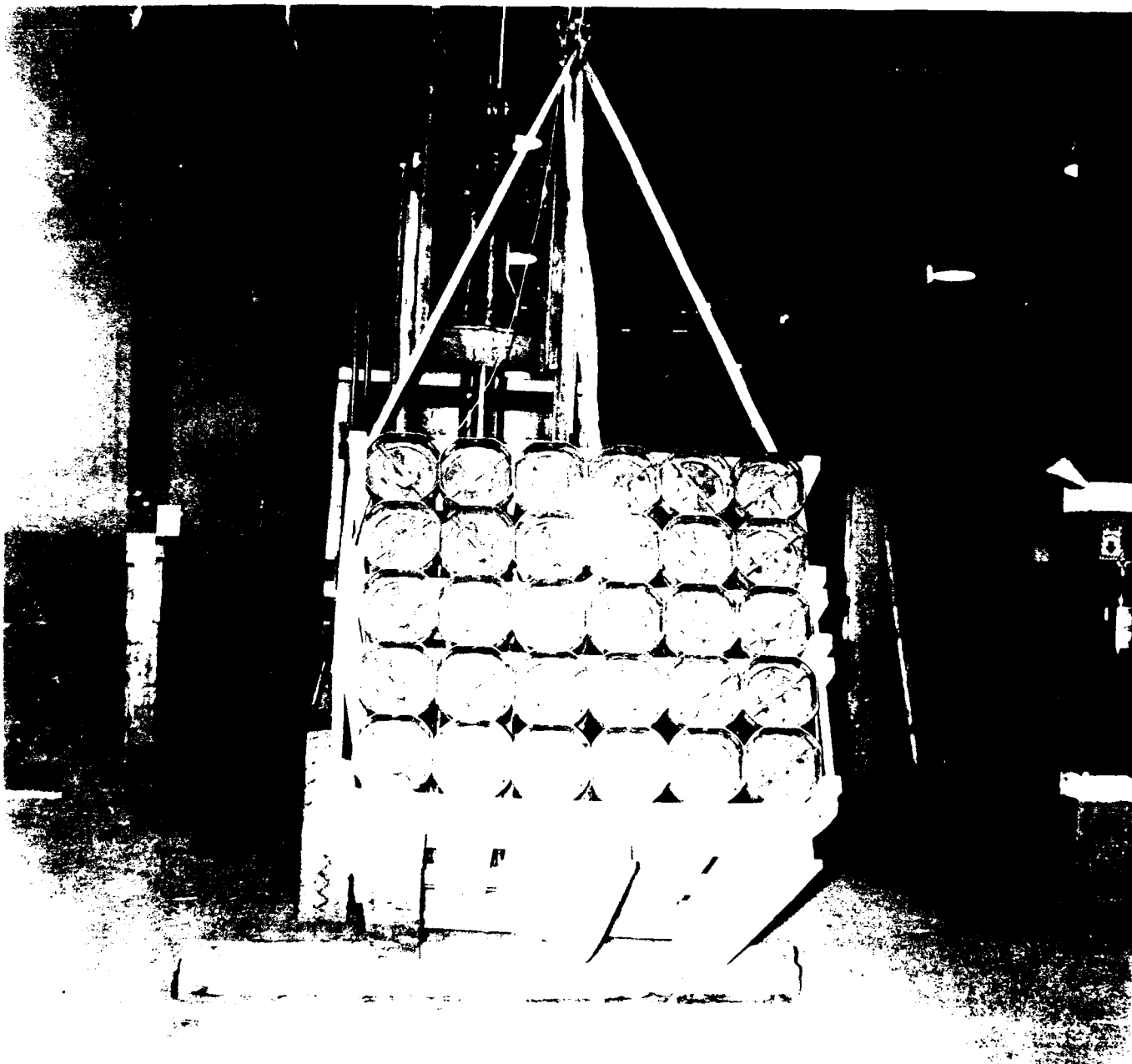
Photo No 1. This photo shows the Volcano Mine System pallet with PA113 containers ready for the first edgewise rotational drop. Drop height is 24'.



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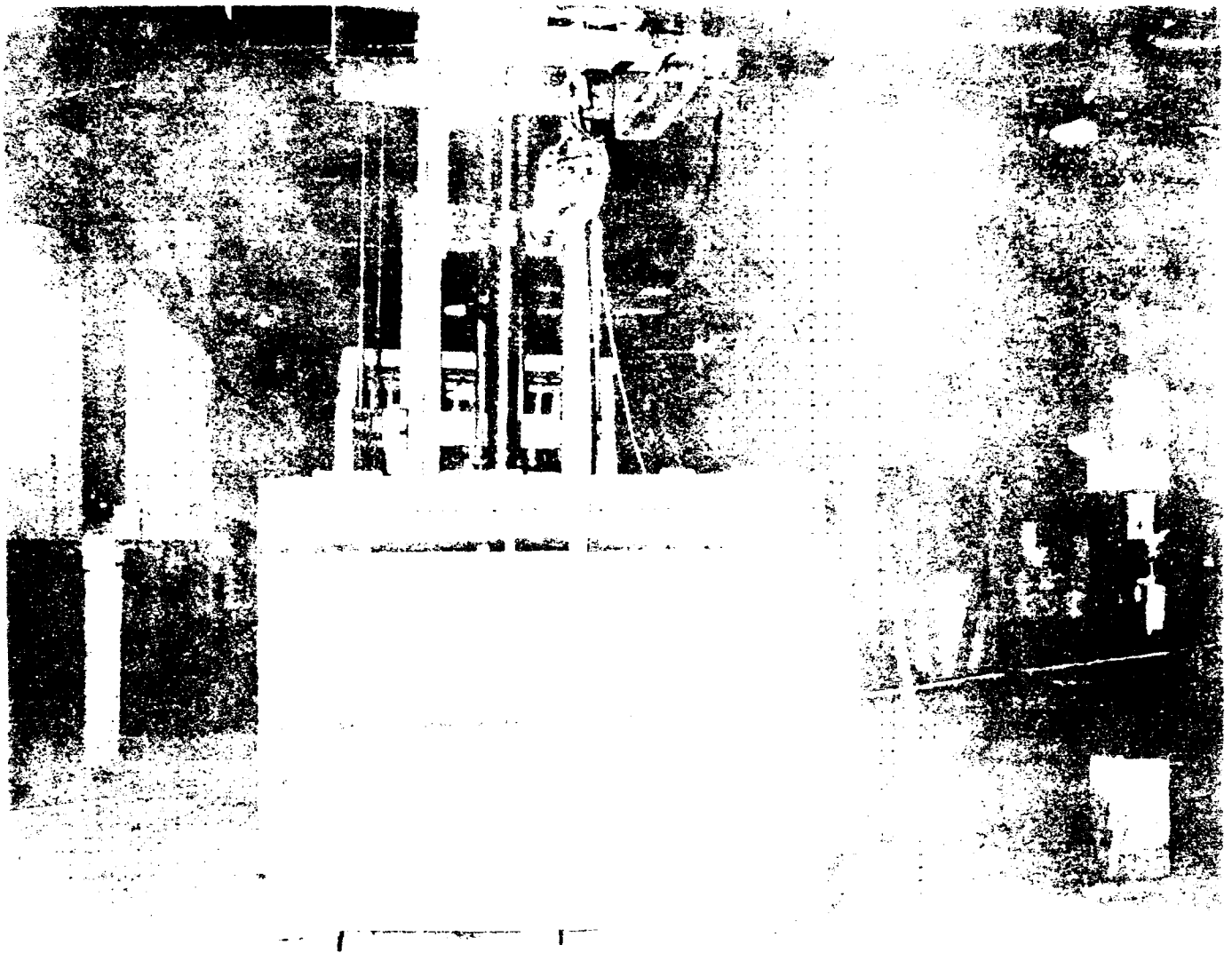
Photo No. 2. This photo shows the Volcano Mine System pallet being ready for the second edgewise rotational drop.

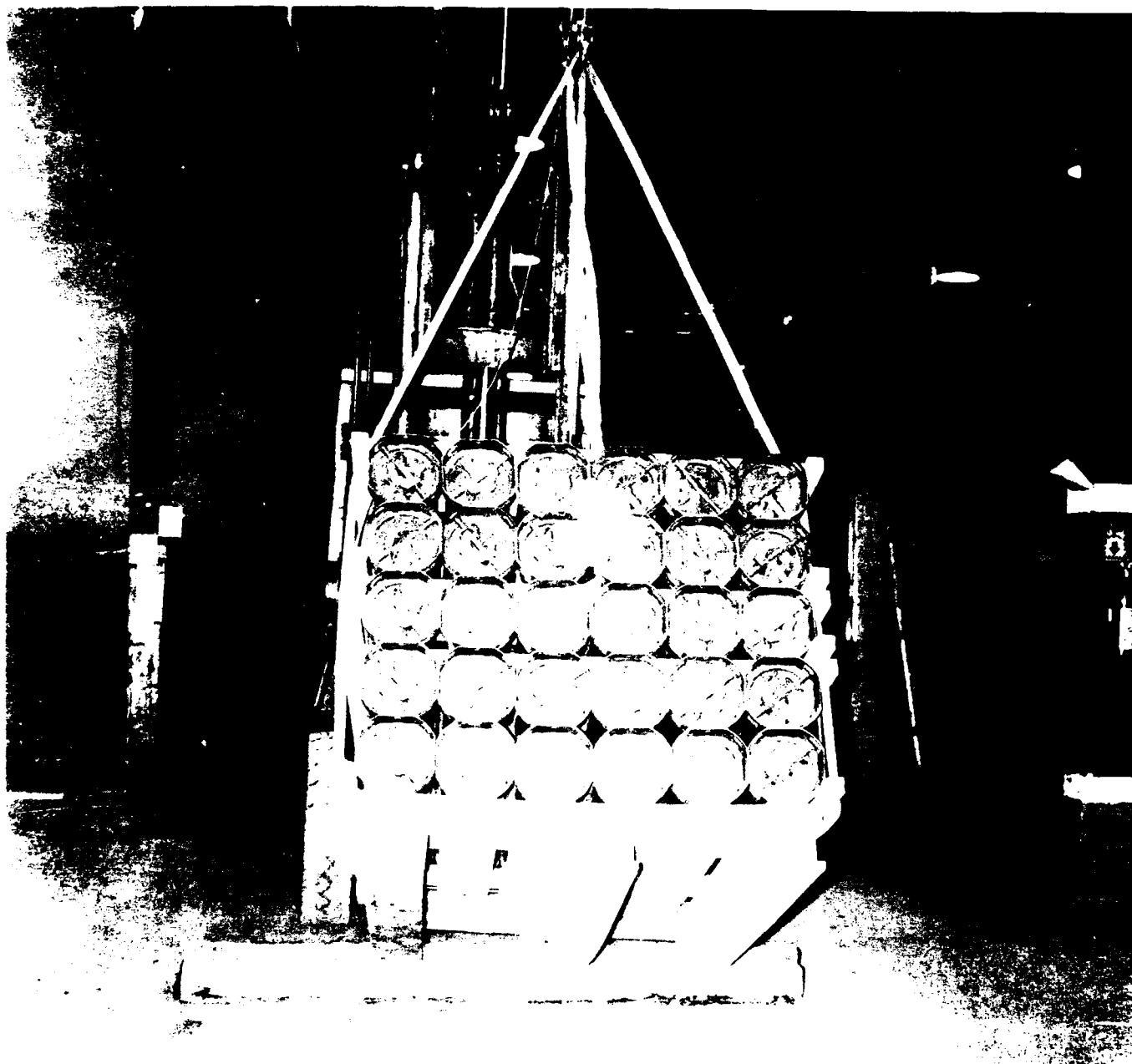




DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

FIGURE 4 - This unit shows the Volcano Mine Unit, a unit of 55-gallon drums, being hoisted by a crane. The unit is being hoisted for the first and final, side-by-side rotational, and side-by-side weight is 100,000 lbs. No damage to the unitization occurred during all four drop tests.





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Figure No. 4 - This photo shows the Vulcano Mine System package ready for the fourth and final, edgewise rotational drop. Drop height is 4'. No damage to the unitization occurred during all four drop tests.



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Photograph showing the Defense Ammunition Center pallet unit
in the background and the Defense Ammunition Center in the foreground.



DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No 8. This photo shows the Volcano Mine System pallet unit after the fourth and last inclined impact test.

PART 8
UNITIZATION PROCEDURES

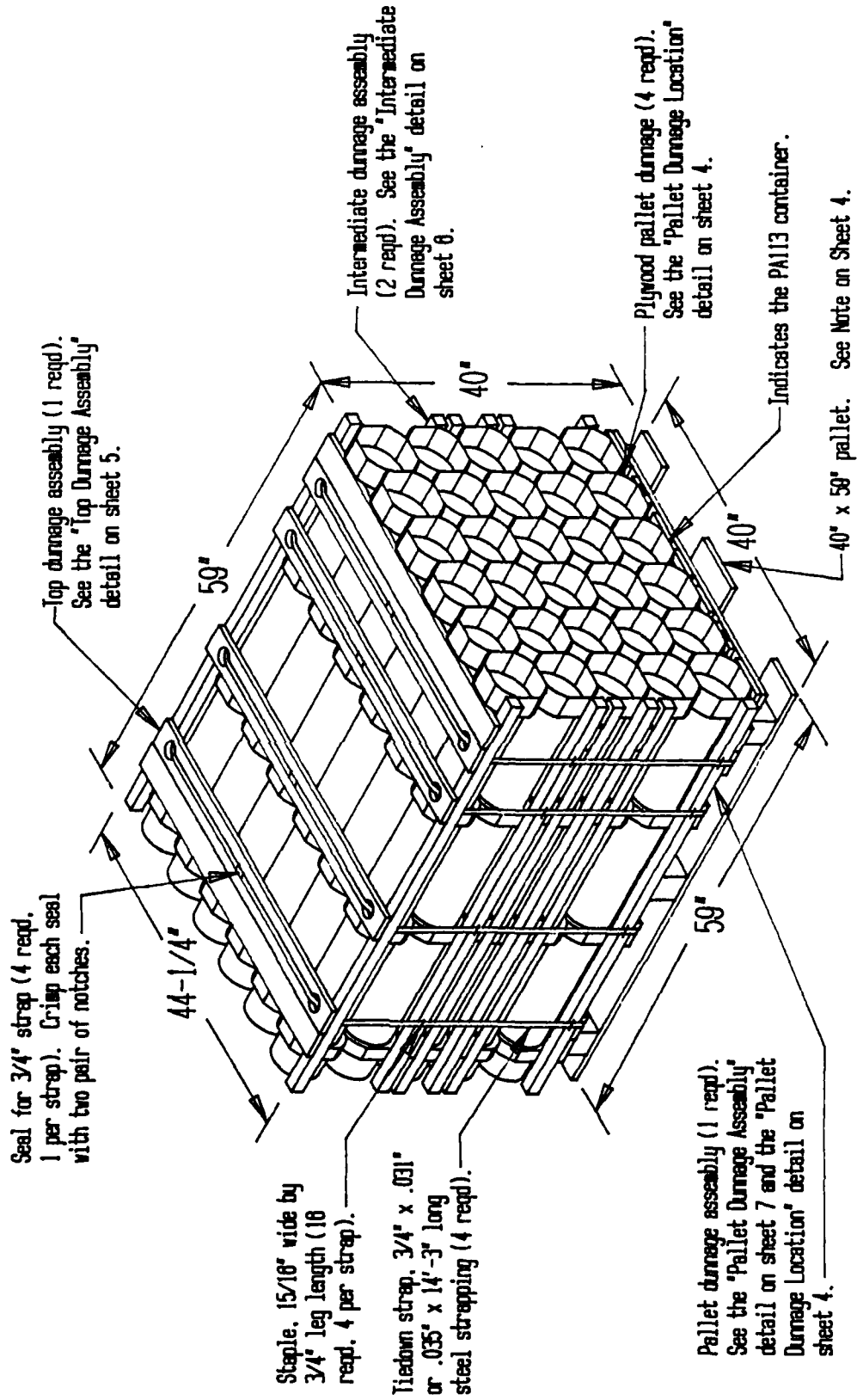
UNITIZATION PROCEDURES FOR VOLCANO MINE SYSTEM

This 7-sheet document delineates unitization procedures for VOLCANO mines packed in PA113 cylindrical metal containers.

MATERIAL SPECIFICATIONS

Pallet-----: 4-way entry, Style I (modified), Type I, Class I, Mil Spec MIL-P-15011.
Lumber-----: See TM 743-200-1, dunnage lumber, Fed Spec MM-L-751.
Nails-----: Common, Fed Spec FF-N-105.
Strapping, Steel---: Class I, Type I or IV, heavy duty, finish A or B (Grade 2); Fed Spec QQ-S-781.
Seal, Strap-----: Type D, Style I, II or IV, Class H, finish A or B (Grade 2); Fed Spec QQ-S-781.
Staple-----: Type III, Style 3, Fed Spec FF-N-105.

Prepared during March 1987 by:
U.S. Army Defense Ammunition
Center & School
ATTN: SMCAC-DEO
Savanna, IL 61074-9639



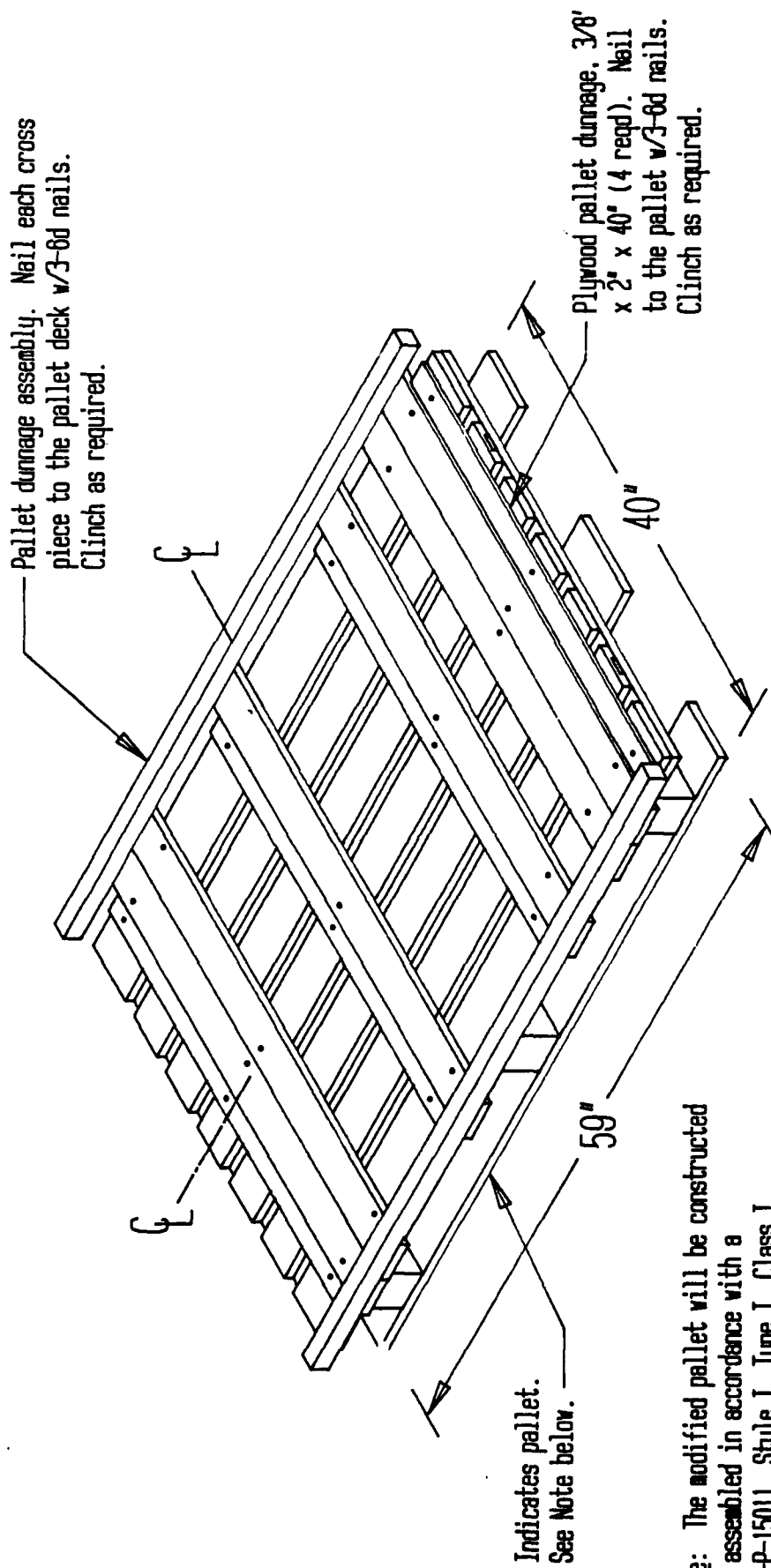
ISOMETRIC VIEW

PALLET UNIT DATA

30 PA113 containers • 85 Lbs ————— 2,550 Lbs
 Dunnage ————— 98 Lbs
 Pallet ————— 95 Lbs

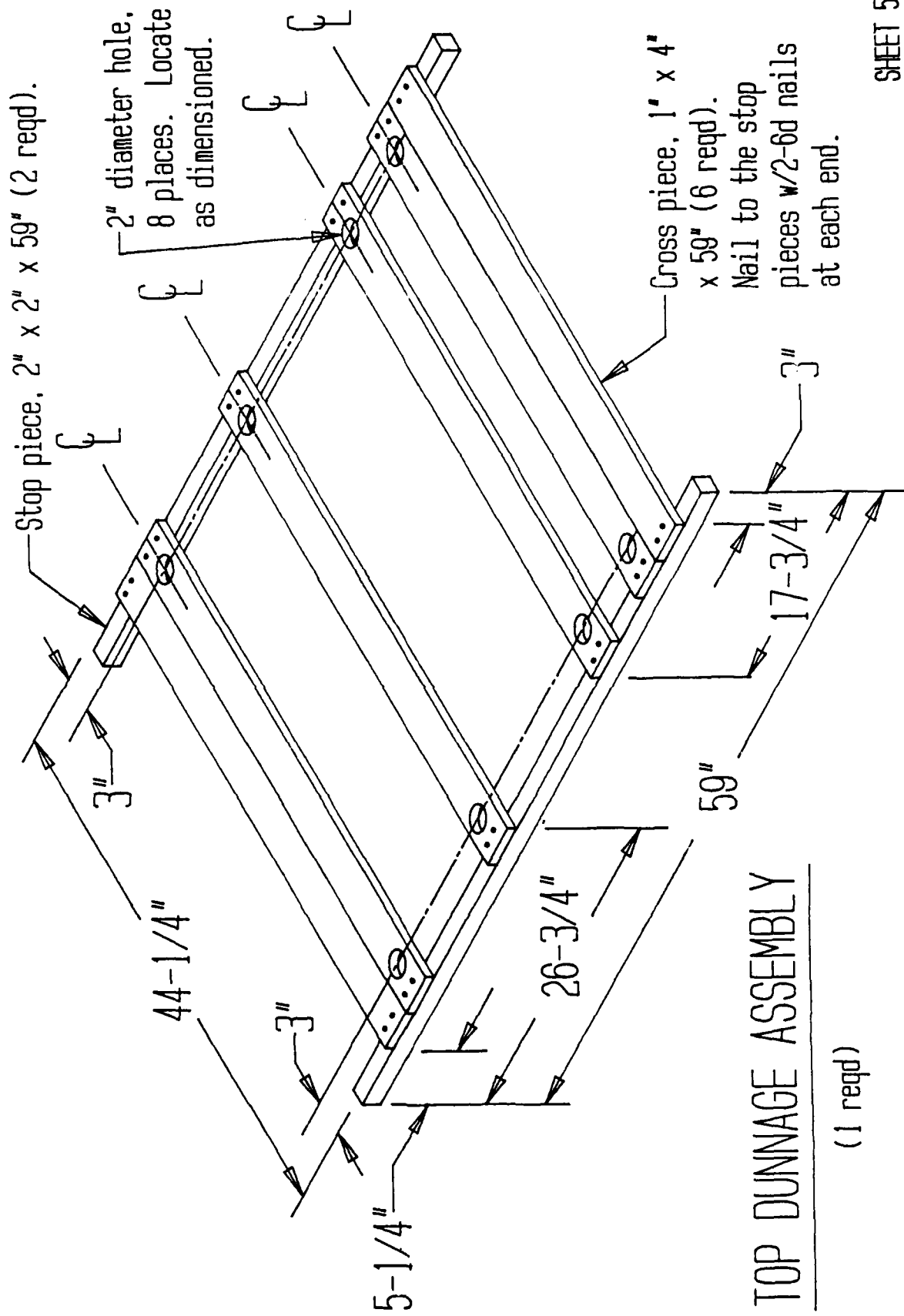
Total Weight ————— 2,741 Lbs
 Cube ————— 60.4 Cu Ft

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" x 4"	73.75	24.58
2" x 2"	59.00	19.67
NAILS	NO. REQD	POUNDS
8d (2")	78	0.46 Lbs
8d (2-1/2")	84	0.67 Lbs
Pallet, 40" x 50" ————— 1 reqd ————— 95 Lbs Steel Strapping, 3/4" ————— 57.00' reqd ————— 4.07 Lbs Seal for 3/4" strapping ————— 4 reqd ————— NIL Staples, 15/16" x 3/4" ————— 18 reqd ————— NIL Plywood, 3/8" ————— 2.22 sq ft reqd ————— 2.38 Lbs		



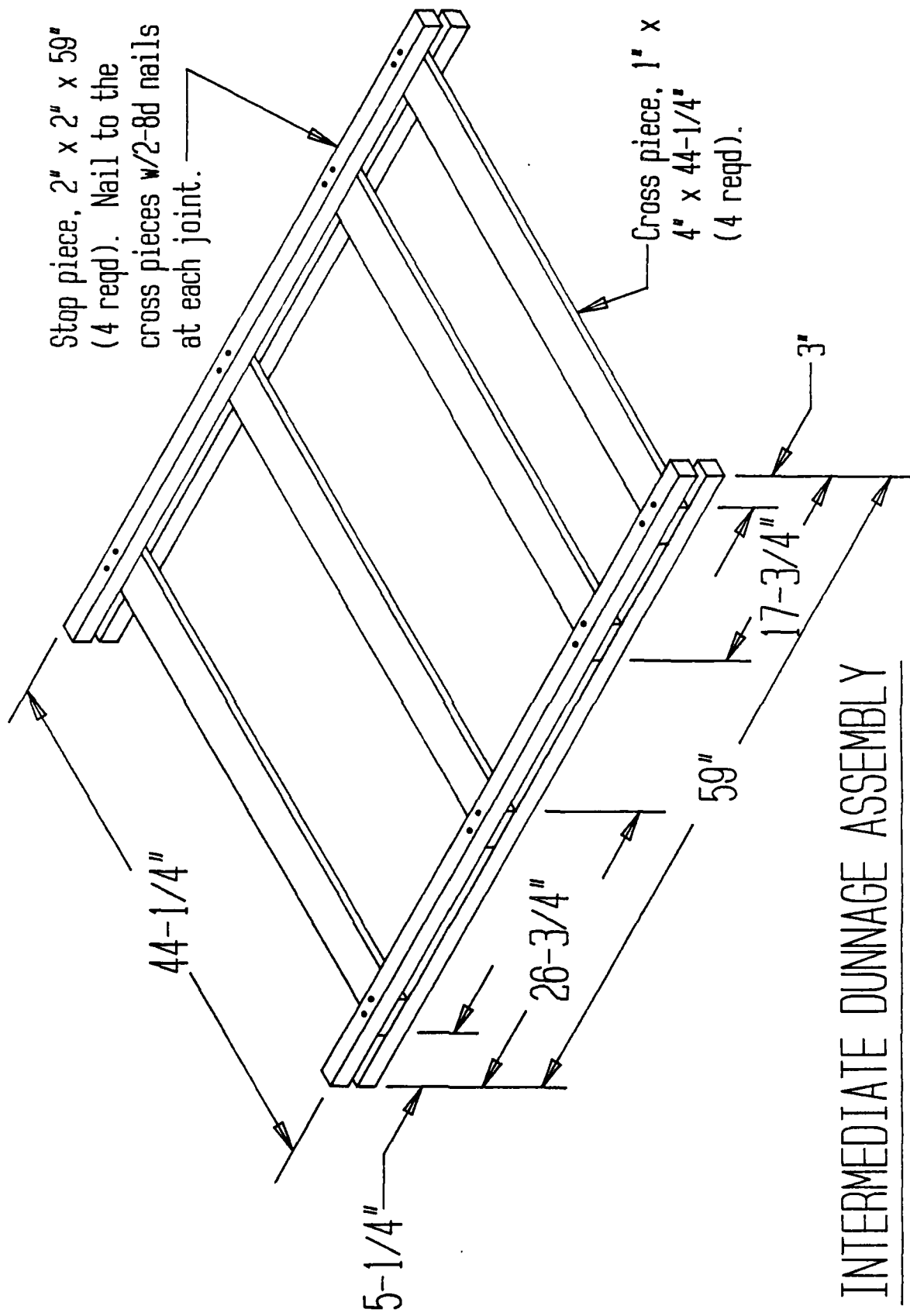
PALLET DUNNAGE LOCATION

Note: The modified pallet will be constructed and assembled in accordance with a MIL-P-15011, Style I, Type I, Class I pallet with the exception that the top and bottom deck boards will be 59" long instead of 48". All other requirements specified within MIL-P-15011 for a Style I, Type I, Class I pallet will apply to the pallet specified in this drawing.



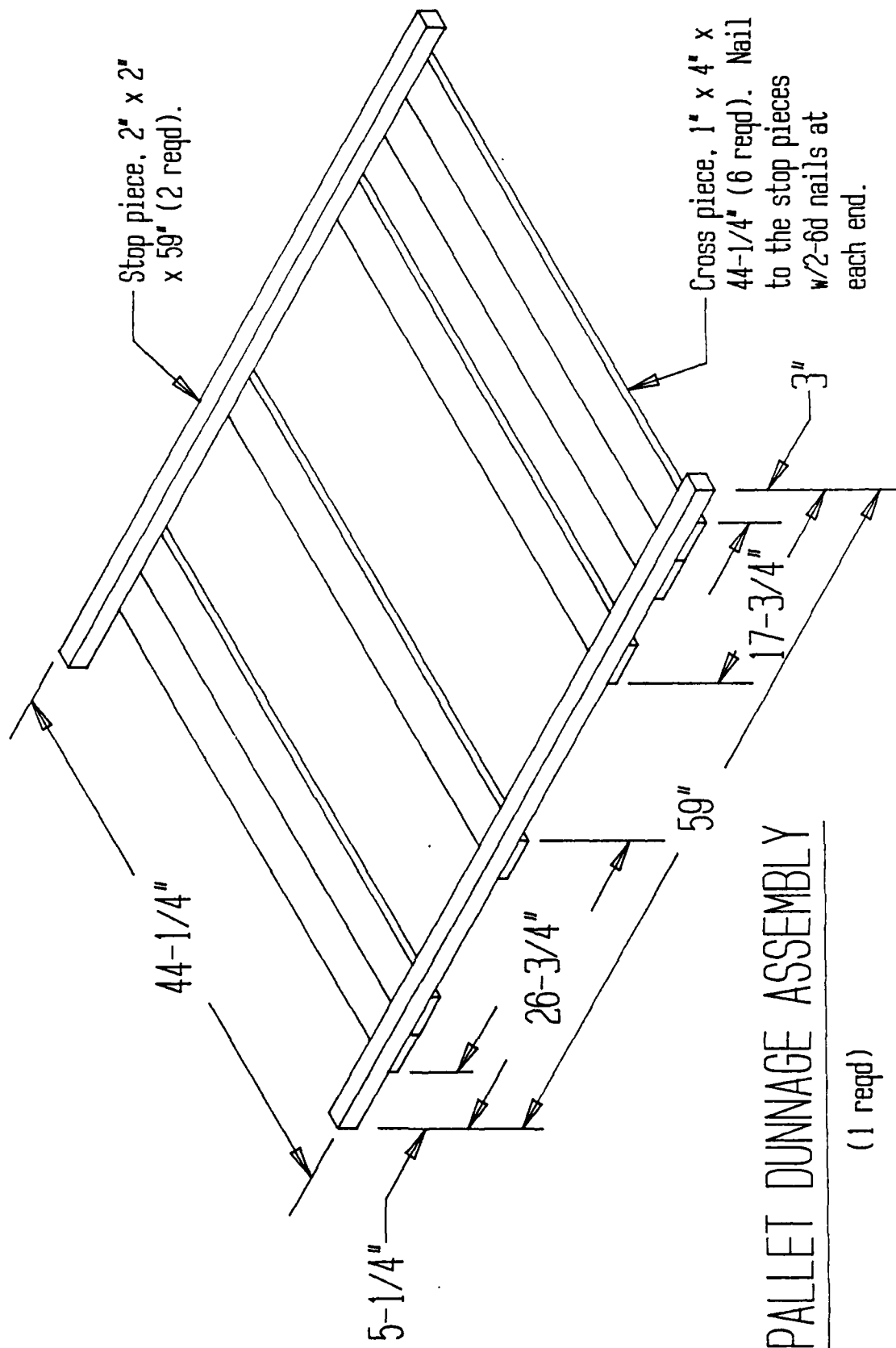
TOP DUNNAGE ASSEMBLY

(1 reqd)



INTERMEDIATE DUNNAGE ASSEMBLY

(2 reqd)



PALLET DUNNAGE ASSEMBLY

(1 reqd)

UNITIZING PROCEDURES FOR COMPLETE ROUNDS[®] PACKED IN CYLINDRICAL METAL CONTAINERS ON 4-WAY ENTRY PALLETS

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DUNNAGE DETAILS -----	5
FILLERS AND INSTALLATION PROCEDURES FOR OMITTED CONTAINERS -----	6.7

PALLET UNIT DATA						
ITEMS INCLUDED		HAZARD CLASSIFICATION				WEIGHT (LBS)
NSN	DODIC	DOT CLASS	CG CLASS	QD CLASS	COMP GROUP	
1345 - 01-233-2030	K042	C	I	(04) 1.2	C	2,741
01-233-2029	K045	A	<u>VII</u>	1.1	D	2,741

- HAZARD CLASSIFICATION DATA CONTAINED IN THE ABOVE CHART IS FOR GUIDANCE AND INFORMATIONAL PURPOSES ONLY. VERIFICATION OF THE SPECIFIED DATA SHOULD BE MADE BY CONSULTING THE MOST RECENT JOINT HAZARD CLASSIFICATION SYSTEM LISTING OR OTHER APPROVED LISTING(S).

UNITIZATION PROCEDURES CONTAINED WITHIN THIS APPENDIX REFER TO THE VOLCANO MINE SYSTEM.

NOTICE: THIS APPENDIX CANNOT STAND ALONE BUT MUST BE
USED IN CONJUNCTION WITH THE BASIC INITIALIZATION PROCEDURES
DRAWING 19-48-4079-20PM1002.

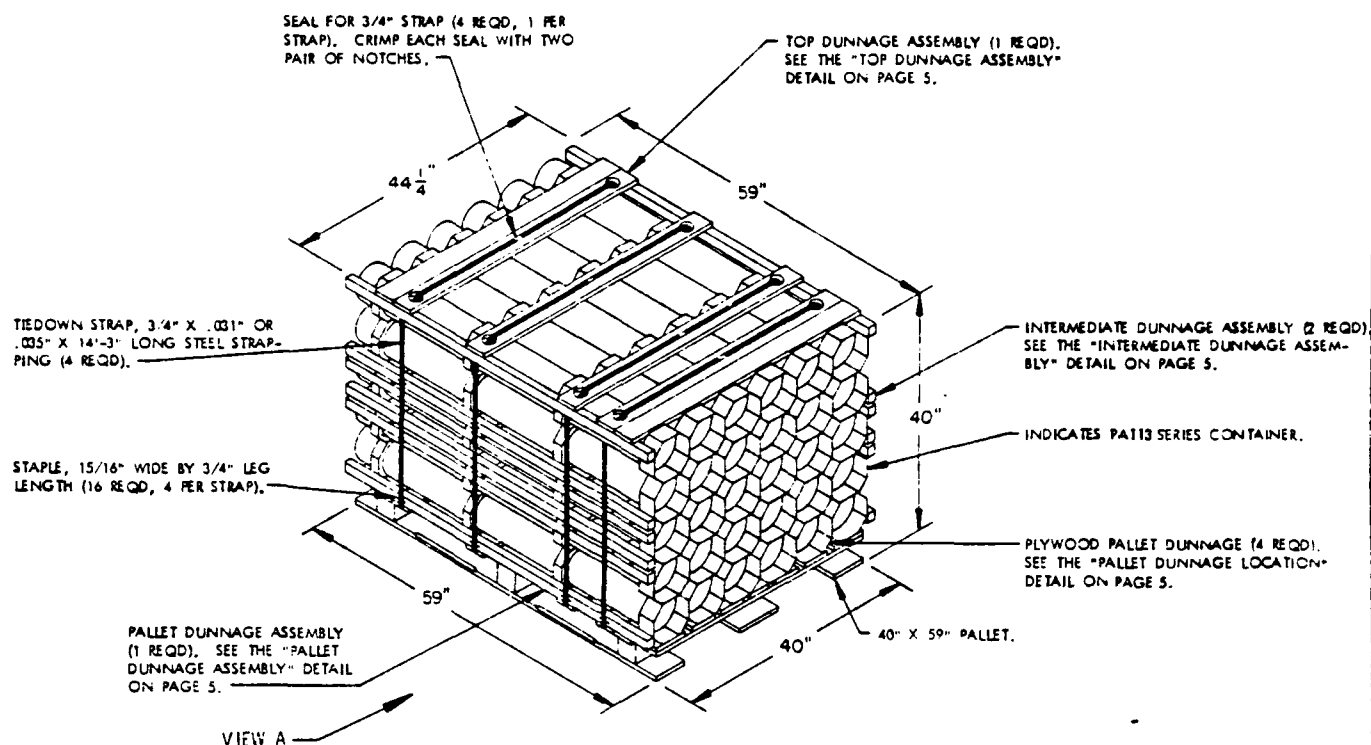
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			U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL					
			U.S. ARMY AMC DRAWING					
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DO NOT SCALE

GENERAL NOTES

- A. THIS APPENDIX CANNOT STAND ALONE BUT MUST BE USED IN CONJUNCTION WITH THE BASIC UNITIZATION PROCEDURES DRAWING 19-48-4077-20P11002, TO PRODUCE AN APPROVED UNIT LOAD. ALL PERTINENT PROCEDURES, SPECIFICATIONS AND CRITERIA SET FORTH WITHIN THE BASIC DRAWING WILL APPLY TO THE PROCEDURES DELINEATED IN THIS APPENDIX. ANY EXCEPTIONS TO THE BASIC PROCEDURES ARE SPECIFIED IN THIS APPENDIX.
- B. DIMENSIONS, CUBE AND WEIGHT OF A PALLET UNIT WILL VARY SLIGHTLY DEPENDING UPON THE ACTUAL DIMENSIONS OF THE BOXES AND THE WEIGHT OF THE SPECIFIC ITEM BEING UNITIZED.
- C. FOR OUTLOADING AND STORAGE OF THE ITEMS COVERED BY THIS APPENDIX, CONTACT THE U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL, ATTN: SMCAC-DEO, SAVANNA, IL 61074-9639 FOR SPECIFIC PROCEDURAL GUIDANCE.
- D. FOR METHOD OF SECURING A STRAP CUTTER TO THE PALLET UNIT, SEE DARCOM DRAWING 19-48-4127-20P1000.
- E. IF ITEMS COVERED HEREIN ARE UNITIZED PRIOR TO ISSUANCE OF THIS APPENDIX, THE BOXES NEED NOT BE REUNITIZED SOLELY TO CONFORM TO THIS APPENDIX.
- F. FOR DETAILS OF THE PA113 SERIES CONTAINER, SEE U.S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER DRAWING NO. 9390404.
- CONTAINER DIMENSIONS ——— 39" LONG X 6-7/8" WIDE X 6-7/8" HIGH
CONTAINER CUBE ——— 1.6 CUBIC FEET (APPROX)
CONTAINER WEIGHT
(WITH ROLLS) ——— 35 POUNDS (APPROX)
- G. THE UNITIZATION PROCEDURES DEPICTED HEREIN MAY ALSO BE USED FOR UNITIZING MINE CANISTERS WHEN IDENTIFIED BY DIFFERENT NATIONAL STOCK NUMBERS (NSN) THAN WHAT IS SHOWN ON THE TITLE PAGE, PROVIDED THE CONTAINER DOES NOT VARY FROM WHAT IS DELINEATED HEREIN. THE EXPLOSIVE CLASSIFICATION OF OTHER ITEMS MAY BE DIFFERENT THAN WHAT IS SHOWN.
- H. DIMENSIONS GIVEN FOR DUNNAGE PIECES WILL BE FIELD CHECKED PRIOR TO THEIR ASSEMBLY TO THE PALLET UNIT. CONTAINERS MUST FIT SINGLY IN THE DUNNAGE ASSEMBLIES.
- J. THE SPECIAL PALLET WILL BE CONSTRUCTED IN ACCORDANCE WITH MILITARY SPECIFICATION MIL-P-15011, STYLE 1, TYPE 2, CLASS 1 PALLET WITH THE EXCEPTION THAT THE TOP AND BOTTOM DECK BOARDS WILL BE 39" LONG INSTEAD OF 48". ALL OTHER REQUIREMENTS SPECIFIED WITHIN MIL-P-15011 FOR A STYLE 1, TYPE 2, CLASS 1 PALLET WILL APPLY TO THE PALLET SPECIFIED WITHIN THIS DRAWING.

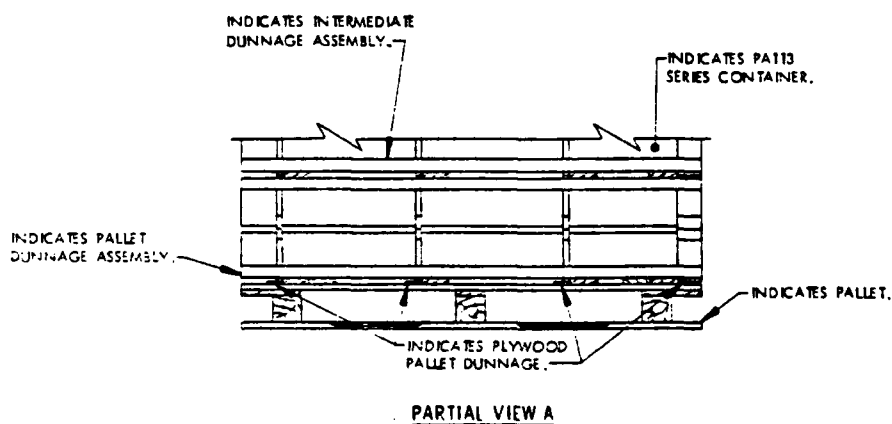
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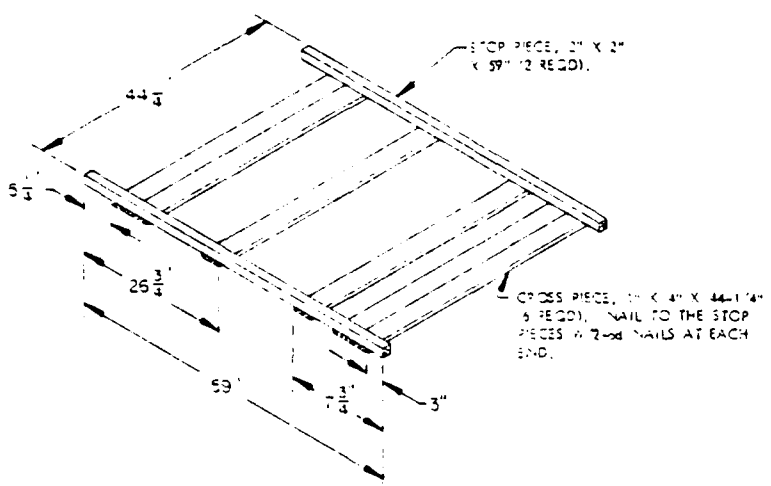


ISOMETRIC VIEW

SPECIAL NOTE:

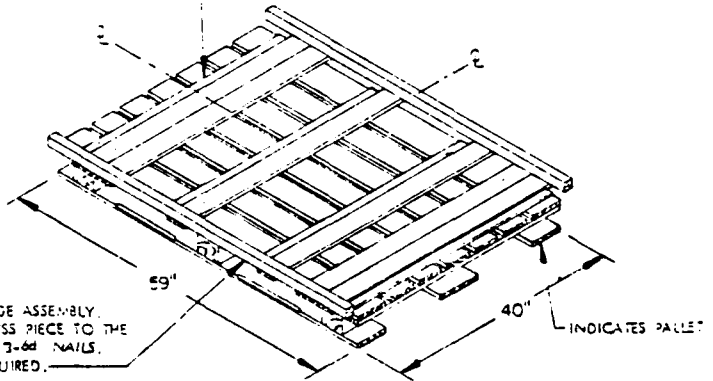
THE CONTAINERS DEPICTED IN THE UNIT LOAD ABOVE ARE CONSTRUCTED WITH BOTH LATERAL AND VERTICAL INTERLOCKS. TO FUNCTION PROPERLY, THE VERTICAL INTERLOCKS (PINS) MUST BE POSITIONED UPWARD. THIS ORIENTATION WILL PRECLUDE INTERFERENCE OF THE "PINS" AND THE PLYWOOD PALLET DUNNAGE, FOR THE LATERAL INTERLOCKS TO FUNCTION PROPERLY, THE LATERAL INTERLOCKING DEVICES ON THE RINGS OF A CONTAINER MUST BE ENGAGED WITH THE LATERAL INTERLOCKING DEVICES ON THE RINGS OF AN ADJACENT CONTAINER. LATERAL INTERLOCK ENGAGEMENT IS ACCOMPLISHED WHEN CONTAINERS ARE LOWERED ONTO THE PALLET UNIT. THE INTERLOCKS WILL ALSO AID IN THE PREVENTION OF CONTAINER MOVEMENT, BOTH LATERAL AND LONGITUDINAL, DURING SHIPMENT OF THE UNIT LOAD.



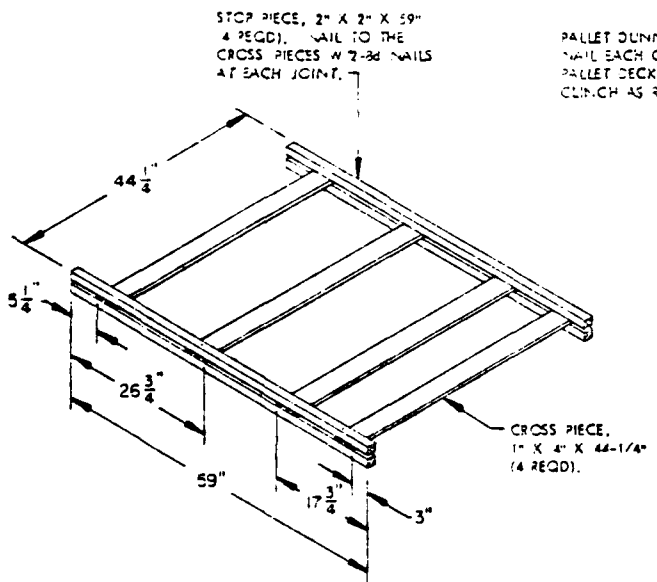


PALLET DUNNAGE ASSEMBLY
(1 REQD)

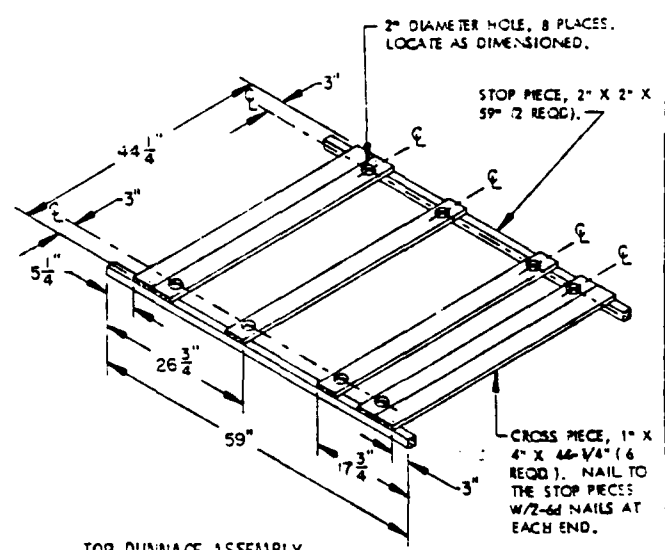
PLYWOOD PALLET DUNNAGE,
3/8\"/>



PALLET DUNNAGE LOCATION



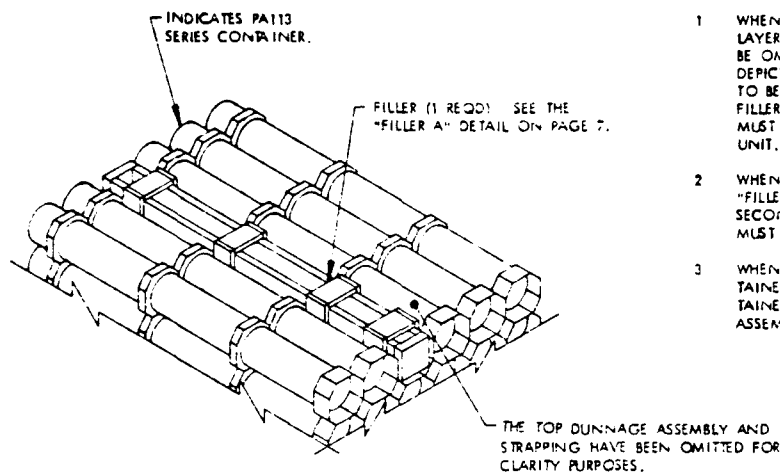
INTERMEDIATE DUNNAGE ASSEMBLY
(2 REQD)



TOP DUNNAGE ASSEMBLY
(1 REQD)

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1\"/>	73.75	24.58
2\"/>	59.00	19.67
NAILS	NO. REQD	POUNDS
4d (1-1/2\")	12	0.04
6d (2\")	66	0.39
8d (2-1/2\")	64	0.67
PALLET, 40\"/>	1 REQD	95 LBS
STEEL STRAPPING, 3/4\"/>	57.00 REQD	4.07 LBS
SEAL FOR 3/4\"/>	4 REQD	NIL
STAPLES, 15/16\"/>	16 REQD	NIL
PLYWOOD, 3/8\"/>	2.22 SQ FT REQD	2.29 LBS

UNIT DATA	WEIGHT
CUBE	60.4 CU FT (APPROX)
CONTAINER	30 EACH @ 85 LBS
DUNNAGE	95 LBS
PALLET	95 LBS
TOTAL WEIGHT	2,741 LBS (APPROX)

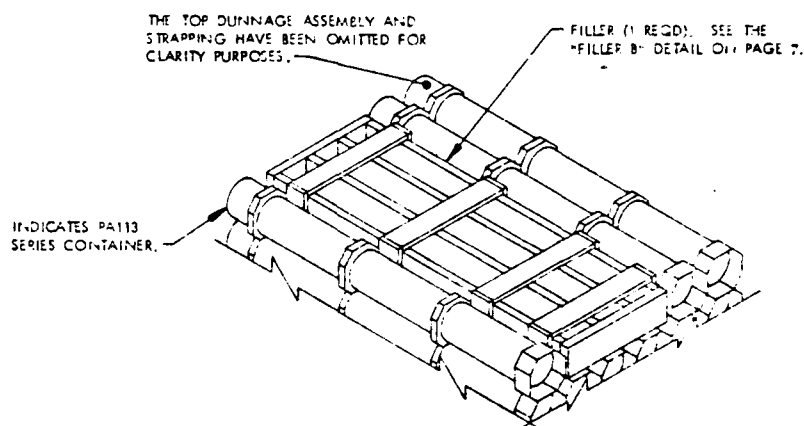


DETAIL A

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS ONE CONTAINER IS TO BE UNITIZED. THE FILLER ASSEMBLY DEPICTED MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER OF THE PALLET UNIT.

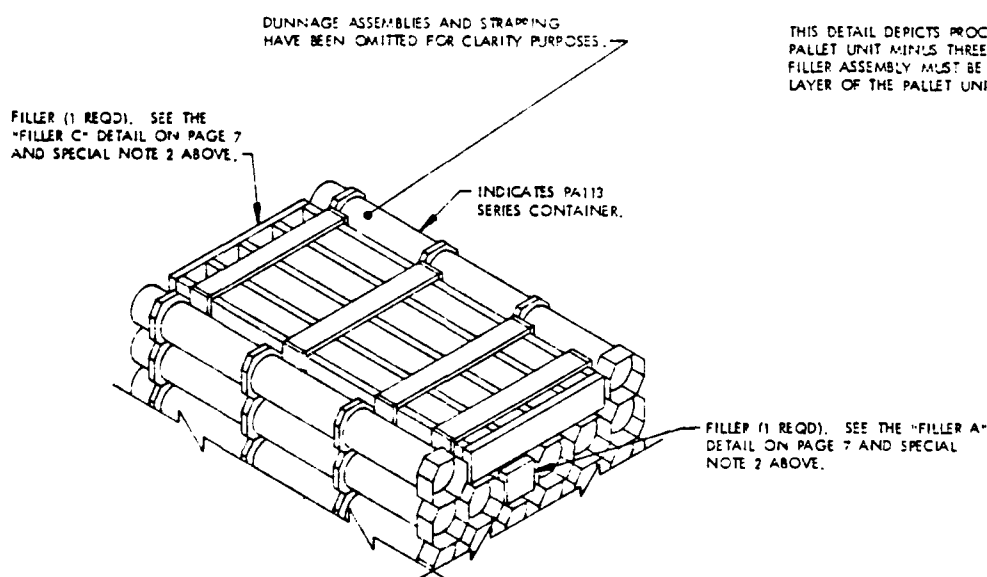
SPECIAL NOTES:

- 1 WHEN SIX CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMPLETE LAYER OF CONTAINERS MUST BE OMITTED. WHEN FIVE CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMBINATION OF FILLER ASSEMBLIES DEPICTED ON PAGE 7 MUST BE USED. WHEN FOUR OR LESS CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMBINATION OR ONE OF THE FILLER ASSEMBLIES DEPICTED ON PAGE 7 MAY BE USED. ALL FILLER ASSEMBLIES MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER OR LAYERS OF A PALLET UNIT.
- 2 WHEN A "FILLER A" ASSEMBLY IS USED IN COMBINATION WITH A "FILLER B" OR "FILLER C" ASSEMBLY, THE "FILLER A" ASSEMBLY MUST BE POSITIONED IN THE SECOND LAYER OF CONTAINERS FROM THE TOP OF THE PALLET UNIT AND MUST HAVE ITS OVERALL HEIGHT REDUCED FROM 6-3/4" TO 6".
- 3 WHEN TWO "FILLER A" ASSEMBLIES ARE USED IN PLACE OF TWO OMITTED CONTAINERS, THE FILLER ASSEMBLIES WILL BE SEPARATED BY AT LEAST ONE CONTAINER TO INSURE PROPER FILLER ASSEMBLY RETENTION AND TO PRECLUDE ASSEMBLY INTERFERENCES.



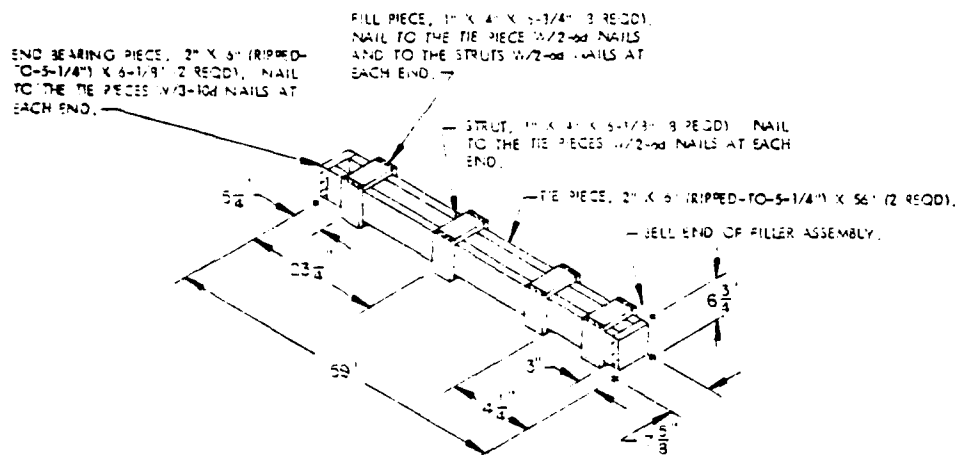
DETAIL B

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS THREE CONTAINERS IS TO BE UNITIZED. THE FILLER ASSEMBLY MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER OF THE PALLET UNIT.



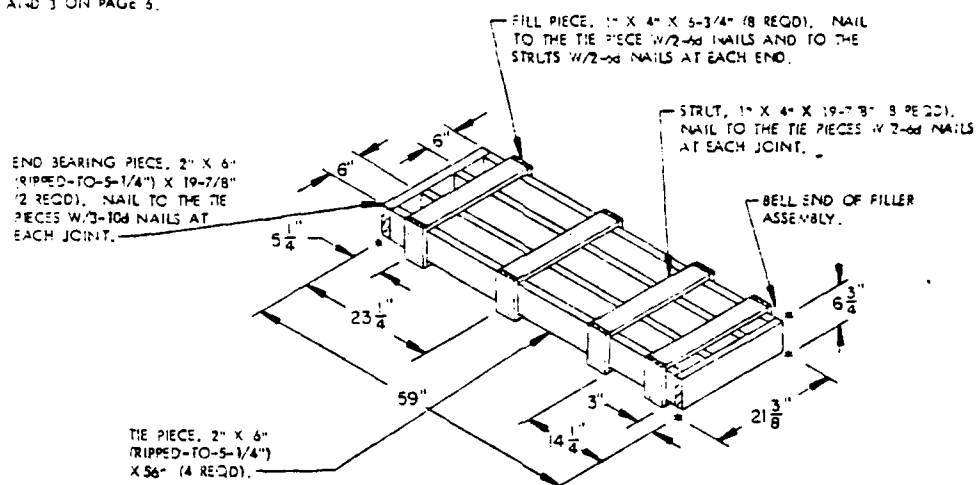
DETAIL C

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS FIVE CONTAINERS IS TO BE UNITIZED. THE FILLER ASSEMBLIES DEPICTED MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYERS OF THE PALLET UNIT.



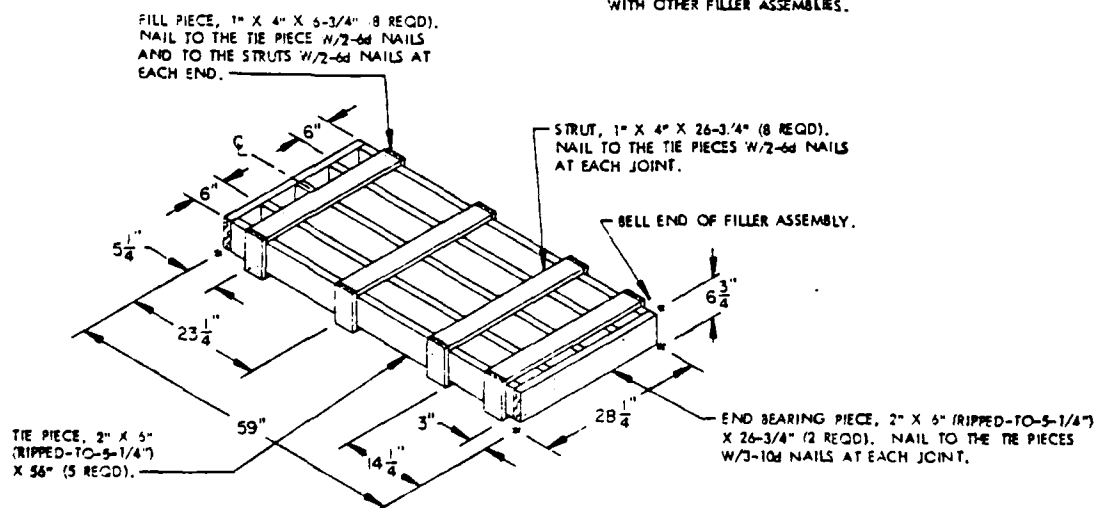
FILLER A

THIS FILLER ASSEMBLY IS TO BE USED WHEN ONE OR TWO CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, OR IN COMBINATION WITH OTHER FILLER ASSEMBLIES. SEE SPECIAL NOTE 2 AND 3 ON PAGE 5.



FILLER B

THIS FILLER ASSEMBLY IS TO BE USED WHEN THREE CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, OR IN COMBINATION WITH OTHER FILLER ASSEMBLIES.



FILLER C

THIS FILLER ASSEMBLY IS TO BE USED WHEN FOUR CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, OR IN COMBINATION WITH A "FILLER A" ASSEMBLY.