

APPROVED BY
 MECH DIV AAR, THEIR LETTER
 DATED 6 Jan 77 FILE LR-11.0.48
 SIGNED Frank L. Row
 DATE 7 March 1977
 TEA, MTMC, FT EUSTIS, VA.

LOADING AND BRACING ON FLAT CAR OF 105 MM HOWITZER, XM204

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				U.S. ARMY DARCOM DRAWING			
				MARCH 1977			
				CLASS	DIVISION	DRAWING	FILE
				19	48	8100	5WE1

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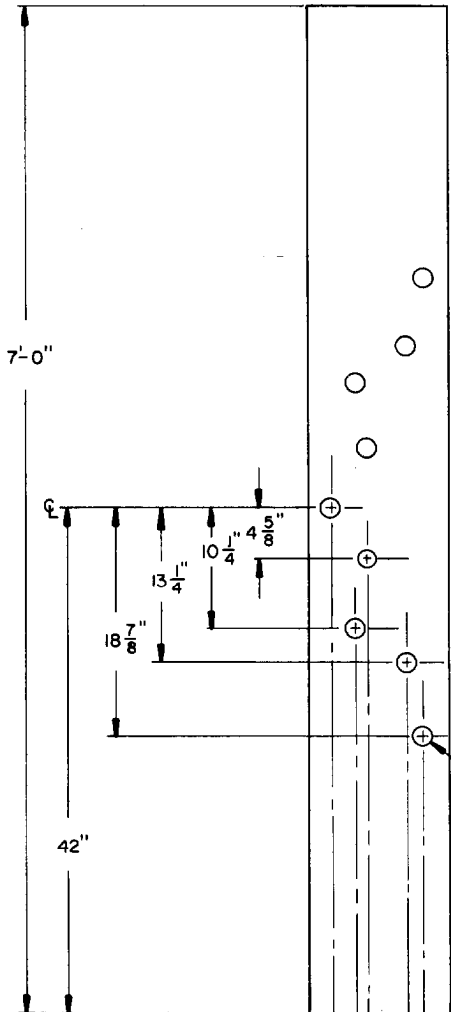
GENERAL NOTES

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1.
- B. THE LOAD AS SHOWN IS BASED ON FLAT CARS 9'-2" WIDE (PLATFORM). WIDER CARS MAY BE USED. ONLY ONE UNIT OF LADING IS SHOWN; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A CAR IF SPACE PERMITS. THE NUMBER OF UNITS TO BE LOADED ON A CAR WILL BE DEPENDENT ON THE SIZE OF THE CAR OR THE QUANTITIES OF UNITS TO BE SHIPPED, WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT. SEE GENERAL NOTE "K" BELOW.
- C. LADING DATA FOR THE 105MM HOWITZER:
- ITEM DIMENSIONS ----- 15'-6" LONG BY 6'-5" WIDE BY 4'-6" HIGH.
ITEM GROSS WEIGHT ---- 4,778 POUNDS (APPROX).
- D. REFER TO ASSOCIATION OF AMERICAN RAILROADS MANUAL, "GENERAL RULES GOVERNING THE LOADING OF COMMODITIES ON OPEN TOP CARS", FOR APPLICABLE LOADING RULES: PREFACE, 1-A, 2, 3, 4, 5, 9, 14 AND 15. ADDITIONALLY ALL HAND BRAKES MUST BE "SET" WITH THE HAND LEVERS WIRE TIED.
- E. ONLY CARS WITH "SOUND" FLOORS WILL BE USED. CARS WITH STEEL FLOOR ENDS AND/OR EXPOSED STEEL BOLSTERS WHICH INTERFERE WITH PROPER POSITIONING OR NAILING OF THE DUNNAGE WILL NOT BE USED.
- F. WHEN ANY STRAP IS SEALED AT AN END-OVER-END LAP JOINT AS SHOWN IN THE "STRAP THREADING DETAIL" ON PAGE 6, OR AS SHOWN IN "DETAIL A" AND "DETAIL B" ON PAGE 6, A MINIMUM OF TWO (2) SEALS, BUTTED TOGETHER, WITH TWO (2) PAIR OF CRIMPS PER SEAL MUST BE USED.
- G. CAUTION: STAKE POCKETS WILL BE USED FOR ANCHORING TIE DOWN STRAPPING WHENEVER POSSIBLE. DO NOT USE SWIVEL RING TYPE ANCHOR DEVICES. IF OTHER TYPES ARE USED, THEY MUST BE OF SUFFICIENT WIDTH TO RECEIVE 2" STRAPPING, AND ALSO BE OF A DESIGN WHICH WILL PROVIDE A BEARING SURFACE ACROSS THE FULL WIDTH OF THE STRAPPING THAT WILL NOT DEFORM A STRAP, ESPECIALLY AT THE EDGES, WHEN IT IS TENSIONED. SEE GENERAL NOTE "L" BELOW.
- H. NOTICE: A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. THE NAILING PATTERN WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL DOES NOT PENETRATE INTO OR NEAR A CRACK BETWEEN THE FLOOR BOARDS. 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.
- J. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE UNLESS OTHERWISE DIMENSIONED. FOR EXAMPLE, 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE AND 4" X 4" MATERIAL IS ACTUALLY 3-1/2" THICK BY 3-1/2" WIDE.
- K. WHEN SHIPPING ONE (1) AND/OR TWO (2) HOWITZERS A FLAT CAR LONGER THAN 40'-6" SHOULD NOT BE ORDERED. WHEN SHIPPING THREE (3) HOWITZERS A FLAT CAR LONGER THAN 49'-0" SHOULD NOT BE ORDERED.
- L. THE LOAD AS SHOWN IN THE "ISOMETRIC VIEW" ON PAGE 4, THE "ELEVATION VIEW" ON PAGE 5 AND "PLAN VIEW" ON PAGE 5 IS BASED ON FLAT CARS HAVING STAKE POCKETS SPACED 42" CENTER-TO-CENTER. FLAT CARS HAVING STAKE POCKETS SPACED OTHER THAN SHOWN MAY BE USED, HOWEVER, THEY MUST BE SPACED IN SUCH A MANNER THAT WHEN THE CENTER HOLD-DOWN STRAP IS PROPERLY POSITIONED THE TWO END HOLD-DOWN STRAPS WILL BE IN APPROXIMATELY THE SAME POSITION AS SHOWN. MINOR VARIATIONS ARE PERMITTED, SUCH AS THE NUMBERING OF THE STAKE POCKETS MAY VARY FROM THAT SHOWN; HOWEVER, THE SPECIFIED INTENT OF THE PROCEDURES SHALL BE ACHIEVED.
- M. THE HOWITZERS MUST BE POSITIONED ON THE FLAT CAR 8" OFF CENTER Laterally, TOWARD THE LEFT SIDE OF THE HOWITZER AS SHOWN. THIS PERMITS AN OFF SET LOADING PATTERN AS SHOWN IN THE "PLAN VIEW" ON PAGE 5 AND ALSO GIVES MORE CLEARANCE BETWEEN THE CENTER HOLD-DOWN STRAP AND THE ROD HOLDING BRACKET LOCATED ON THE RIGHT SIDE OF THE HOWITZER.

MATERIAL SPECIFICATIONS

- LUMBER ----- : DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS ----- : COMMON, CEMENT COATED OR CHEMICALLY ETCHED.
REF: FED SPEC FF-N-105.
ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.
- STRAPPING, STEEL - : CLASS I, TYPE I, HEAVY DUTY, FINISH A, B (GRADE 2), OR C, FED SPEC QQ-5-781.
- STAKE POCKET PROTECTOR ----- : COMMERCIAL GRADE.
- SEAL, STRAP ----- : TYPE D, STYLE I, II, OR IV, CLASS H, FED SPEC QQ-5-781.
- WIRE ----- : ANNEALED, BLACK. REF: FED SPEC QQ-W-461.

FIRING BASE SUPPORT ASSEMBLY.
2" X 4" X 6'-0" (DOUBLED)
LAMINATE W/1-10d NAIL AT
EACH END.

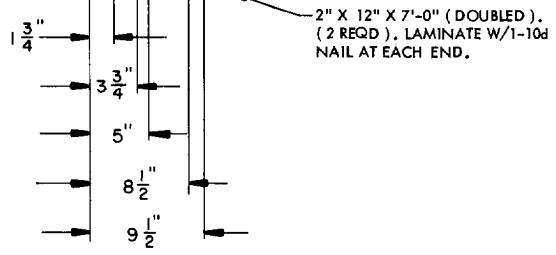
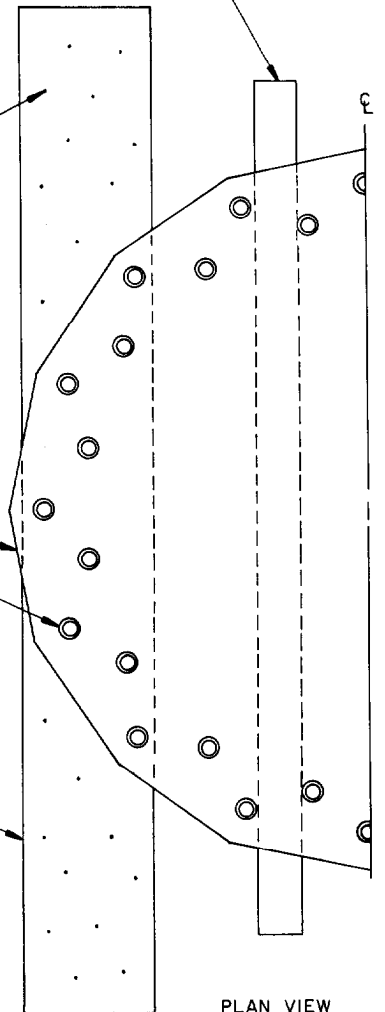


INDICATES NAILING.

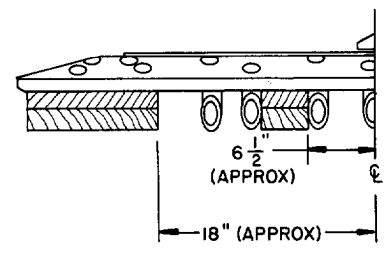
FIRING BASE.

FIRING BASE SPIKES.

HOWITZER RETAINING
ASSEMBLY.

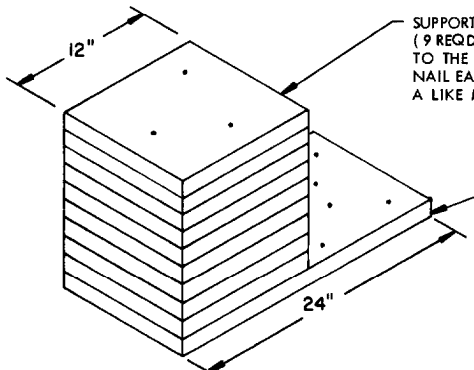


HOWITZER RETAINING ASSEMBLY

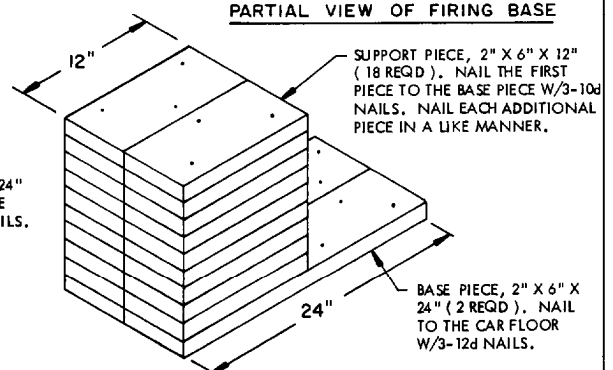


THESE ASSEMBLIES ARE SYMMETRICAL AND WILL BE USED ON BOTH SIDES OF THE FIRING BASE.

PARTIAL VIEW OF FIRING BASE

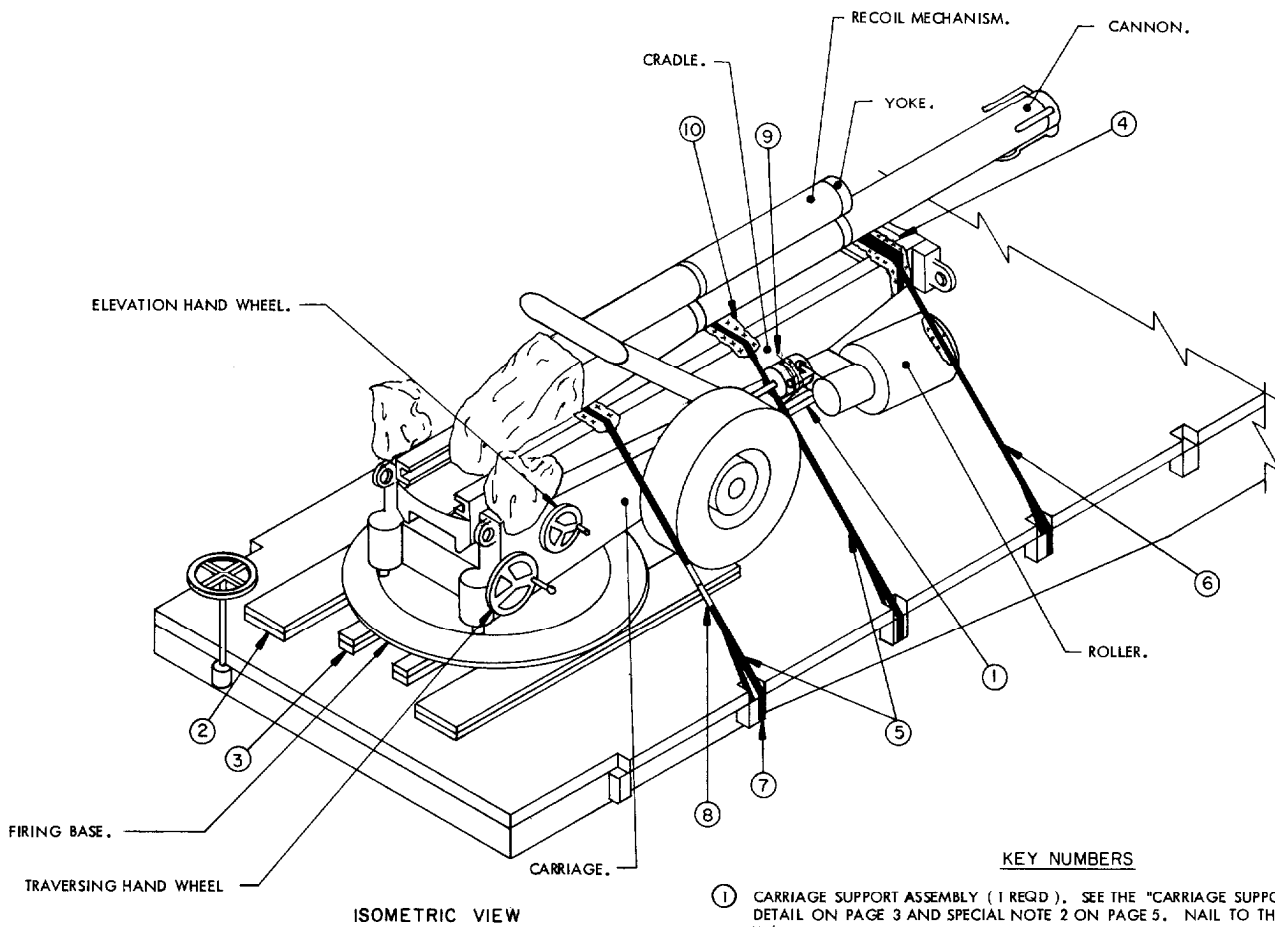


CARRIAGE SUPPORT ASSEMBLY



ALTERNATIVE CARRIAGE SUPPORT ASSEMBLY

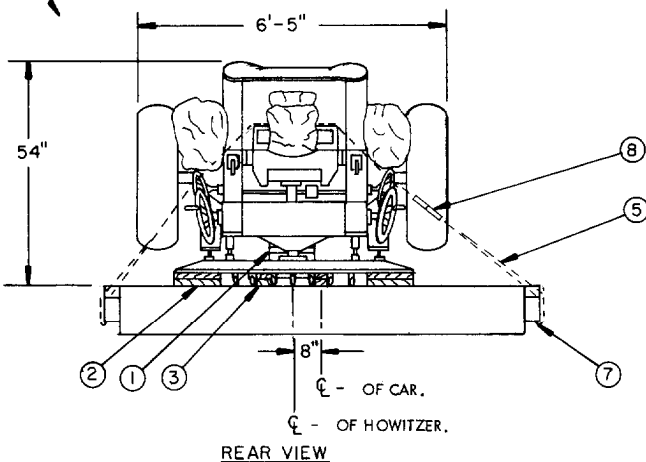
IF 2" X 12" MATERIAL IS NOT AVAILABLE 2" X 6" MATERIAL MAY BE USED. SEE THE ALTERNATIVE CARRIAGE SUPPORT ASSEMBLY ON THIS PAGE.

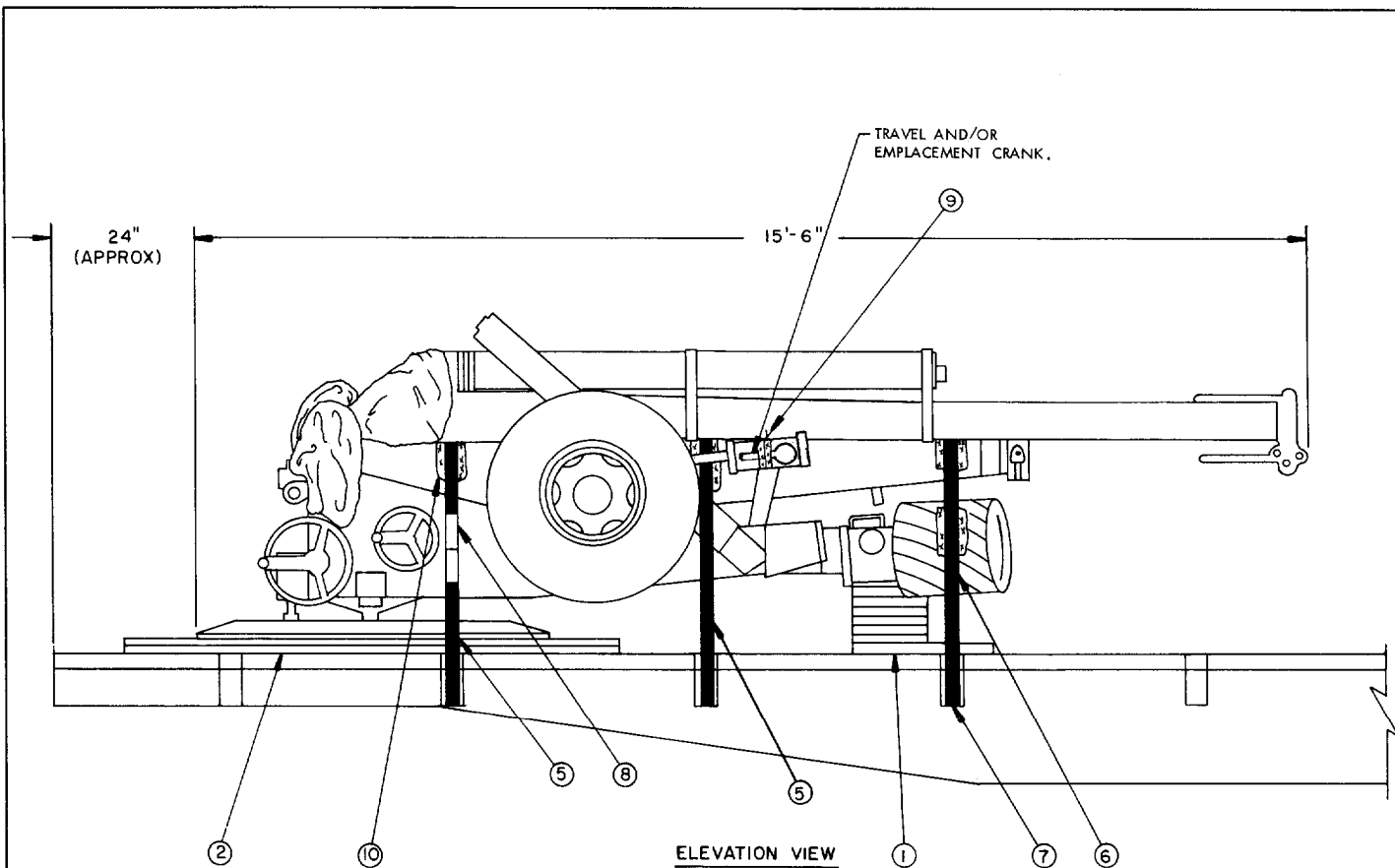


KEY NUMBERS

- ① CARRIAGE SUPPORT ASSEMBLY (1 REQD). SEE THE "CARRIAGE SUPPORT ASSEMBLY" DETAIL ON PAGE 3 AND SPECIAL NOTE 2 ON PAGE 5. NAIL TO THE CAR FLOOR W/6-12d NAILS.
- ② HOWITZER RETAINING ASSEMBLY (2 REQD). SEE THE "HOWITZER RETAINING ASSEMBLY" DETAIL AND THE "PARTIAL VIEW OF FIRING BASE" DETAIL ON PAGE 3 AND SPECIAL NOTE 3 ON PAGE 5. NAIL TO THE CAR FLOOR, THROUGH EACH DOUBLED 2" X 12" ASSEMBLY, W/10-50d NAILS AT EACH END.
- ③ FIRING BASE SUPPORT ASSEMBLY, 2" X 4" X 6'-0" (DOUBLED) (2 REQD). SEE THE "PARTIAL VIEW OF FIRING BASE" DETAIL ON PAGE 3 AND SPECIAL NOTE 3 ON PAGE 5. NAIL TO THE CAR FLOOR, THROUGH EACH DOUBLED 2" X 4" ASSEMBLY, W/3-40d NAILS AT THE REAR END OF EACH ASSEMBLY ONLY.
- ④ CRADLE SPACER ASSEMBLY (1 REQD). SEE THE "CRADLE SPACER ASSEMBLY" DETAIL AND THE "STRAP THREADING DETAIL" ON PAGE 6.
- ⑤ HOLD-DOWN STRAPPING, 2" X .050" X 22'-0" LONG STEEL STRAPPING (2 REQD). INSTALL EACH STRAP FROM ONE PIECE OF STRAPPING; ANCHOR IT TO A STAKE POCKET ON ONE SIDE OF THE CAR, THREAD IT OVER THE CRADLE (UNDER THE CANNON AS SHOWN), PASS IT THROUGH A STAKE POCKET ON THE OTHER SIDE OF THE CAR AND BRING IT BACK UP ABOVE THE POCKET WHERE IT CAN BE TENSIONED AND SEALED. INSTALL THESE STRAPS PRIOR TO PIECES MARKED ④.
- ⑥ HOLD-DOWN/SIDE RETAINER STRAPPING, 2" X .050" X 22'-0" LONG STEEL STRAPPING (2 REQD). INSTALL EACH STRAP TO FORM A COMPLETE LOOP THROUGH STAKE POCKET ON ONE SIDE OF CAR, AROUND THE CRADLE, AND LAPPED-BACK-ON-SELF WHERE IT CAN BE TENSIONED AND SEALED. SEE THE "STRAP THREADING DETAIL" ON PAGE 6.
- ⑦ PAD, 2" X .050" STEEL STRAPPING 24" LONG (6 REQD). POSITION UNDER STAKE POCKET AND SEAL TO PIECES MARKED ⑤ AND/OR ⑥. SEE "DETAIL A" ON PAGE 6. ALTERNATIVE: STAKE POCKET PROTECTOR (12 REQD). USE TWO (2) UNDER EACH STAKE POCKET WITH PIECES MARKED ⑤ AND/OR ⑥. SEE "DETAIL B" ON PAGE 6.
- ⑧ SEAL FOR 2" STRAPPING (18 REQD, 6 PER EACH PIECE MARKED ⑤ AND 3 PER EACH PIECE MARKED ⑥) EXCEPT FOR SEALS USED TO SECURE THE PADS, PIECES MARKED ⑦, DOUBLE CRIMP EACH SEAL.
- ⑨ WIRE, NO. 14 GAGE, SOFT ANNEALED, (AS REQD). WIRE TIE THE TRAVEL AND/OR EMPLACEMENT CRANK WITH THREE WRAPS AROUND THE CRANK AND THE CRANK HOUSING. TWIST ENDS TOGETHER. SEE SPECIAL NOTE 3 ON PAGE 5.
- ⑩ WATER PROOF PAPER OR BURLAP OF A SUFFICIENT SIZE TO POSITION UNDER STRAPPING AND/OR WIRE AT ALL POINTS OF CONTACT WITH THE HOWITZER.

LEFT SIDE OF HOWITZER.





ELEVATION VIEW

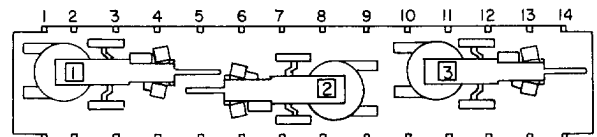
SPECIAL NOTES:

1. POSITION A HOWITZER 8" OFF CENTER Laterally, TOWARD THE LEFT SIDE OF THE HOWITZER, AS SHOWN, WITH THE FIRING BASE NEAR THE END OF THE RAILCAR, AND IN SUCH A MANNER THAT THE STEEL STRAP HOLD-DOWNS WILL BE IN VERTICAL ALIGNMENT WHILE UTILIZING THE SECOND, THIRD, AND FOURTH STAKE POCKETS FROM THE END OF THE RAILCAR. SEE THE "REAR VIEW" ON PAGE 4, THE "ELEVATION VIEW" ABOVE, AND THE "PLAN VIEW" BELOW. SEE GENERAL NOTE "M" ON PAGE 2.
2. AFTER THE HOWITZER IS PROPERLY LOCATED ON THE RAILCAR, AND IS IN A TOWING POSITION, POSITION THE CARRIAGE SUPPORT ASSEMBLY UNDER THE FORWARD END OF THE CARRIAGE AS SHOWN IN THE "ELEVATION VIEW" ON THIS PAGE. DO NOT NAIL UNTIL FINAL ADJUSTMENTS ARE MADE. SEE SPECIAL NOTE 3.
3. LOWER THE FIRING BASE BY TURNING THE TRAVEL AND/OR EMPLACEMENT CRANK LOCATED ON THE RIGHT SIDE OF THE HOWITZER. AS THE FIRING BASE IS BEING LOWERED POSITION THE HOWITZER RETAINING ASSEMBLIES UNDER IT MAKING SURE THE 9 SPIKES ON EACH SIDE OF THE FIRING BASE ARE PROPERLY SEATED INTO THE 9 HOLES IN THE HOWITZER RETAINER ASSEMBLIES. JUST BEFORE THE FIRING BASE IS ALL THE WAY DOWN, SLIDE THE FIRING BASE SUPPORT ASSEMBLIES INTO PLACE, CONTINUE TO CRANK UNTIL THE WHEELS ARE ALL THE WAY UP. WIRE TIE THE CRANK TO KEEP IT FROM TURNING DURING TRANSIT. MAKE FINAL LONGITUDINAL ADJUSTMENTS TO ALIGN THE HOWITZER WITH THE STAKE POCKETS AND THEN NAIL THE HOWITZER RETAINING ASSEMBLIES, THE FIRING BASE SUPPORT ASSEMBLIES, AND THE CARRIAGE SUPPORT ASSEMBLY INTO PLACE.
4. THE CANNON MUST BE LOWERED UNTIL THE CRADLE RESTS ON THE CARRIAGE.

(CONTINUED AT RIGHT)

(SPECIAL NOTES CONTINUED FROM LEFT)

5. STEEL STRAPPING, SHOWN AS PIECES MARKED ⑤, MUST BE POSITIONED FROM A STAKE POCKET ON ONE SIDE OF THE RAILCAR OVER THE CRADLE TO A STAKE POCKET ON THE OTHER SIDE OF THE RAILCAR AS STRAIGHT AS POSSIBLE. AVOID TWISTING AND/OR BENDING THE STRAPS, MAKING SURE THEY FORM A STRAIGHT LINE FROM THE EDGE OF THE CRADLE TO A STAKE POCKET. THE MIDDLE HOLD-DOWN STRAP MUST BE THREADED UNDER THE TRAVEL AND/OR EMPLACEMENT CRANK SHAFT LOCATED ON THE RIGHT SIDE OF THE HOWITZER, AS SHOWN IN THE ELEVATION VIEW ABOVE. STRAPS MUST NOT PASS OVER THE TOP OF BRACKETS AND/OR OTHER APPURTENANCES.
6. FOR MAXIMUM UTILIZATION OF THE RAILCAR AN OFF-CENTER LOADING PATTERN IS REQUIRED. POSITION THE SECOND HOWITZER 8" OFF CENTER Laterally, TOWARD THE OPPOSITE SIDE OF THE RAILCAR, WITH THE FIRING BASE TOWARD THE OPPOSITE END OF THE RAILCAR, AND WITH THE CANNON OVERLAPPING THE CANNON OF THE FIRST HOWITZER BY APPROXIMATELY 40". POSITION THE HOWITZER IN SUCH A MANNER THAT THE STEEL STRAP HOLD-DOWN WILL BE IN VERTICAL ALIGNMENT WHILE UTILIZING THE SIXTH, SEVENTH, AND EIGHTH STAKE POCKETS FROM THE END OF THE RAILCAR. SEE THE "PLAN VIEW" BELOW.
7. POSITION THE THIRD HOWITZER 8" OFF CENTER Laterally, TOWARD THE LEFT SIDE OF THE HOWITZER AND IN ALIGNMENT WITH THE FIRST HOWITZER AND WITH THE FIRING BASE TOWARD THE SAME END OF THE RAILCAR AS THE FIRST HOWITZER. POSITION THE HOWITZER IN SUCH A MANNER THAT THE STEEL STRAP HOLD-DOWN WILL BE IN VERTICAL ALIGNMENT WHILE UTILIZING THE ELEVENTH, TWELFTH, AND THIRTEENTH STAKE POCKETS FROM THE END OF THE RAILCAR. SEE THE "PLAN VIEW" BELOW.



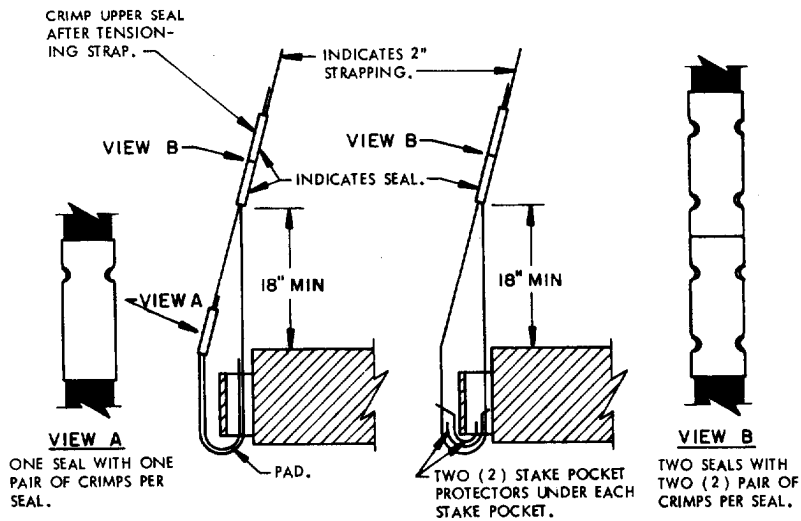
PLAN VIEW

SEE GENERAL NOTE "L" ON PAGE 2.

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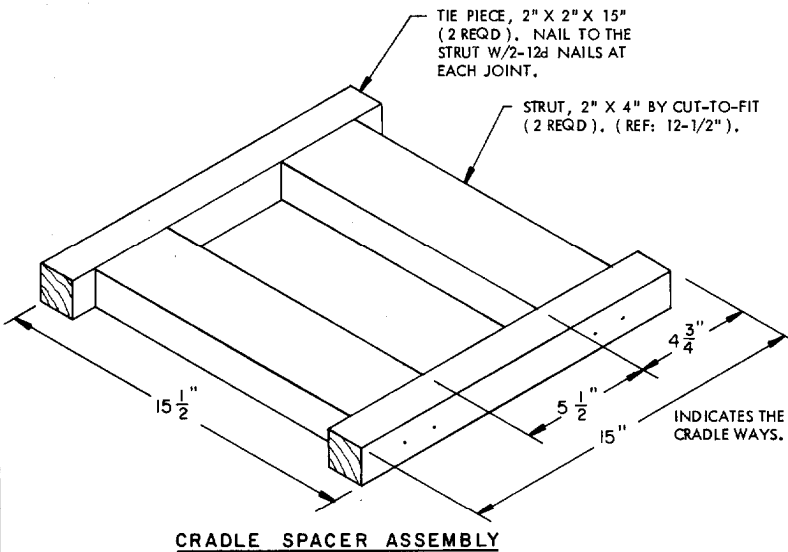
ITEM	QUANTITY	WEIGHT (APPROX)
105MM HOWITZER-----	1-----	4,778 LBS
DUNNAGE-----		238 LBS
TOTAL WEIGHT-----		5,016 LBS

BILL OF MATERIAL (ONE HOWITZER)		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	3	1
2" X 4"	27	18
2" X 12"	39	78
NAILS	NO. REQD	POUNDS
10d (3")	27	1/2
12d (3-1/4")	14	1/4
40d (5")	6	1/2
50d (5-1/2")	40	4
STEEL STRAPPING, 2" X .050"-----	100' REQD-----	34 LBS
SEAL FOR 2" STEEL STRAPPING-----	18 REQD-----	4 LBS
WATERPROOF PAPER OR BURLAP-----	AS REQD-----	NIL
WIRE, NO. 14 GAGE-----	AS REQD-----	NIL

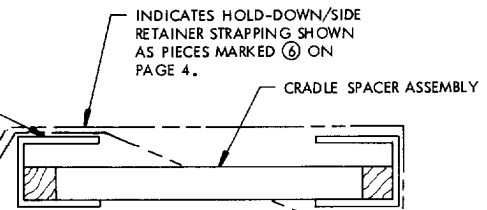


DETAIL A
METHOD OF INSTALLING 2" STRAPPING AND PAD AT STAKE POCKET.

DETAIL B
METHOD OF INSTALLING 2" STRAPPING AND STAKE POCKET PROTECTORS (ALT PAD).



SLIDE THE CRADLE SPACER ASSEMBLY INTO POSITION BETWEEN THE CRADLE WAYS, AS SHOWN IN THE STRAP THREADING DETAIL ON THIS PAGE, UNTIL THE STRUT CONTACTS THE YOKE WHICH SECURES THE RECOIL MECHANISM TO THE CANNON.



INSTALL EACH STRAP TO FORM A COMPLETE LOOP THROUGH THE STAKE POCKET ON ONE SIDE OF THE CAR, OVER THE TOP OF THE NEAR CRADLE WAY, DOWN BETWEEN THE STRUTS OF THE CRADLE SPACER ASSEMBLY, UNDER THE FAR CRADLE WAY, UP-OVER THE FAR CRADLE WAY, BACK OVER THE TOP OF THE NEAR CRADLE WAY, LAP-BACK-ON-SELF AND SEAL WITH TWO SEALS, AS SHOWN.

INDICATES STAKE POCKET ON THE CAR.