

# MULTIPLE SYSTEMS

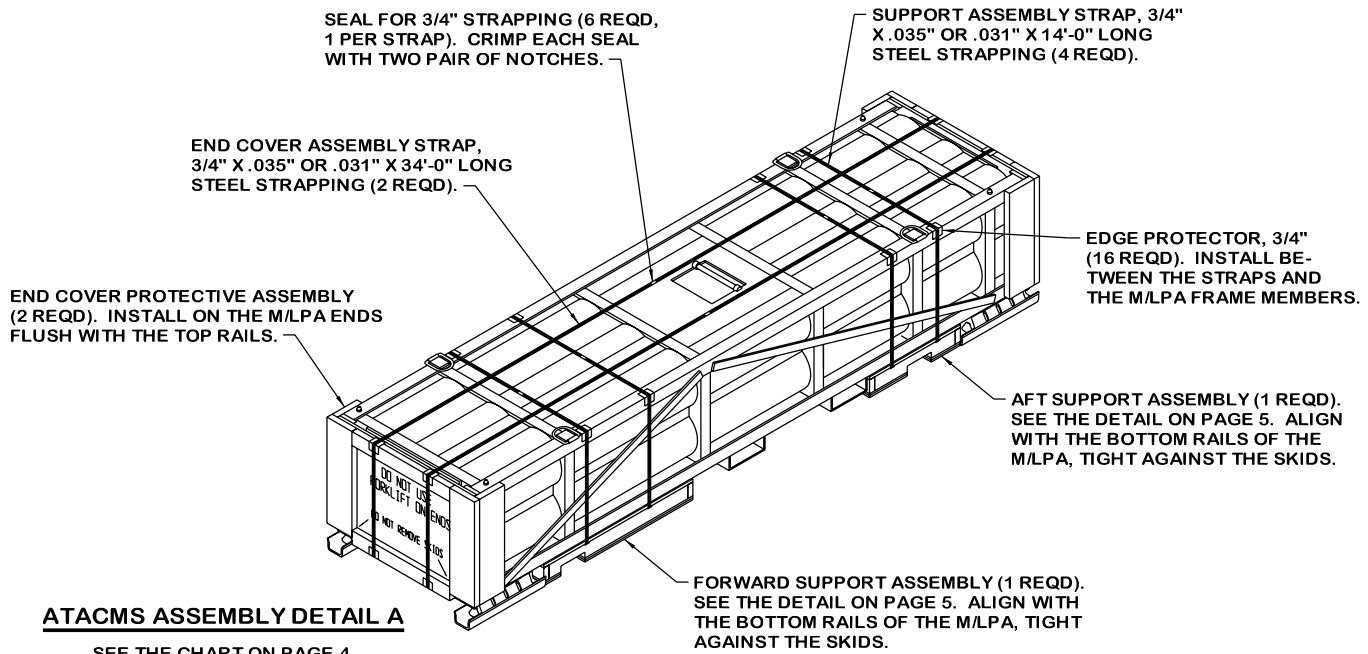
## PROTECTION OF MULTIPLE LAUNCH ROCKET SYSTEM (MLRS) FAMILY OF MUNITIONS (MFOM) FOR AIR SHIPMENT

### INDEX

<u>ITEM</u>	<u>PAGE(S)</u>
TYPICAL PROTECTION PROCEDURES - - - - -	2
GENERAL NOTES AND MATERIAL SPECIFICATIONS - - - - -	3
MFOM DETAILS - - - - -	4
DETAILS - - - - -	5-6

### U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY AVIATION AND MISSILE COMMAND  	<b>CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 6.</b>				
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND    U.S. ARMY DEFENSE AMMUNITION CENTER	DO NOT SCALE	MARCH 2006			
	ENGINEER OR TECHNICIAN	BASIC REV.	LAURA A. FIEFFER		
TRANSPORTATION ENGINEERING DIVISION			CLASS		
VALIDATION ENGINEERING DIVISION		DIVISION	DRAWING		
ENGINEERING DIRECTORATE		DIVISION	FILE		
		19	48	5276	GM20MS2



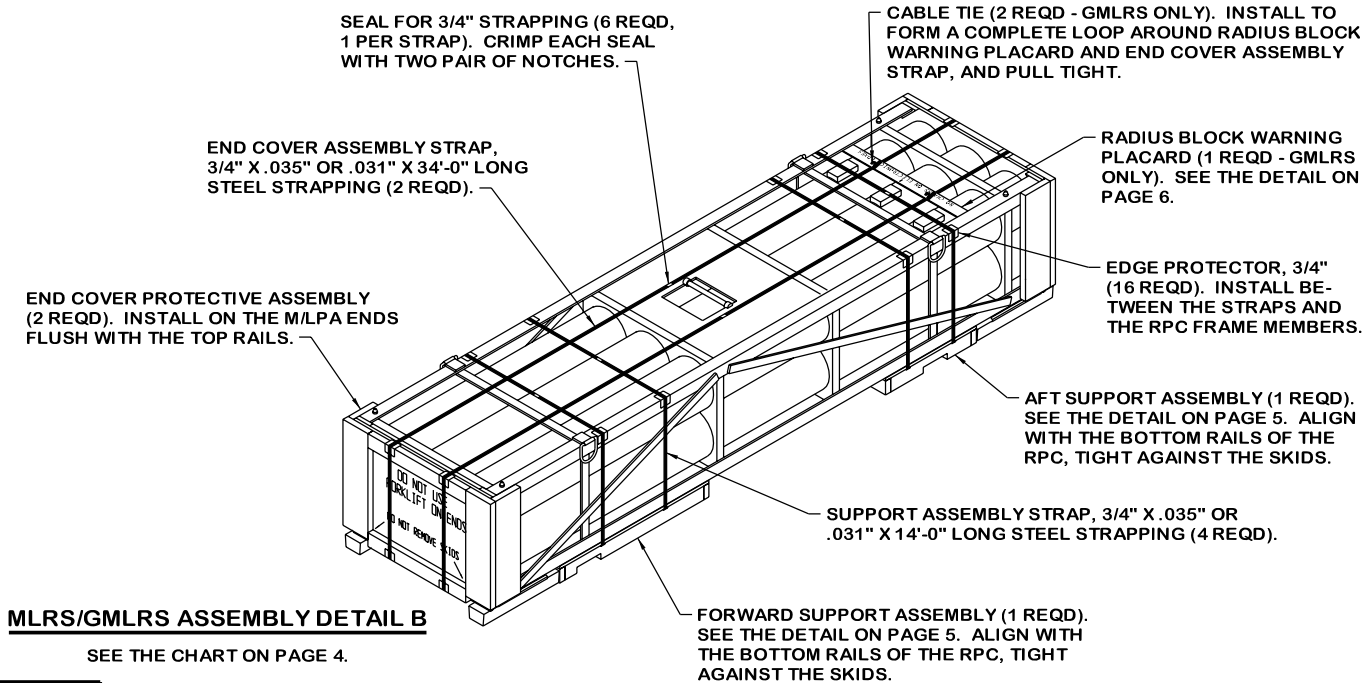
**ATACMS ASSEMBLY DETAIL A**

SEE THE CHART ON PAGE 4.

BILL OF MATERIAL (DETAIL "A")		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	17.19	5.73
2" X 4"	22.88	15.25
2" X 8"	17.83	23.78
4" X 4"	10.67	14.22
NAILS	NO. REQD	POUNDS
6d (2")	132	0.78
10d (3")	32	0.49
PLYWOOD, 1/2"	5.44 SQ FT REQD	7.49 LBS
PLYWOOD, 3/4"	16.06 SQ FT REQD	33.12 LBS
EDGE PROTECTORS, 3/4"	16 REQD	1.60 LBS
STEEL STRAPPING, 3/4"	124' REQD	11.07 LBS
SEAL FOR 3/4" STRAPPING	6 REQD	NIL

BILL OF MATERIAL (DETAIL "B")*		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	17.17	5.73
2" X 4"	22.88	15.25
2" X 8"	17.83	23.78
4" X 4"	10.67	14.22
NAILS	NO. REQD	POUNDS
6d (2")	84	0.49
10d (3")	32	0.49
PLYWOOD, 1/4"	0.82 SQ FT REQD	0.56 LBS
PLYWOOD, 3/4"	16.06 SQ FT REQD	33.12 LBS
EDGE PROTECTORS, 3/4"	16 REQD	1.60 LBS
CABLE TIES	2 REQD	NIL
STEEL STRAPPING, 3/4"	124' REQD	11.07 LBS
SEAL FOR 3/4" STRAPPING	6 REQD	NIL

\*NOTE: CABLE TIES AND 1/4" PLYWOOD ONLY REQUIRED WITH GMLRS, NOT WITH MLRS OR ATACMS BLOCK 1.



**MLRS/GMLRS ASSEMBLY DETAIL B**

SEE THE CHART ON PAGE 4.

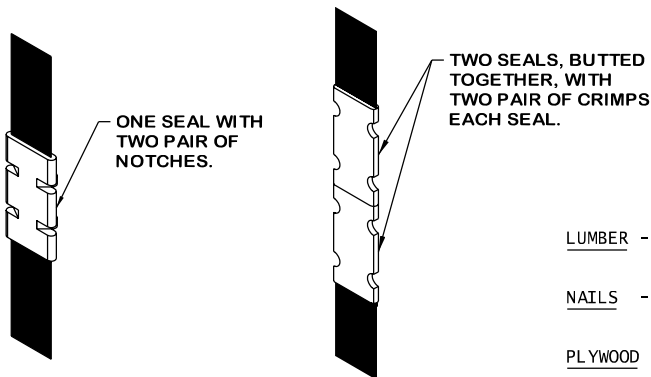
(GENERAL NOTES CONTINUED)

GENERAL NOTES

- H. 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.
- J. RECOMMENDED SEQUENTIAL ASSEMBLY PROCEDURES:
  1. PREFABRICATE ONE FORWARD SUPPORT ASSEMBLY, ONE AFT SUPPORT ASSEMBLY, TWO END COVER PROTECTIVE ASSEMBLIES, AND ONE RADIUS BLOCK WARNING PLACARD (FOR GMLRS ONLY).
  2. REMOVE THE M/LPA FORKLIFT GUIDES (ATACMS ONLY).
  3. INSTALL THE TWO END COVER PROTECTIVE ASSEMBLIES SO THE TOP EDGE IS FLUSH WITH THE TOP RAIL CORNERS.
  4. INSTALL THE TWO END COVER STRAPS APPROXIMATELY 15-1/2" FROM THE OUTSIDE EDGES OF THE M/LPA OR RPC, TIGHTENING SNUG, BUT NOT SO TIGHT AS TO MAKE THE PLYWOOD COVERS BOW INWARD AGAINST THE END COVERS. TIGHTEN AND SEAL.
  5. REATTACH THE M/LPA FORKLIFT GUIDES (ATACMS ONLY).
  6. PRE-INSTALL THE SUPPORT ASSEMBLY STRAPS THROUGH THE STRAP SLOTS IN THE 4" X 4" PIECES OF THE FORWARD AND AFT SUPPORT ASSEMBLIES.
  7. LIFT THE M/LPA OR RPC, TAKING CARE TO AVOID THE END COVER STRAPS, AND POSITION ON TOP OF THE SUPPORT ASSEMBLIES SUCH THAT THE SUPPORT ASSEMBLIES ARE TIGHT AGAINST THE M/LPA OR RPC SKIDS, AND ALIGNED WITH THE RAILS OF THE M/LPA OR RPC. NOTCHES ON THE BOTTOM SUPPORT ASSEMBLIES MUST ALIGN WITH THE M/LPA OR RPC LIFTING RING TO ALLOW FOR STACKING.
  8. TIGHTEN AND SEAL THE SUPPORT ASSEMBLY STRAPS, TAKING CARE NOT TO CUT INTO THE SUPPORT ASSEMBLY LUMBER.
  9. INSTALL THE RADIUS BLOCK WARNING PLACARD (GMLRS ONLY), BETWEEN THE AFT END OF THE RPC AND THE RADIUS BLOCKS, OVER THE END COVER STRAPS. PLACE THE ENDS OF THE PLACARD UNDER THE TOP RAILS. SECURE THE PLACARD TO THE END COVER STRAPS WITH TWO CABLE TIES.

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO THE MULTIPLE LAUNCH ROCKET SYSTEM (MLRS) FAMILY OF MUNITIONS (MFOM) LOADED INTO ATACMS MISSILE/LAUNCH POD ASSEMBLIES (M/LPAS) OR MLRS OR GMLRS ROCKET POD CONTAINERS (RPCS). SUBSEQUENT REFERENCE TO M/LPAS OR RPCS MEANS M/LPAS OR RPCS WITH THE MUNITIONS. SEE PAGE 4 FOR DETAILS OF THE MFOM.
- C. WHEN STEEL STRAPPING IS SEALED AT 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 "STRAP JOINT A" AND "STRAP JOINT B" DETAILS BELOW FOR GUIDANCE.
- D. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- E. A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. 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 THE PIECE ONTO OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- F. INDIVIDUAL PIECES OF ASSEMBLIES SHOULD BE CUT TO WITHIN 1/8" OF THE DIMENSIONS GIVEN IN THIS DRAWING AND DIMENSIONS FOR EACH COMPLETED ASSEMBLY SHOULD BE AS CLOSE AS POSSIBLE TO THOSE GIVEN. SOME SMALL ADJUSTMENTS TO THE ASSEMBLIES WILL BE REQUIRED TO ALLOW THEM TO FIT ONTO THE M/LPAS OR RPCS, BUT ASSEMBLIES MUST NOT BE FORCED TO FIT.
- G. ALL NON-MANUFACTURED WOOD USED IN THE DUNNAGE ASSEMBLIES SHALL BE HEAT TREATED TO A CORE TEMPERATURE OF 56 DEGREES CELSIUS FOR A MINIMUM OF 30 MINUTES. THE MANUFACTURER OF WOOD TO BUILD DUNNAGE ASSEMBLIES SHALL BE AFFILIATED WITH AN INSPECTION AGENCY ACCREDITED BY THE AMERICAN LUMBER STANDARDS COMMITTEE. THE MANUFACTURER OF WOOD USED TO BUILD DUNNAGE ASSEMBLIES SHALL ENSURE TRACEABILITY TO THE ORIGINAL SOURCE OF HEAT TREATMENT. EACH DUNNAGE ASSEMBLY SHALL BE MARKED TO SHOW THE CONFORMANCE TO THE INTERNATIONAL PLANT PROTECTION CONVENTION STANDARD. DUNNAGE ASSEMBLIES MADE OF NON-MANUFACTURED WOOD SHALL BE HEAT TREATED AND MARKED APPROPRIATELY. THE QUALITY MARK FOR THE DUNNAGE ASSEMBLIES SHALL BE PLACED ON TWO OPPOSITE SIDES. FOREIGN MANUFACTURERS SHALL HAVE THE HEAT TREATMENT OF NON-MANUFACTURED WOOD PRODUCTS VERIFIED IN ACCORDANCE WITH THEIR NATIONAL PLANT PROTECTION ORGANIZATION'S COMPLIANCE PROGRAM.

(CONTINUED AT LEFT)



**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.

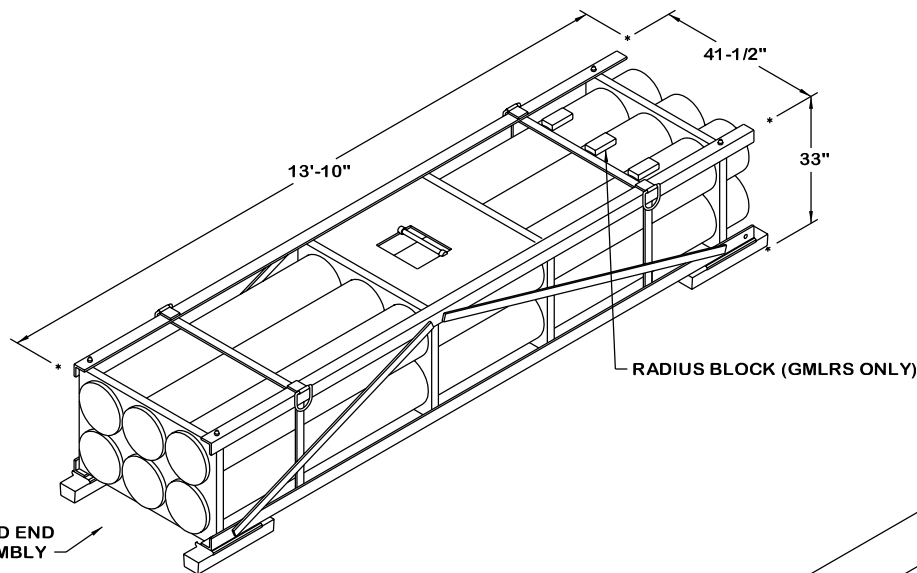
**END-OVER-END LAP JOINT DETAILS**

**MATERIAL SPECIFICATIONS**

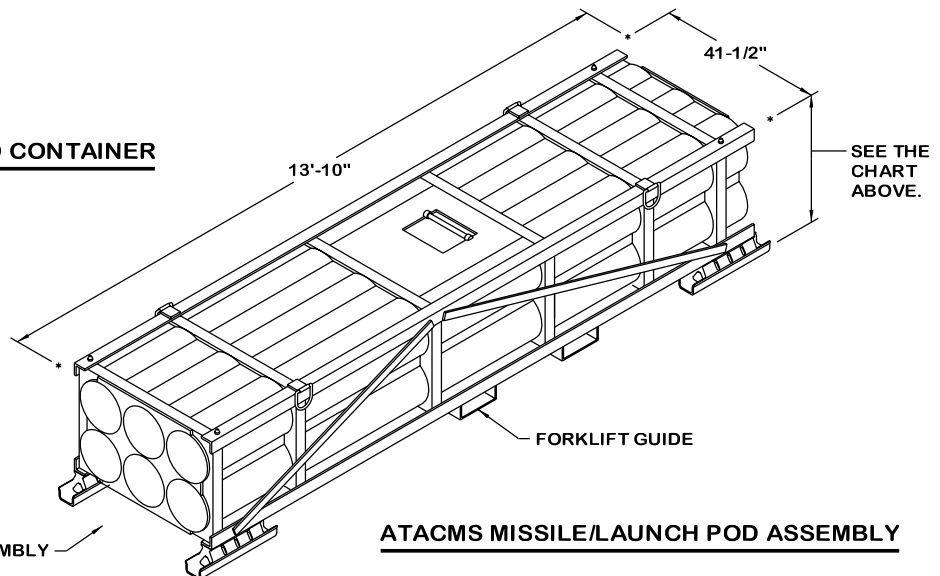
<u>LUMBER</u> - - - - -	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
<u>NAILS</u> - - - - -	ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
<u>PLYWOOD</u> - - - - -	COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
<u>STRAPPING, STEEL</u> - - -	ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
<u>SEAL, STRAP</u> - - - - -	ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
<u>CABLE TIE</u> - - - - -	BLACK NYLON, COMMERCIAL GRADE, ULTRAVIOLET LIGHT-RESISTANT.
<u>EDGE PROTECTOR, STEEL</u> - - - - -	STEEL EDGE PROTECTOR, SIGNODE MODEL 7 OR EG3A OR EQUIVALENT.

**MISSILE/LAUNCH POD ASSEMBLY AND ROCKET POD CONTAINER DETAILS**

NSN	DODIC	TYPE	SKID	PAGE 2 DETAIL	LENGTH	WIDTH	HEIGHT	WEIGHT (LBS)	CUBE (CU FT)
1427-00-000-0195	PL81	BLOCK I	13031726	"A"	13' -10"	41-1/2"	32-5/8"	5,105	129.7
1427-01-274-3904	PL81	BLOCK I	13031726	"A"	13' -10"	41-1/2"	32-5/8"	4,814	129.7
1427-01-386-3113	PL81	BLOCK I	13031726	"A"	13' -10"	41-1/2"	32-5/8"	5,111	129.7
1427-01-398-6538	PL38	BLOCK IA	13365803	"B"	13' -10"	41-1/2"	33-3/4"	4,640	134.6
1427-01-463-0001	PL38	BLOCK IA	13365803	"B"	13' -10"	41-1/2"	33-3/4"	4,640	134.6
1427-01-439-8639	PL47	BLOCK II	13330979	"B"	13' -10"	41-1/2"	33-3/4"	4,985	134.6
1427-01-480-8516	PL65	UNITARY	13365803	"B"	13' -10"	41-1/2"	33-3/4"	4,694	134.6
1427-01-511-2143	PL65	UNITARY	13365803	"B"	13' -10"	41-1/2"	33-3/4"	4,682	134.6
1340-01-122-3506	H104	MLRS-BASIC	13031726	"A"	13' -10"	41-1/2"	33"	5,095	131.5
1340-01-450-5876	H186	MLRS-ER	13031726	"A"	13' -10"	41-1/2"	33"	5,091	131.5
1340-01-149-0918	H108	MLRS-PRACTICE	13031726	"A"	13' -10"	41-1/2"	33"	5,095	131.5
1340-01-370-9666	H185	MLRS-RRPR	13031726	"A"	13' -10"	41-1/2"	33"	5,091	131.5
1340-01-484-9001	H185	MLRS-RRPR	13031726	"A"	13' -10"	41-1/2"	33"	5,005	131.5
1340-01-490-9695	HA22	GMLRS DPICM	13031726	"A"	13' -10"	41-1/2"	33"	5,071	131.5
1340-01-517-4757	HA37	GMLRS UNITARY	13031726	"A"	13' -10"	41-1/2"	33"	5,093	131.5



**MLRS OR GMLRS ROCKET POD CONTAINER**



**ATACMS MISSILE/LAUNCH POD ASSEMBLY**

TIE PIECE, 1" X 4" X 26-1/2" (2 REQD).  
NAIL TO THE LONGITUDINAL PIECES  
W/2-6d NAILS AT EACH END AND TO  
THE LATERAL PIECE W/3-6d NAILS.

LONGITUDINAL PIECE, 2" X 4" X  
40-1/8" (2 REQD). NAIL TO THE  
LATERAL PIECES W/2-10d NAILS  
AT EACH END.

FILL PIECE, PLYWOOD, 1/2"  
X 3-1/2" X 11" (DOUBLED) (2  
REQD). NAIL THE FIRST PIECE  
TO THE LATERAL PIECE W/3-6d  
NAILS. LAMINATE THE SECOND  
PIECE TO THE FIRST W/3-6d  
NAILS. SEE NOTE BELOW.

1-1/4" X 1/4" NOTCH (4 PLACES).

STRAP RETAINER PIECE, 1" X 4" X 33-1/8" (1 REQD).  
NAIL TO THE LONGITUDINAL PIECE W/6-6d NAILS.

LATERAL PIECE, 4" X 4" X 23-1/2"  
(2 REQD). CUT NOTCH AS SHOWN  
PRIOR TO ASSEMBLY.

7" X 1-1/2" NOTCH (2 PLACES).

1/4"

1-1/2"

FILL PIECE, PLYWOOD,  
1/2" X 3-1/2" X 8-1/2"  
(DOUBLED) (2 REQD).  
NAIL THE FIRST PIECE  
TO THE LATERAL PIECE  
W/3-6d NAILS. LAMINATE  
THE SECOND PIECE TO  
THE FIRST W/3-6d NAILS.  
SEE NOTE BELOW.

4-1/2"

1-1/4"

4-1/2"

9-1/2"

### AFT SUPPORT ASSEMBLY

NOTE: PLYWOOD FILL PIECES ONLY REQUIRED  
WHEN THE ASSEMBLY IS TO BE USED WITH AN  
M/LPA THAT IS EQUIPPED WITH SKID PART NUMBERS  
13365803 OR 13330979. THESE PIECES WILL BE  
ELIMINATED WHEN USED WITH ANY OTHER SKIDS.

TIE PIECE, 1" X 4" X 43-1/2" (2 REQD).  
NAIL TO THE LONGITUDINAL PIECES  
W/2-10d NAILS AT EACH END AND TO  
THE LATERAL PIECE W/5-10d NAILS.

LONGITUDINAL PIECE, 2" X 4" X  
40-1/8" (2 REQD). NAIL TO THE  
LATERAL PIECES W/2-10d NAILS  
AT EACH END.

FILL PIECE, PLYWOOD, 1/2" X  
3-1/2" X 5" (DOUBLED) (2 REQD).  
NAIL THE FIRST PIECE TO THE  
LATERAL PIECE W/2-6d NAILS.  
LAMINATE THE SECOND PIECE  
TO THE FIRST W/2-6d NAILS.  
SEE NOTE BELOW.

7" X 1-1/2" NOTCH (2 PLACES).

1-1/4" X 1/4" NOTCH (4 PLACES).

STRAP RETAINER PIECE, 1" X 4" X  
33-1/8" (1 REQD). NAIL TO THE  
LONGITUDINAL PIECE W/6-6d  
NAILS.

1/4"

LATERAL PIECE, 4" X  
4" X 40-1/2" (2 REQD).  
CUT NOTCHES AS  
SHOWN PRIOR TO  
ASSEMBLY.

10-1/2"

1-1/4"

28-3/4"

FILL PIECE, PLYWOOD, 1/2" X 3-1/2" X 31-1/2"  
(DOUBLED) (2 REQD). NAIL THE FIRST  
PIECE TO THE LATERAL PIECE W/4-6d  
NAILS. LAMINATE THE SECOND  
PIECE TO THE FIRST  
W/4-6d NAILS. SEE NOTE BELOW.

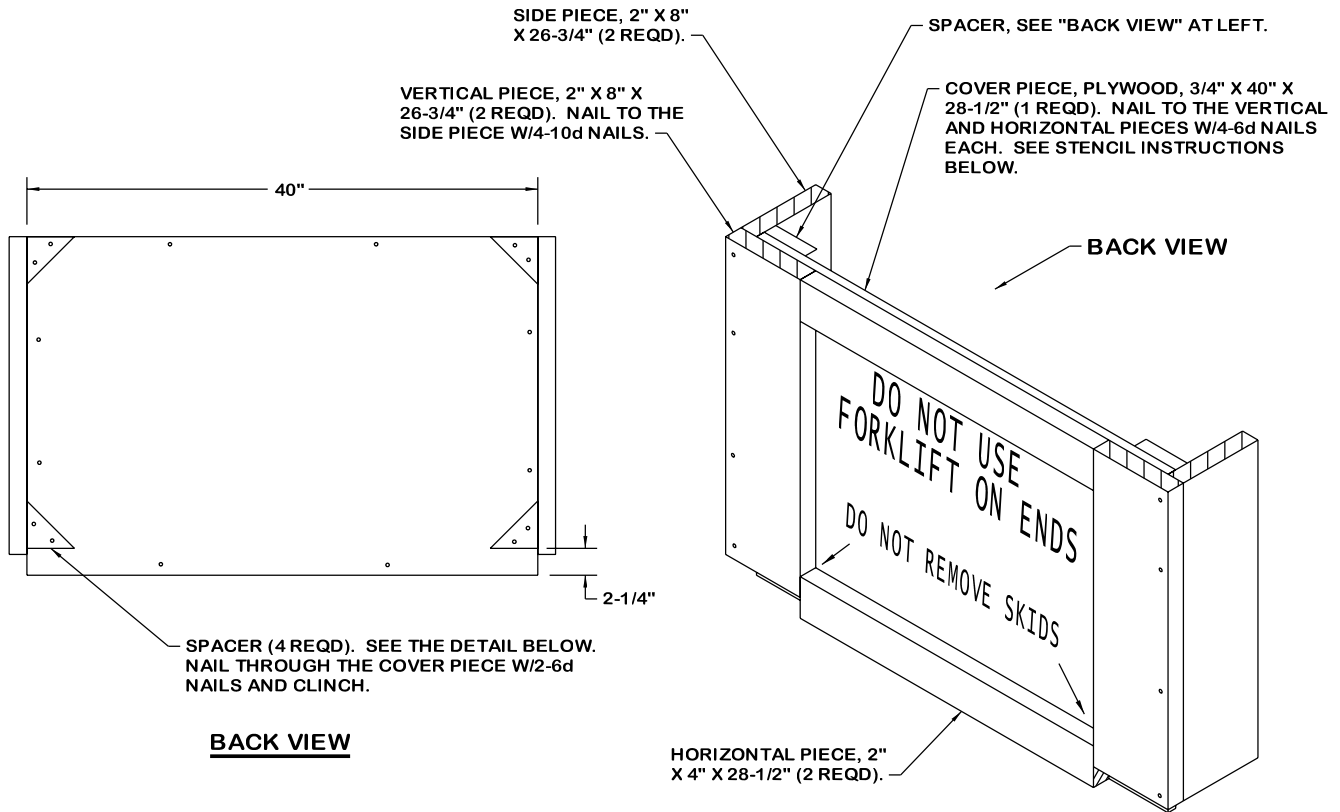
1-1/2"

3-1/2"

7"

### FORWARD SUPPORT ASSEMBLY

NOTE: PLYWOOD FILL PIECES ONLY REQUIRED  
WHEN THE ASSEMBLY IS TO BE USED WITH AN  
M/LPA THAT IS EQUIPPED WITH SKID PART NUMBERS  
13365803 OR 13330979. THESE PIECES WILL BE  
ELIMINATED WHEN USED WITH ANY OTHER SKIDS.

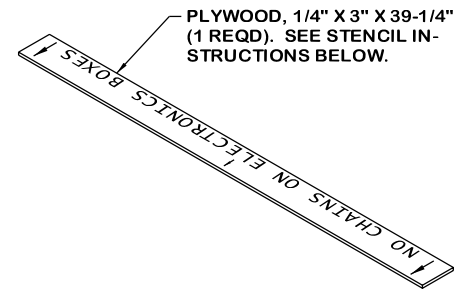


**END COVER SUPPORT ASSEMBLY STENCIL INSTRUCTIONS:**

ALL LETTERS BLOCK CAPITAL LETTERS, COLOR BLACK, +/-1/16"

1. STENCIL (2" HIGH, 1/4" WIDE, 3/4" SPACING) "DO NOT USE" ON ONE LINE, AND "FORKLIFT ON ENDS" ON SECOND. POSITION FIRST LINE 1" +/-1/2" BELOW BOTTOM OF TOP HORIZONTAL PIECE AND CENTER BETWEEN VERTICAL PIECES. POSITION SECOND LINE 1-1/2" +/-1/2" BELOW FIRST LINE AND CENTERED.
2. STENCIL (1-1/2" HIGH, 1/4" WIDE, 1/2" SPACING) "DO NOT REMOVE SKIDS". POSITION BOTTOM OF LINE 5" +/-1/2" FROM TOP OF BOTTOM HORIZONTAL PIECE AND CENTER BETWEEN VERTICAL PIECES.
3. STENCIL TWO ARROWS (2" WIDE X 5" LONG) POINTING APPROXIMATELY TOWARD SKIDS.

**END COVER PROTECTIVE ASSEMBLY**



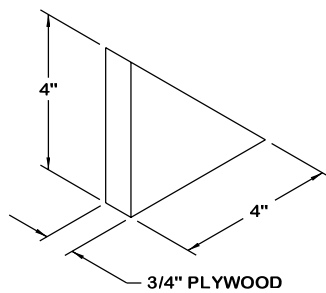
**RADIUS BLOCK WARNING PLACARD**

(FOR USE WITH GMLRS ONLY)

**RADIUS BLOCK WARNING STENCIL INSTRUCTIONS:**

ALL LETTERS BLOCK CAPITAL LETTERS, COLOR BLACK, +/-1/16"

1. STENCIL (1" HIGH, 3/16" WIDE, 1/2" SPACING) "NO CHAINS ON ELECTRONICS BOXES". CENTER MARKING 1/2" +/-1/4" FROM BOTTOM EDGE OF PLYWOOD.
2. STENCIL THREE ARROWS (1/2" WIDE X 2-1/2" LONG - OUTER ARROWS OR 1-1/2" LONG - MIDDLE ARROW) POINTING APPROXIMATELY TOWARD RADIUS BLOCKS.



**SPACER**

TO PROVIDE ADDITIONAL SPACE BETWEEN THE NEW STYLE AFT END COVER AND THE END COVER PROTECTIVE ASSEMBLY, SPACER PIECES, AS DEPICTED ABOVE MUST BE USED. THE SPACER PIECES SHALL BE LOCATED SO THAT THEY CONTACT EITHER THE BOTTOM OR TOP RAIL OF THE M/LPA.