

LOADING AND BRACING[⊕] IN SIDE OPENING ISO CONTAINERS OF MK82 (500 POUND) BOMBS ON MHU-149 METAL PALLETS

INDEX

ITEM	PAGE(S)
TYPICAL LOADING PROCEDURES - - - - -	2
GENERAL NOTES AND MATERIAL SPECIFICATIONS - - - - -	3
PALLET UNIT DETAIL - - - - -	4
DETAILS - - - - -	5-7
LESS-THAN-FULL-LOAD PROCEDURES - - - - -	8

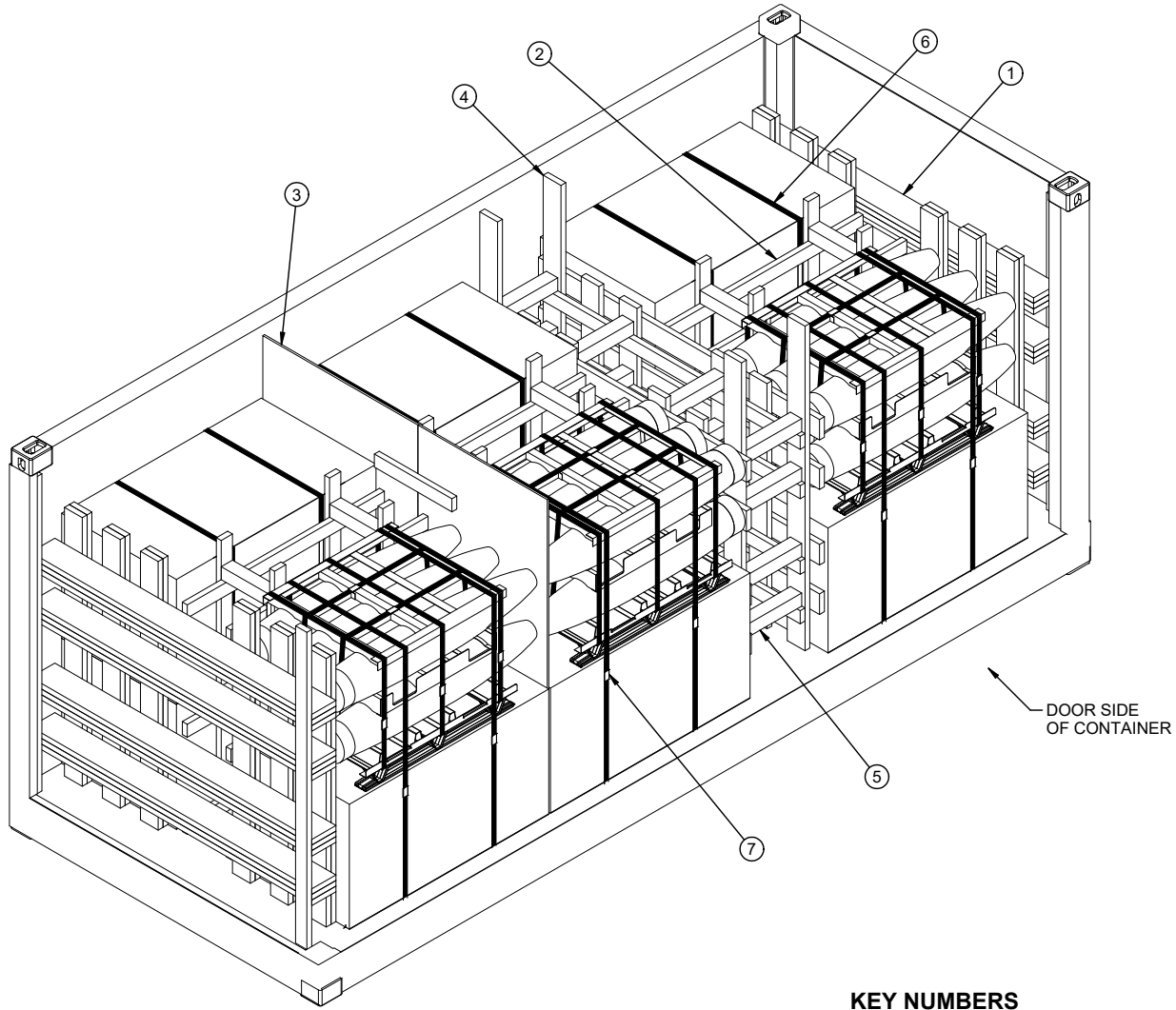
DISTRIBUTION STATEMENT A:

APPROVED FOR PUBLIC RELEASE
DISTRIBUTION IS UNLIMITED.

® THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO
BE SHIPPED BY CONTAINER-ON-FLATCAR (COFC) RAIL, MOTOR, OR WATER
CARRIERS.

U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND		CAUTION: VERIFY PRIOR TO USE AT https://www.dau.edu/cop/ammo/pages/default.aspx THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8.			
WARD.GINA. M.1369379808	Digitally signed by WARD.GINA.M.1369379808 Date: 2020.04.20 09:10:30 -05'00'	DO NOT SCALE		SEPTEMBER 1994	
		DESIGN ENGINEER	BASIC REV.		
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND		ENGINEERING DIVISON	FIEFFER.LAUR A.A.1230375727	REVISION NO. 4	
SMITH.THERESA. ANN.1009147639		TEST ENGINEER	FELICIANO.AD IN.1259200373	MARCH 2020	
Digitally signed by SMITH.THERESA.ANN.1009147 639 Date: 2020.04.22 10:03:38 -05'00'		TEST REPORT	NA	SEE THE REVISION LISTING ON PAGE 3	
U.S. ARMY DEFENSE AMMUNITION CENTER		EXPLOSIVE SAFETY DIRECTORATE	THOMAS.CARL.ANT HONY.1104621372	CLASS	DIVISION
				DRAWING	FILE
				19	48
				7126	SP15PB 1006



ISOMETRIC VIEW

KEY NUMBERS

- ① END BLOCKING ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 5.
- ② CRIB FILL (3 REQD). SEE DETAIL ON PAGE 6. POSITION BETWEEN LATERALLY ADJACENT STACKS OF BOMB PALLET UNITS.
- ③ SEPARATOR GATE (1 REQD). SEE DETAIL ON PAGE 5.
- ④ CENTER GATE (2 REQD). SEE DETAIL AND SPECIAL NOTE ON PAGE 6.
- ⑤ STRUT, 4" X 4" BY LENGTH TO SUIT (REF: 18") (16 REQD). POSITION BETWEEN THE CENTER GATES. TOENAIL TO THE CENTER GATES W/2-12d NAILS AT EACH END. SEE "BEVEL-CUT" DETAIL ON PAGE 7.
- ⑥ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 18'-6" LONG STEEL STRAPPING (12 REQD). INSTALL SO AS TO ENCIRCLE TWO PALLET UNITS AS SHOWN.
- ⑦ SEAL FOR 1-1/4" STEEL STRAPPING (12 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES. SEE GENERAL NOTE "S" ON PAGE 3.

BI LL OF MATERI AL

LUMBER	LI NEAR FEET	BOARD FEET
2" X 3"	8	4
2" X 4"	250	167
2" X 6"	303	303
2" X 8"	174	232
4" X 4"	45	60
NAI LS	NO. REQD	POUNDS
10d (3")	964	14-1/2
12d (3-1/4")	32	1/2
PLYWOOD, 1/2" - - 51.04 SQ FT REQD - - 70.18 LBS		
STEEL STRAPPING, 1-1/4" - 222' REQD - - 5.91 LBS		
SEAL FOR 1-1/4" STRAPPING - 12 REQD - - 0.50 LBS		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	12	36,420 LBS
DUNNAGE		1,616 LBS
CONTAINER		6,050 LBS
TOTAL WEIGHT		44,086 LBS (APPROX)

GENERAL NOTES

(GENERAL NOTES CONTINUED)

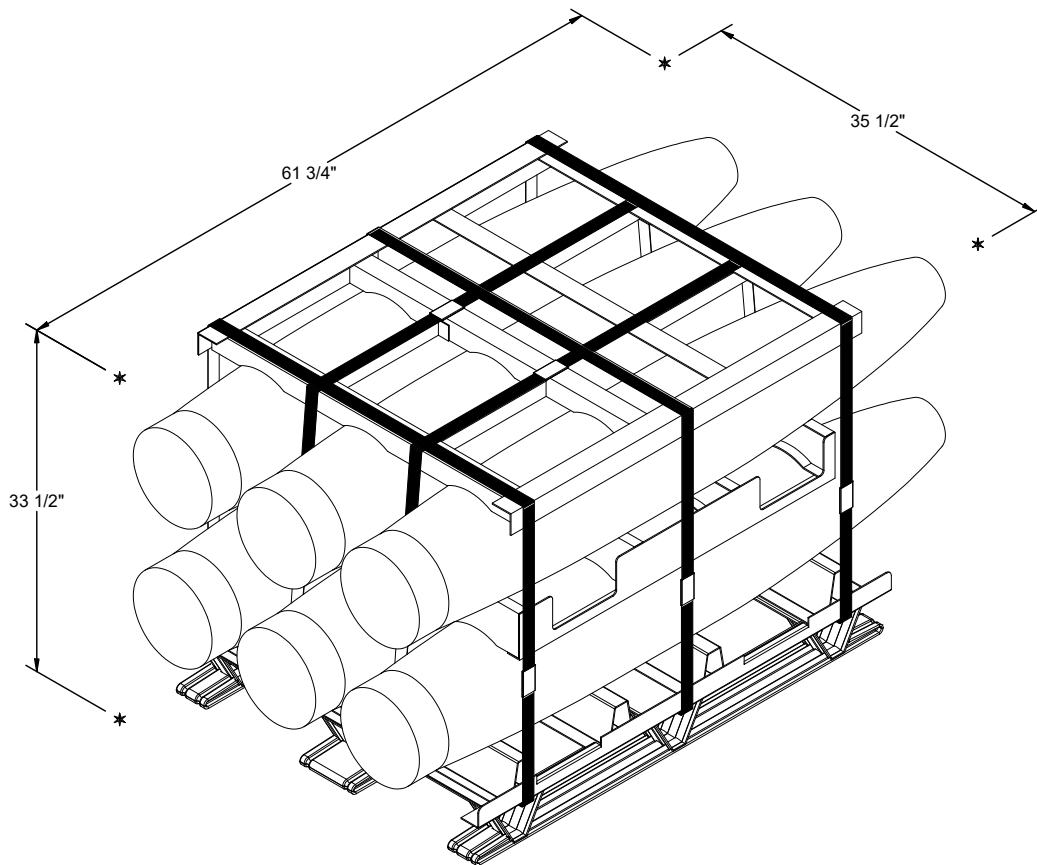
- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF MK82 (500 POUND) BOMBS ON MHU-149 METAL PALLETS. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS MHU-149 METAL PALLET WITH MK82 BOMBS INSTALLED. SEE SPI F00-294-4152 AND PAGE 4 FOR DETAILS OF THE PALLET UNIT. **CAUTION:** REGARDLESS OF THE QUANTITY OF PALLET UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE SIDE OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 6,050 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH SIDE OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-6-1/4" LONG BY 90" WIDE BY 89" HIGH, WITH A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. OLDER/OTHER CONTAINERS MAY HAVE DIFFERENT INSIDE MEASUREMENTS. VERIFY INSIDE CONTAINER DIMENSIONS PRIOR TO FABRICATING DUNNAGE. THE LOAD IS DESIGNED FOR A TRAILER/CONTAINER-ON-FLATCAR (T/COFC) SHIPMENT, HOWEVER THE LOAD AS DESIGNED CAN ALSO BE MOVED BY OTHER SURFACE MODES OF TRANSPORT. **NOTICE:** OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN BE USED.
- D. WHEN LOADING PALLET UNITS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE DUNNAGE ASSEMBLIES). THE UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS NOT TO EXCEED 1-1/2". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE VERTICAL PIECES ON THE CRIB FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE LENGTH OF THE STRUTS IN THE CRIB FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CONTAINER. THE LOADS MUST BE AS TIGHT AS POSSIBLE LONGITUDINALLY, BUT THE VOID MUST NOT EXCEED 3/4" OVERALL. EXCESSIVE SLACK CAN BE ELIMINATED BY INCREASING THE LENGTH OF THE STRUTS AGAINST THE TWO CENTER GATES.
- E. THIS DRAWING DEPICTS A 12-PALLET UNIT MAXIMUM CONFIGURATION, WITH A LADING WEIGHT OF 38,036 POUNDS. DUE TO RESTRICTIONS ENACTED BY THE SURFACE DEPLOYMENT AND DISTRIBUTION COMMAND AND THE JOINT MUNITIONS COMMAND, ANY ISO CONTAINER DESTINED TO BE MOVED OVER CONUS HIGHWAYS CAN NOT EXCEED 40,000 POUNDS GROSS WEIGHT. IN ORDER TO COMPLY WITH THIS RESTRICTION, TWO PALLET UNITS MUST BE ELIMINATED FROM THE 12-PALLET UNIT MAXIMUM LOAD. THIS WILL RESULT IN A 10-PALLET UNIT LOAD WITH A GROSS WEIGHT OF 38,016 POUNDS. SEE THE "LESS-THAN-FULL" LOAD PROCEDURES ON PAGE 8 FOR DETAILS.
- F. A STAGGERED NAILING PATTERN WILL BE USED WHENEVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES OR WHEN LAMINATING DUNNAGE. ADDITIONALLY, THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PIECE WILL NOT BE DRIVEN THROUGH ONTO OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- G. IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE ENDWALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE END BLOCKING ASSEMBLY TO PROVIDE A FLAT SURFACE FOR THE BUFFER PIECES. A PIECE OF 2" X 4", 2" X 3" OR A SPECIAL WIDTH PIECE CUT-TO-FIT CAN BE USED. THIS FILL PIECE WILL BE NAILED WITH ONE APPROPRIATELY SIZED NAIL EVERY 12". NOTE THAT SOME CONTAINERS ARE EQUIPPED WITH "TIE-BARS" IN THE CORNER SLOT, WHICH PRECLUDE THE USE OF A FULL HEIGHT FILL PIECE. WHEN "TIE-BARS" ARE PRESENT, THE FILL PIECE MUST BE INSTALLED IN SEGMENTS DESIGNED TO FIT BETWEEN THE "TIE-BARS" VERTICALLY. THE FILL PIECE(S) IS NOT REQUIRED WHEN THE CORNER PORTIONS OF THE CONTAINER FORWARD WALL ARE SMOOTH AND FLAT. DO NOT ALLOW ANY DUNNAGE ASSEMBLY TO CONTACT THE CONTAINER ENDWALLS, ONLY THE CORNER POSTS OF THE CONTAINER SHOULD BE USED FOR FORWARD LONGITUDINAL BLOCKING.
- H. WHETHER A CONTAINER IS FULL OR IS LOADED WITH A REDUCED QUANTITY OF LADING UNITS, THE LENGTHWISE CENTER OF GRAVITY OF THE LOAD MUST BE WITHIN 12", IN EITHER DIRECTION, OF THE MID-POINT OF THE CONTAINER.
- J. **CAUTION:** DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- K. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- L. **MAXIMUM LOAD WEIGHT CRITERIA:**
THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALTHOUGH THE HEAVIEST MAXIMUM LOADS ARE DELINEATED IN THE LOAD VIEWS, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOADS CAN BE ADJUSTED TO SATISFY A LESSER QUANTITY OF LADING UNITS. DEPENDING ON TRANSPORTATION ROUTING, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY "WEIGHT LAWS" OF CERTAIN STATES. ALSO, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY OTHER WEIGHT RESTRICTIONS IMPOSED ON THE INTERMODAL CONTAINER SYSTEM.
- M. REQUIREMENTS CITED WITHIN THE ASSOCIATION OF AMERICAN RAILROADS (AAR) INTERMODAL LOADING GUIDE APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC). SPECIAL T/COFC NOTES FOLLOW:

(CONTINUED AT RIGHT)

- 1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.
- 2. THE LOAD LIMIT OF A T/COFC RAILCAR MUST NOT BE EXCEEDED, NOR WILL A CAR BE LOADED SO THAT THE TRUCK UNDER ONE END OF THE CAR CARRIES MORE THAN ONE-HALF OF THE LOAD LIMIT FOR THAT CAR.
- N. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.
- P. THE QUANTITY OF PALLET UNITS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE "LESS-THAN-FULL LOAD PROCEDURE" ON PAGE 8.
- Q. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- R. LOAD-BLOCKING STRUTS WHICH ARE 48" OR LONGER MUST BE STIFFENED BY THE APPLICATION OF HORIZONTAL AND VERTICAL STRUT BRACING AS SHOWN IN THE "TYPICAL STRUT BRACING" DETAIL ON PAGE 73 OF DRAWING AMC 19-48-4267-15PA1009. BRACING IS NOT REQUIRED IF THE STRUTS FOR THE LOAD BEING SHIPPED ARE SHORTER THAN 48". THE LENGTH OF THE LOAD-BLOCKING STRUTS SHOULD BE KEPT AS SHORT AS POSSIBLE (APPROX 18" MINIMUM), BUT IN THE EVENT IT IS NECESSARY TO USE STRUTS WHICH ARE 8'-0" OR MORE IN LENGTH, IT WILL BE NECESSARY TO APPLY AN ADDITIONAL SET OF HORIZONTAL AND VERTICAL STRUT BRACING PIECES. STRUT BRACING SHOULD BE APPLIED SO AS TO PROVIDE NEARLY EQUAL SPACES BETWEEN THE BRACING PIECES AND THE CENTER GATES AND/OR BETWEEN ADJACENT STRUT BRACING PIECES. NOTE THAT HORIZONTAL STRUT BRACING PIECES FOR THE UPPER LEVEL OF STRUTS FOR ALL BUT THE UPPERMOST TIER OF A LOAD MAY BE DIFFICULT TO APPLY TO THE TOP SURFACES OF THE STRUT AS DEPICTED. STRUT BRACING WILL BE EQUALLY EFFECTIVE IF APPLIED TO THE UNDER SIDE OF THOSE STRUTS.
- S. WHEN STEEL STRAPPING IS SEALED IN AN END-OVER-END LAP JOINT, A MINIMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO SEALS, BUTTED TOGETHER WITH TWO PAIR OF CRIMPS PER SEAL, WILL BE USED TO SEAL THE JOINT WHEN A CRIMP-TYPE SEALER IS BEING USED. REFER TO THE "END-OVER-END STAP JOINTS FOR DETAILS ON PAGE 7 FOR GUIDANCE.
- T. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CONTAINERS, BETWEEN CONTAINERS AND THE SIDE OPENING CONTAINER, AND BETWEEN CONTAINERS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.

MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
- NAI LS - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
- PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
- ANTI -CHAFING MATERIAL - - - - - : MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
- HARDBOARD - - - - - : ANSI/AHA A135.4, CLASS 1.
- WI RE, CARBON STEEL - - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.



MK82 BOMBS ON MHU-149 PALLET

GROSS WEIGHT - - - - - 3,035 LBS (APPROX)
 CUBE - - - - - 42.5 CU FT (APPROX)

REVISIONS

REVISION NO. 1, DATED SEPTEMBER 2002, CONSISTS OF:

1. ADDING GENERAL NOTES "Q", "R", AND "S".
2. DIMENSIONAL CHANGES TO THE END BLOCKING ASSEMBLY, CRIB FILL, SEPARATOR GATE AND STRUT LENGTH.

REVISION NO. 2, DATED SEPTEMBER 2005, CONSISTS OF:

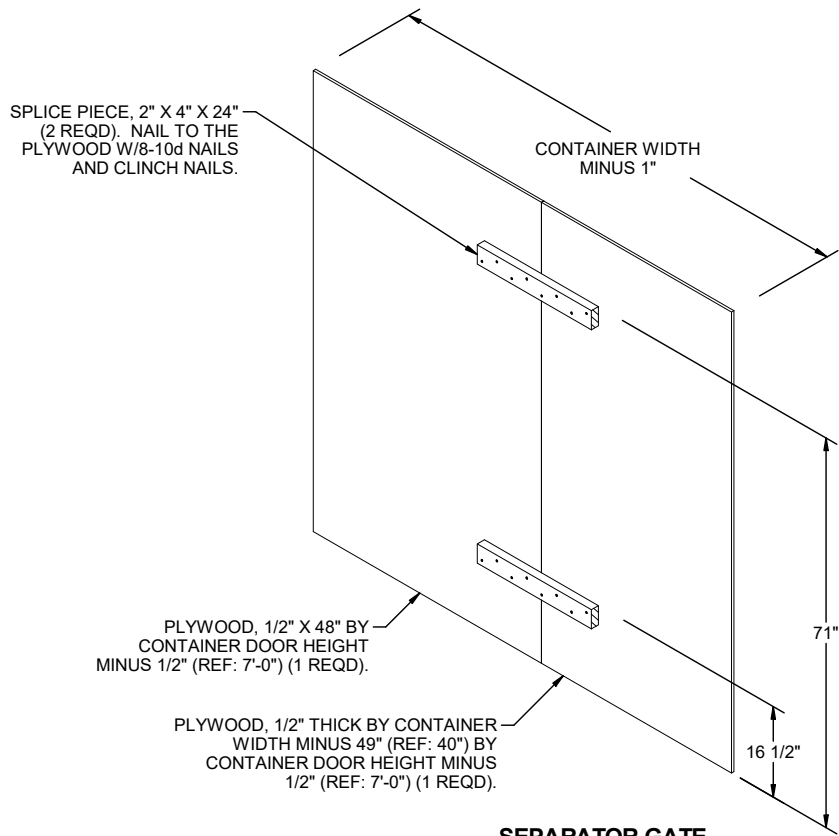
ADDING DIMENSIONS TO THE OMITTED UNIT ASSEMBLY ON PAGE 5 (NOW PAGE 8).

REVISION NO. 3, DATED DECEMBER 2006, CONSISTS OF:

1. REPOSITIONING OF OUTER LOAD BEARING PIECES ON THE END BLOCKING ASSEMBLY.
2. CLARIFYING LOCATION OF THE HOLD DOWN BLOCKS ON THE CRIB FILL ASSEMBLY.
3. IDENTIFYING THE LONGITUDINAL PIECES ON THE OMITTED UNIT ASSEMBLY.

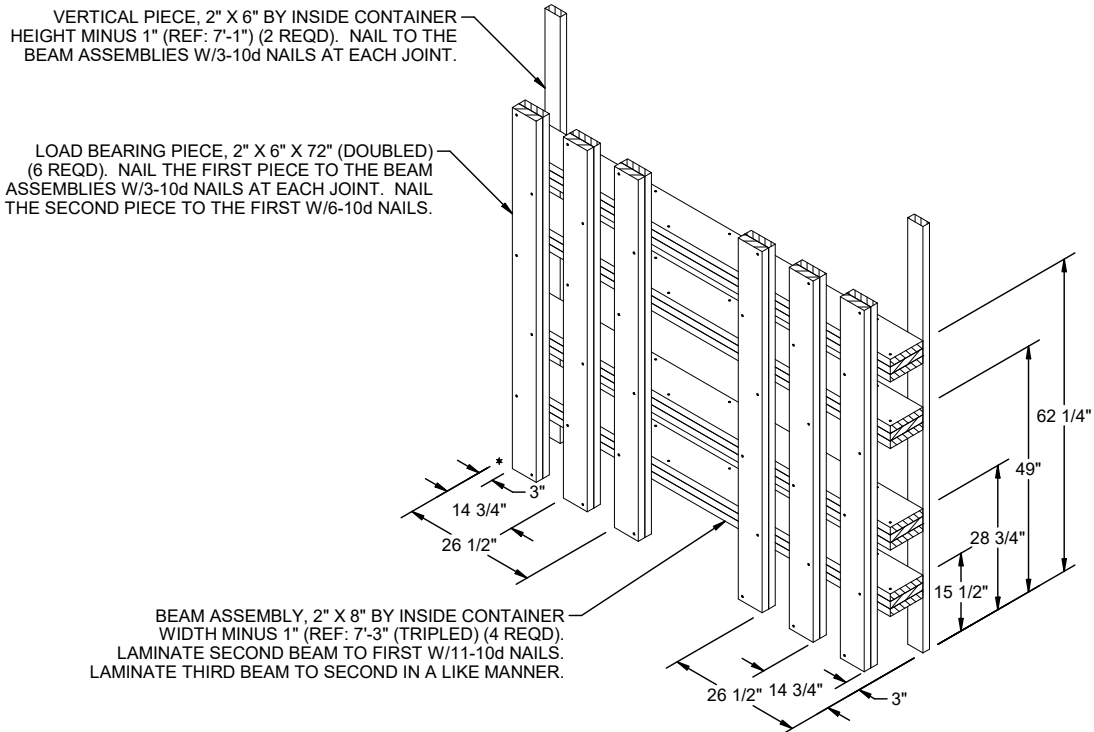
REVISION NO. 4, DATED MARCH 2020, CONSISTS OF:

1. UPDATING DRAWING FORMAT.
2. CORRECTING LOCATION OF VERTICAL PIECES ON THE END BLOCKING ASSEMBLY AND THE CENTER GATE TO BETTER ALIGN WITH BOMB NOSES.



SEPARATOR GATE

THE DETAIL ABOVE DEPICTS A SEPARATOR GATE TO BE USED WITH A TWO HIGH LOAD. FOR A ONE HIGH LOAD REPLACE THE TWO PLYWOOD PIECES WITH ONE PIECE, 1/2" THICK X 35-1/2" BY CONTAINER WIDTH MINUS 1" (REF: 7'-3"), AND ELIMINATE THE TOP SPLICE PIECE.

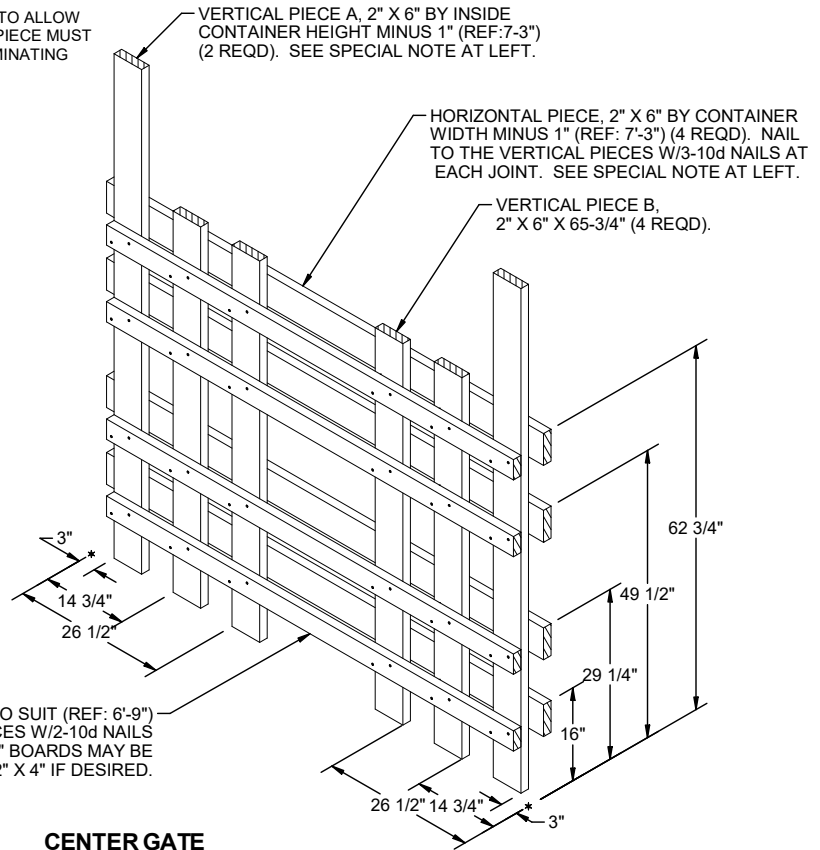


END BLOCKING ASSEMBLY

THE DETAIL ABOVE DEPICTS AN END BLOCKING ASSEMBLY TO BE USED WITH A TWO HIGH LOAD. FOR A ONE HIGH LOAD, SHORTEN THE LOAD BEARING PIECES TO 35-1/2" AND ELIMINATE THE TOP TWO BEAM ASSEMBLIES.

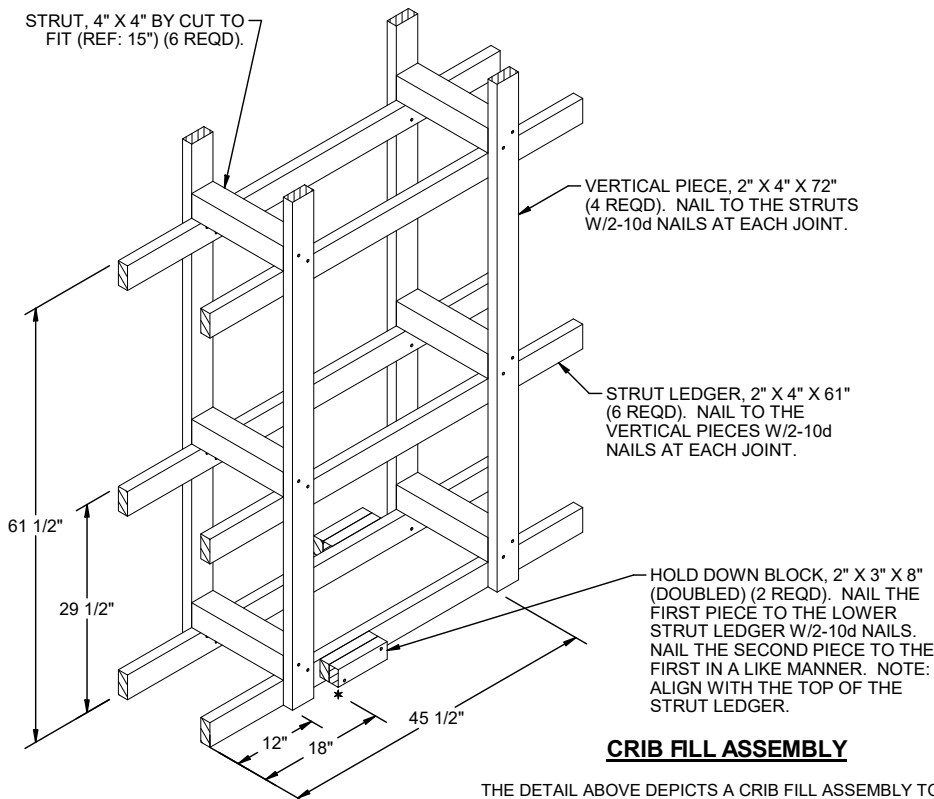
SPECIAL NOTE:

THE VERTICAL PIECES "A" ON THE CENTER GATES MAY BE SHORTENED TO ALLOW FOR THE RESTRICTED HEIGHT OF THE DOOR OPENING. THE VERTICAL PIECE MUST BE EXTENDED TO THE CONTAINER HEIGHT AFTER INSTALLATION BY LAMINATING WITH 2" X 6" MATERIAL NAILED TO THE VERTICAL PIECES.



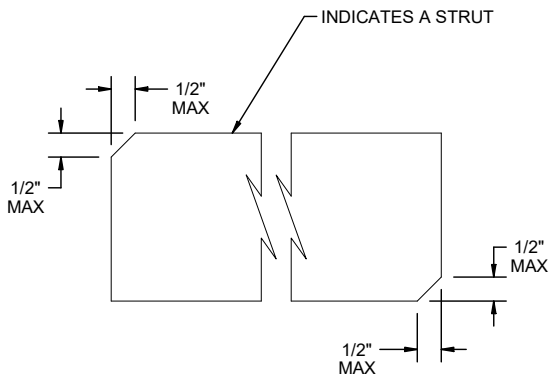
CENTER GATE

THE DETAIL ABOVE DEPICTS A CENTER GATE TO BE USED WITH A TWO HIGH LOAD. FOR A ONE HIGH LOAD, SHORTEN VERTICAL PIECES "B" TO 35-1/2" AND ELIMINATE THE TOP TWO STRUT LEDGERS AND HORIZONTAL PIECES.



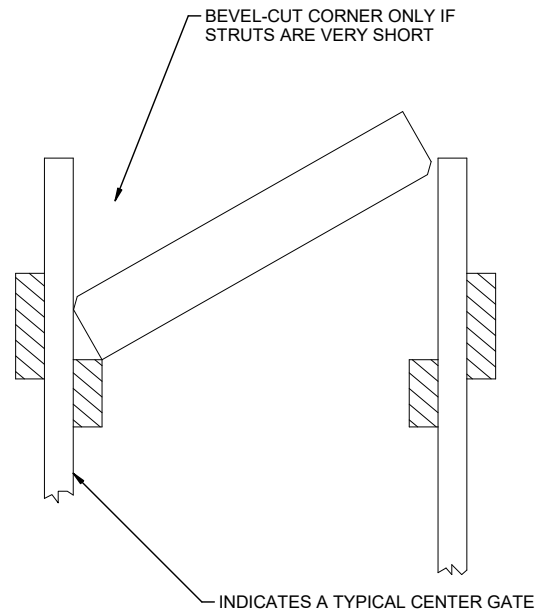
CRIB FILL ASSEMBLY

THE DETAIL ABOVE DEPICTS A CRIB FILL ASSEMBLY TO BE USED WITH A TWO HIGH LOAD. FOR A ONE HIGH LOAD, SHORTEN FOUR VERTICAL PIECES TO 35-1/2" AND ELIMINATE THE TOP TWO STRUTS AND STRUT LEDGERS.

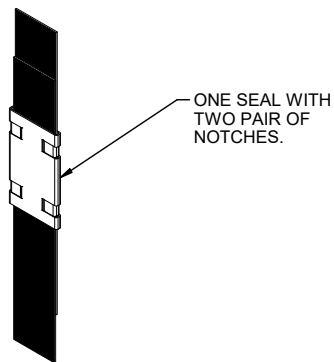


BEVEL CUT

IF DESIRED, EACH END OF A STRUT MAY BE BEVEL-CUT AS SHOWN ABOVE TO FACILITATE INSTALLING THE STRUTS WITH A "DRIVE" FIT.

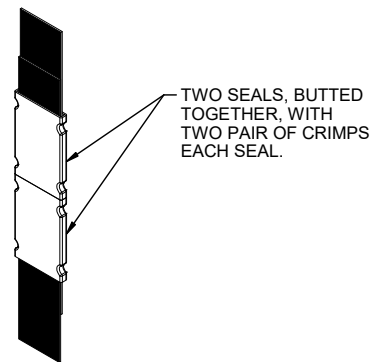


STRUT INSTALLATION



STRAP JOINT A

METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.

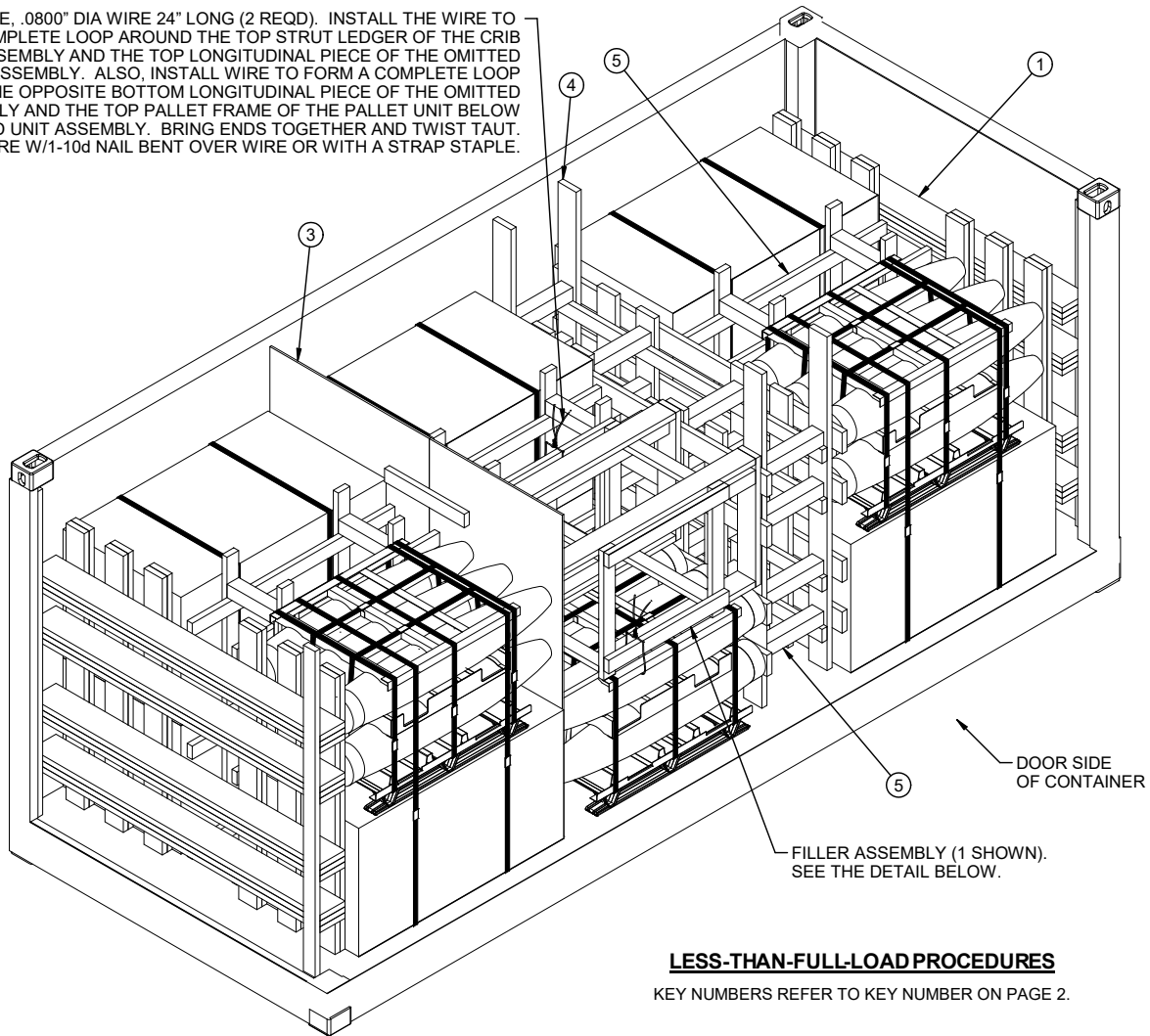


STRAP JOINT B

METHOD OF SECURING A STRAP JOINT WHEN USING A CRIMP-TYPE SEALER.

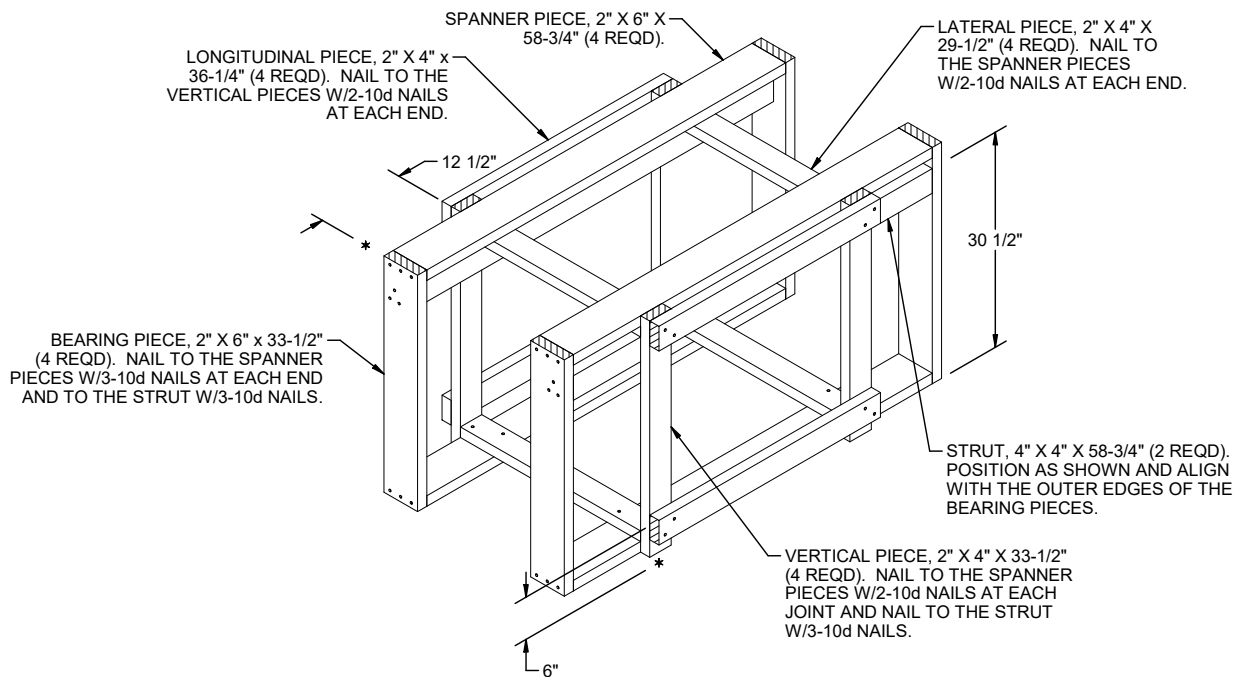
END-OVER-END LAP JOINT DETAILS

TIE WIRE, .0800" DIA WIRE 24" LONG (2 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP STRUT LEDGER OF THE CRIB FILL ASSEMBLY AND THE TOP LONGITUDINAL PIECE OF THE OMITTED UNIT ASSEMBLY. ALSO, INSTALL WIRE TO FORM A COMPLETE LOOP AROUND THE OPPOSITE BOTTOM LONGITUDINAL PIECE OF THE OMITTED UNIT ASSEMBLY AND THE TOP PALLET FRAME OF THE PALLET UNIT BELOW THE OMITTED UNIT ASSEMBLY. BRING ENDS TOGETHER AND TWIST TAUT. SECURE W/1-10d NAIL BENT OVER WIRE OR WITH A STRAP STAPLE.



LESS-THAN-FULL-LOAD PROCEDURES

KEY NUMBERS REFER TO KEY NUMBER ON PAGE 2.



OMITTED UNIT ASSEMBLY