

**TECHNICAL BULLETIN
TEST PROCEDURES**

**DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE LEVELS LOAD TESTING HEAVY
EXPANDED MOBILITY TACTICAL TRUCK (HEMTT)
VEHICLE CRANES**

M977 CARGO TRUCK W/O WINCH W/GROVE MODEL M977 CRANE	2320-01-099-6426
M977 CARGO TRUCK W/WINCH W/GROVE MODEL M977 CRANE	2320-01-097-0260
M984 WRECKER W/HIAB MODEL 8109 CRANE	2320-01-097-0248
M984EI WRECKER W/GROVE MODEL M984 CRANE	2320-01-195-7641
M985 CARGO TRUCK W/O WINCH W/GROVE MODEL M985 CRANE	23204-01-100-7673
M985 CARGO TRUCK W/WINCH W/GROVE MODEL M985 CRANE	2320-01-097-0261
M985EI CARGO TRUCK W/WINCH W/HIAB MODEL 8108/8108-2 CRANE	2320-01-194-7032
M985EI CARGO TRUCK W/O WINCH W/HIAB MODEL 8108/8108-2 CRANE	2320-01-194-7031

HEADQUARTERS, DEPARTMENT OF THE ARMY

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23 DECEMBER 1988

WARNING

When loads are applied to the boom cable, all personnel must move away to a safe distance. If the load falls, it could cause serious injury or death to personnel.

Always wear heavy leather gloves when handling wire rope. Never let wire rope run through hands. Frayed wire rope can cut hands.

Grove M984 is used on M984E1 wrecker. The crane used on the M984 wrecker is the HIAB model 8109. Failure to use proper procedure for crane load testing may result in injury to personnel and/or damage to equipment.

Rotate crane either left or right, but never over crane operator. Injury to personnel and/or damage to equipment may occur if crane fails during rotational maneuver.

TECHNICAL BULLETIN

No. 9-2320-279-34

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 23 December 1988

TEST PROCEDURES

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE LEVELS

LOAD TESTING HEAVY EXPANDED MOBILITY TACTICAL TRUCK (HEMTT) VEHICLE CRANES

MODEL	NSN
M977 Cargo Truck, w/o Winch, w/Grove Model M977 Crane	2320-01-099-6426
M977 Cargo Truck, w/Winch, w/Grove Model M977 Crane	2320-01-097-0260
M984 Wrecker, w/HIAB Model 8109 Crane	2320-01-097-0248
M984E1 Wrecker, w/Grove Model M984 Crane	2320-01-195-7641
M985 Cargo Truck, w/o Winch, w/Grove Model M985 Crane	2320-01-100-7673
M985 Cargo Truck, w/Winch, w/Grove Model M985 Crane	2320-01-097-0261
M985E1 Cargo Truck, w/Winch, w/HIAB Model 81 08/81 08-2 Crane	2320-01-194-7032
M985E1 Cargo Truck, w/o Winch, w/HIAB Model 81 08/81 08-2 Crane	2320-01-194-7031

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this bulletin. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 direct to: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

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CHAPTER I

INTRODUCTION

1-1. PURPOSE.

This bulletin supplements instructions contained in TB 43-0142 by establishing specific load test procedures for the vehicle cranes listed in the title.

1-2. SCOPE.

This bulletin tells how to prepare test weights and load test the vehicle cranes listed in the title. These instructions supplement the regular services and inspections described in the HEMIT technical manuals and are to be employed to safety certify applicable HEMIT cranes.

1-3. REQUIREMENTS FOR LOAD TESTING.

Load testing of cranes is required before initial use of all new cranes, cranes that have been extensively repaired, cranes that have undergone modification or alteration, and cranes that have remained idle six or more months. Load testing will be accomplished by support maintenance activities unless manufacturers, repair-contractor or depot, as appropriate, provides written certification that testing has been conducted. Additional load testing may be scheduled, as established locally, based on type of materials handled, equipment utilization and local requirements or conditions.

CHAPTER 2
PROCEDURES

2-1. CLASSIFICATION OF TESTS.

Table 2-1 lists the tests which are to be employed to safety certify applicable HEMIT cranes. Table 2-2 lists the load ratings which are to be stenciled on the applicable HEMTT crane after completion of all load tests. (Refer to paragraph 2-7). The load rating is the maximum authorized load that maybe lifted by that specific HEMIT crane. Two different types of testing are described in this bulletin:

- a. Static testing, as used in this technical bulletin, is defined as lifting or lowering of the test load without traversing.
- b. Dynamic testing, as described within the bulletin, includes traversing the test load.

Table 2-1. Classification

Crane Model	Test Classification			
	I	II	III	IV
Grove M977	x	x		x
Grove M984 (on M984E1 vehicle)	x	x		x
Grove M985	x	x		x
HIAB 8108 & 8108-2 (on M985E1 vehicle)				x
HIAB 8109 (on M984 vehicle)			x	x

NOTE

The difference in the test requirements between Test Classification II (125 percent) and Test Classification III (110 percent) is due to the difference in overload protection systems of the HIAB and Grove Cranes.

Test Classification I is a static overload protection test performed to assure proper setting of overload protection switches on Grove Cranes.

Test Classification II is a static proof test performed to assure the structural integrity of Grove Cranes at 125 percent of the maximum rated load or the maximum load the crane overload protection system will allow the crane to lift,

Test Classification III is a static test used to assure structural integrity of HIAB Cranes at 110 percent of their maximum rated load.

Test Classification IV is a dynamic functions test performed to assure operability of crane and outriggers. All cranes are tested at 100 percent of their maximum rated load. The HIAB 8108 Crane dynamic testing is at 110 percent of the load rating.

Table 2-2. Load Ratings

Crane Model	Load Rating (pounds)	Load Radius (Feet' and Inches ")
Grove M977	4,500	9'
Grove M984 (on M984E1)	14,000	9'
Grove M985	5,400	16'6"
HIAB 8108 & 8108-2 on M985E1	4,090	20'6"
HIAB 8109 (on M984)	10,000	12'

2-2. TEST LOADS.

Test loads for HEMIT Cranes may take the form of weights that are locally fabricated, or any available item of the proper weight. (The weight of any lifting slings, hooks or rigging should be considered in selecting or instructing test weights). A calibrated load indicator or a calibrated dynamometer may be used for static testing. All load testing devices should have a valid calibration label affixed in a visible place. If a calibrated dynamometer is used, be sure it has a minimum capacity of twice the load test value for proper accuracy.

2-3. FABRICATING TEST WEIGHTS.

Table 2-3 lists the test loads that are required for testing the various HEMIT Cranes. Although no unique fabrication details are given, Table 2-4 gives weight details for bulk plate steel of varying thickness. If weights are constructed by welding plates together, allowance should be made for additional weight added by the welding process. All lifting slings hooks, and rigging should comply with the strength requirements given in MIL-STD-209F, paragraph 5.1.1.1. (Refer to Appendix B). Mark value clearly on each weight.

Table 2-3. Required Test Loads

*Test Loads (Lbs.)				
Crane Model	Test Classification			
	I	II	III	IV
Grove M977	3,000, 5,200	3,500		2,500
Grove M984 (on M984E1)	7,300, 9,700, 14,200, 16,500	15,000		12,000
Grove M985	6,200	6,750		5,400
HIAB 8108/8108-2 (On M985E1)				4,500
HIAB 8109 (On M984)			11,000	10,000

- A tolerance of plus or minus 25 lbs. is allowable.

WARNING

- When loads are applied to the boom cable, all personnel must move away to a safe distance. If the load falls, it could cause serious injury or death to personnel.

Always wear heavy leather gloves when handling wire rope. Never let wire rope run through hands. Frayed wire rope can cut hands.

2-4. LOAD TEST PROCEDURES FOR GROVE M977, GROVE M984, AND GROVE M985 CRANES.

Table 2-4. Weight Details for Bulk Plate Steel*					
Size (Thickness by width) (inches)	Weight (Pounds/ linear foot)	Weight (Pounds/ square foot)	US Standard gage	Weight (Pounds/ linear foot)	Weight (Pounds/ square foot)
5/8 x 84	178.7	25.53	0000000	N/A	20.409
5/8 x 96	204.2	25.53	000000	N/A	19.123
3/4 x 84	214.4	30.63	00000	N/A	17.856
3/4 x 96	245.0	30.63	0000	N/A	16.588
7/8 x 84	250.2	35.74	000	N/A	15.302
7/8 x 96	285.9	35.74	00	N/A	14.035
1 x 84	285.9	40.84	0	N/A	12.748
1 x 96	326.7	40.84*	1	N/A	11.481
1-1/4 x 84	357.3	50.05	2	N/A	10.848
1-1/4 x 96	408.4	51.05	3	N/A	10.4
1-1/2 x 84	428.8	61.26	4	N/A	9.55
1-1/2 x 96	490.1	61.26	5	N/A	8.89
1-3/4 x 84	500.3	71.47	6	N/A	8.28
1-3/4 x 96	571.8	71.47	7	N/A	7.63
2 x 84	571.8	81.68	8	N/A	6.98
2 x 96	653.4	81.68	10	N/A	5.71

● Based on a weight of 40.84 pounds/square foot/inch thickness.

WARNING

- * When loads are applied to the boom cable, all personnel must move away to a safe distance. A load that falls can cause serious injury or death to personnel.
- Always wear heavy leather gloves when handling wire rope. Never let wire rope run through hands. Frayed wire rope can cut hands.
- Grove M984 Crane is used on M984E1 Wrecker. The crane used on the M984 Wrecker is the HIAB Model 8109 (see paragraph 2-5). Failure to use proper procedure for crane load testing may result in injury to personnel and/or damage to equipment.

2-4.1 Initial Setup.

- a. Park vehicle on hard, level surface.
- b. Inspect crane in accordance with Appendix A of TB43-0142. Equipment having defects shall be repaired in accordance with the appropriate technical manual.
- c. Setup crane (Refer to TM 9-2320-279-10).

d. Connect the remote control. Exercise all crane functions to their full extent, without a load, for a period of 15 minutes. (Refer to TM 9-2320-279-10).

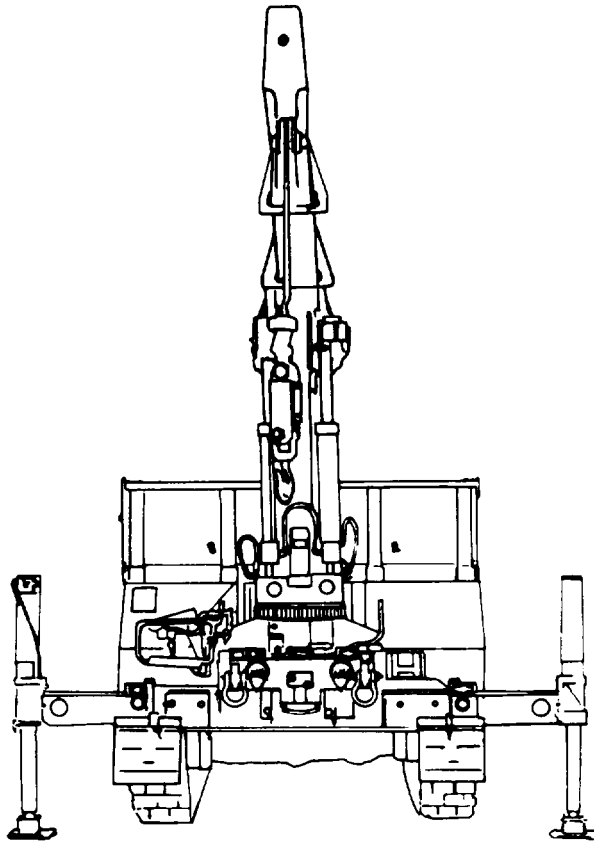


FIGURE 2-1. Boom In Line With Centerline.

e. Position the crane boom in line with centerline of vehicle. (See FIGURE 2-1).

2-4.2. Test Classification I: Static Overload Protection Test.

Check for correct setting of overload protection switches. (Refer to TM 9-2320-279-34).

2-4.3. Test Classification II: Static Proof Test.

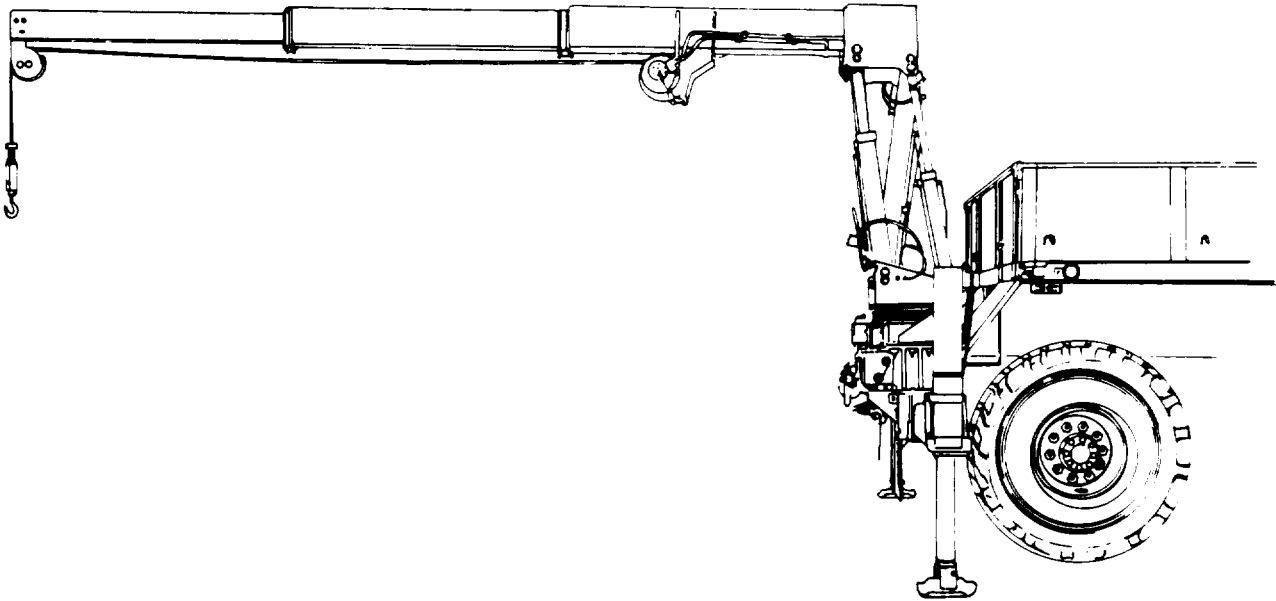


FIGURE 2-2. Boom Parallel to Ground.

- a. Disconnect remote control, use the manual station for this test. (Refer to TM 9-2320-279-10).

NOTE

Step b. applies only to the Grove M977 and Grove M985 Cranes.

- b. Position Grove M977 and M985 boom parallel to the ground. Extend boom to length given in Table 2-5 and attach test load.

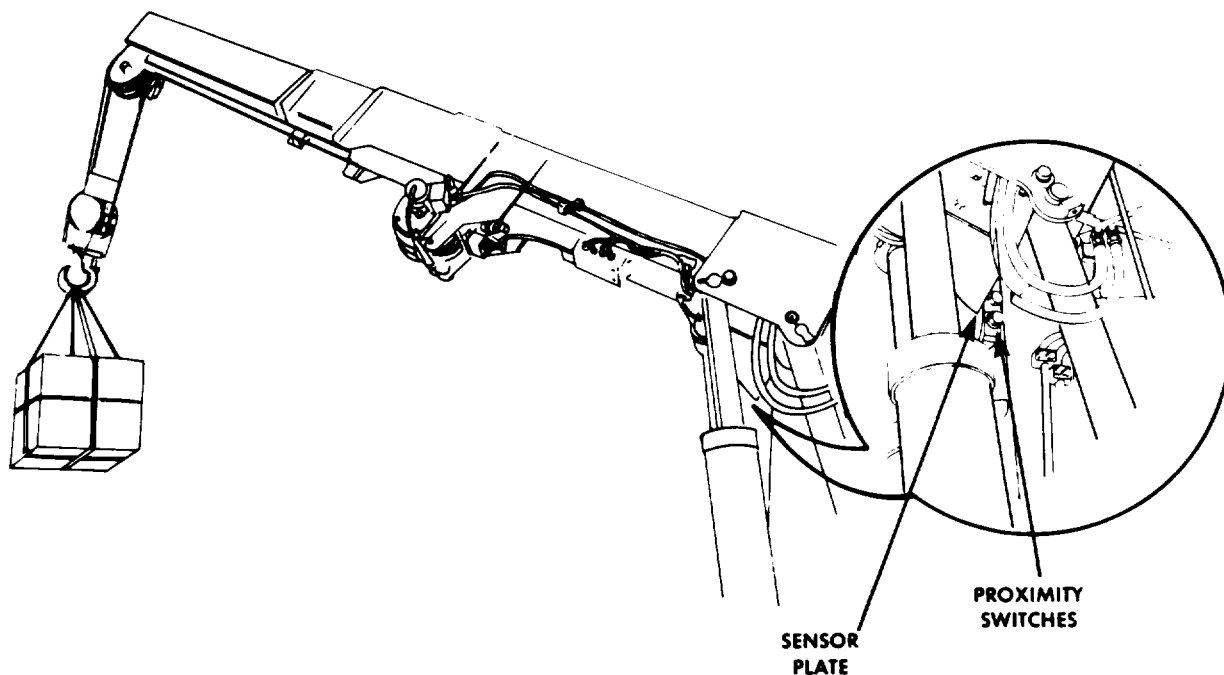


FIGURE 2-3. M984 Crane Sensor Plate.

NOTE

Step c. applies only to the Grove M984 Crane.

c. Position Grove M984 boom so that the boom sensor plate completely covers only the top proximity switch (see Figure 2-3). Extend boom to length given in Table 2-5 and attach test load.

Table 2-5. Test Classification I Conditions

Grove Crane Model	*Boom Extension Feet(') and Inches (")	Rated Load Pounds	Test Load Pounds (Percent of Rated Load)
M977	19'	2,500	3,500 (140 Percent)
M984	11'10"	12,000	15,000 (125 Percent)
M985	16'6"	5,400	6,750 (125 Percent)

● Boom extension is measured on a horizontal line from the center of the turntable to the center of the hoist line with load attached.

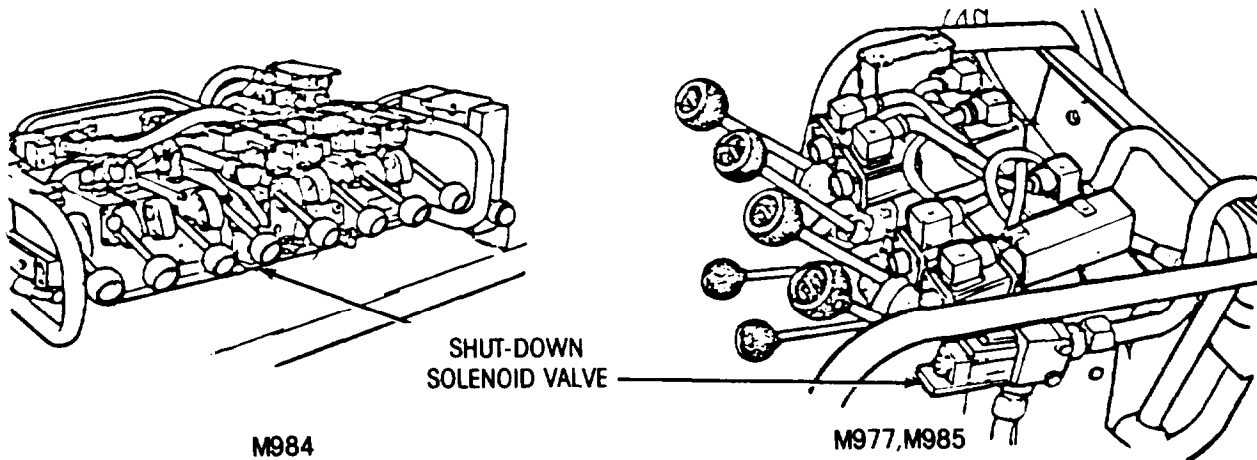


FIGURE 2-4. M977, M984, and M985 Shutdown Solenoid Valve.

NOTE

Steps d. and e. are performed to bypass the crane overload system.

d. Place crane power switch in off position.

e. Place a flat tip screwdriver in slot in front of (M977 and M985 Grove Cranes) or below (M984 Grove Crane) shutdown solenoid to hold shutdown valve closed for steps f., g., and h. (See FIGURE 2-4).

NOTE

* Use the manual boom control when performing step g. on the M977 and M985 Grove Cranes. Use the manual hoist control when performing step g. on the Grove M984 Crane.

* All test loads should be raised slowly and smoothly.

f. Raise the test load approximately six inches off ground.

g. Hold load stationary. Observe performance of crane structure and note any evidence of possible failure.

h. Lower load completely. Remove flat tip screwdriver from solenoid valve.

i. Thoroughly inspect crane in accordance with Appendix A of TB43-0142.

NOTE

Crane should not be able to lift load in step j. If crane lifts load, reset crane overload protection switches (Refer to TM 9-2320-279-34).

j. Connect remote control, set crane power switch to ON position. Attempt to lift test load.

2-4.4. Test Classification IV: Dynamic Functional Test.

- a. Position boom in line with centerline of vehicle. Extend and raise boom as given in Table 2-6.

Table 2-6. Test Classification IV Conditions

Grove Crane Model	*Boom Extension (Load Radius) Feet (') and Inches (")	**Test Load Pounds	Initial Boom Position (Elevation)
M977	19'	2,500 Lbs.	Parallel to Ground
M984	11'10"	12,000 Lbs.	***
M985	16'6"	5,400 Lbs.	Parallel to Ground

● Boom extension is measured on a horizontal line from the center of the turntable to the center of the hoist line with load attached.

● *Test load is 100 percent of load rating.

● **Raised boom so that sensor plate covers only top proximity switch (see Figure 2-3).

b. Attach test load to crane hook.

c. Use crane winch to raise test load to a height of 18 inches (plus or minus three inches).

d. When test load has stopped swaying, measure and record distance from load to ground.

e. Disengage Power Take Off (PTO) and shut off vehicle engine. (Refer to TM 9-2320-279-10).

f. Allow vehicle to sit undisturbed for 30 minutes. Measure distance between load and ground again. Note any difference between measurements. The difference in the two measurements should not be greater than 12 inches. If difference is greater than 12 inches, determine the cause, repair crane, and retest.

Warning

Never rotate crane over crane operator. Injury or death to personnel and/or damage to equipment may occur if crane fails during rotational maneuver.

CAUTION

Do not contact vehicle with test load. Damage to vehicle may result.

NOTE

Two soldiers are required to do step g.; one to operate the crane and one to signal the crane operator to ensure that the load does not hit the side of the vehicle.

g. Rotate crane boom first right and then left, stopping short of load contacting the vehicle. Return crane boom to a position in line with the centerline of vehicle.

CAUTION

Do not contact crane with test load. Damage to crane may result.

h. Raise boom to maximum elevation. Raise and lower test load with crane winch. Return boom to initial elevation. Retract and extend boom. Do not exceed rated load radius. All crane movements should be smooth (without jerking). If not, determine the cause, repair, and retest.

i. End of test. Lower and disconnect load. Return crane to stowage position and shut down. (Refer to TM 9-2320 -279-10).

2-5. LOAD TEST PROCEDURES FOR HIAB 8109 CRANE.

2-5.1. Initial Setup.

a. Park vehicle on a hard level surface.

b. Inspect the crane in accordance with Appendix A of TB43-0142. Equipment having defects should be repaired in accordance with the appropriate technical manual.

c. Setup crane and exercise all crane functions to their full extent, without a load, for a period of 15 minutes. (Refer to TM 9-2320-279-10 or TM 9-2320-354-10).

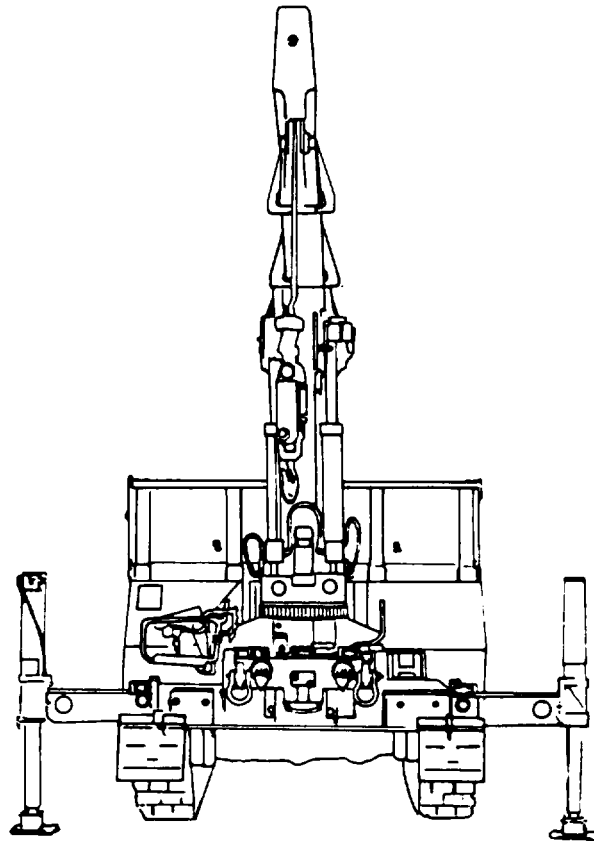


FIGURE 2-5. Boom In Line With Centerline.

- d. Position the crane boom in line with centerline of the vehicle. (See Figure 2-5).

2-5.2. Test Classification III: 110 percent Static Lift Test.

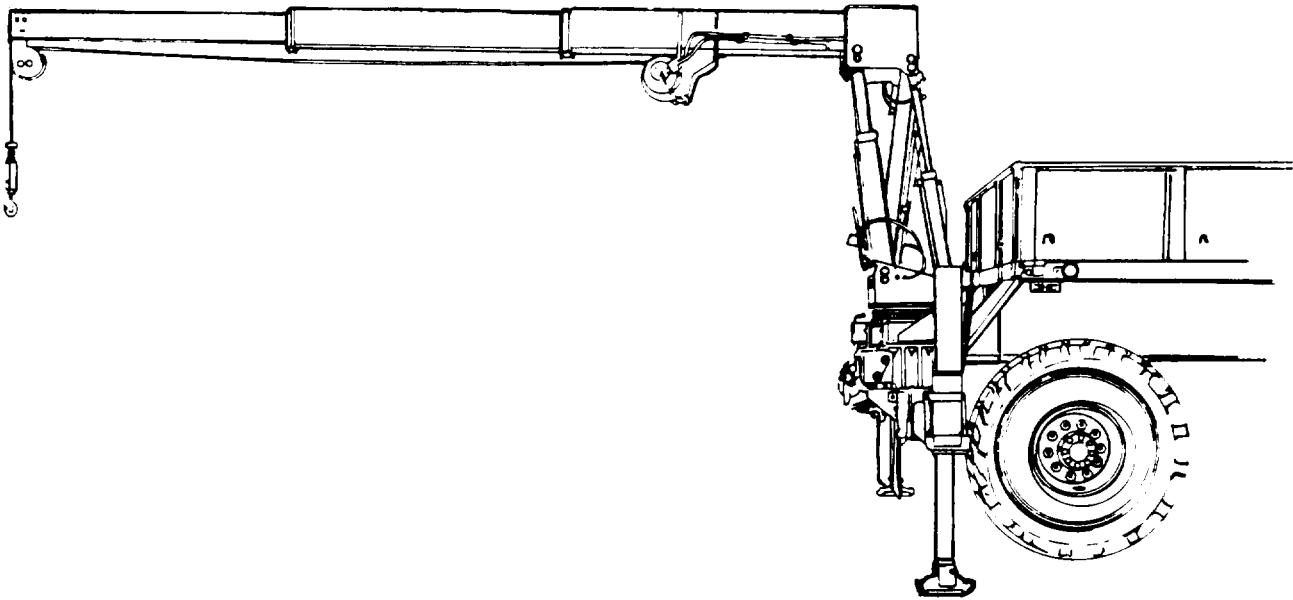


FIGURE 2-6. HIAB 8109 Crane with boom in line with centerline.

a. Position boom parallel to ground. (See Figures 2-5 or 2-6). Extend boom to length given in Table 2-7 and attach test bad.

Table 2-7. Test Classification III Conditions

HIAB Crane Model	*Boom Extension (Load Radius) feet (')	Rated Load Pounds	Test Load Pounds (Percent of Rated Load)
8109	12'	10,000	11,000 (110 Percent)

I Boom extension is measured on a horizontal line from center of turntable to the center of the vertical hoist line with load attached.

NOTE

I Use the manual boom control when performing step b. on crane winch control on the HIAB 8109 Crane.

I All test loads should be raised smoothly so as not to create a sudden trounce.

b. Raise the test bad to a height of six inches.

c. Hold load stationary. Observe performance of crane structure and note any evidence of possible failure. Lower load completely.

d. Thoroughly inspect crane in accordance with Appendix Aof TB43-0142.

2-5.3. Test Classification IV: Dynamic Functional Test.

a. Connect remote control. (Refer to TM 9-2320-279-10 or TM 9-2320-354-10).

b. Position boom parallel to ground. (See Figure 2-5 or 2-6). Extend boom to length given in Table 2-8 and attach test bad.

Table 2-8. Test Classification IV Conditions

HIAB Crane Model	*Boom Extension (Load Radius) feet (')	**Test Load Pounds
8109	12'	10,000

● Boom extension is measured on a horizontal line from center of turntable to center of the vertical hoist line with bad attached.

● *Test load is 100 percent of load rating.

c. Use the crane winch to raise test bad to a height of 18 inches (plus or minus three inches).

d. When load stops swaying, measure and record the distance from the load to the ground.

e. Disengage PTO and shutoff vehicle engine.

f. Allow the vehicle to sit undisturbed for 30 minutes. Again, measure the distance between the load and the ground. Note any differences between the two measurements. The difference between the two measurements should not be greater than 12 inches. If the difference is greater than 12 inches, determine the cause, repair the crane, and retest.

WARNING

Rotate crane either left or right, but never over crane operator. Injury or death to personnel and/or damage to equipment may occur if crane fails during rotational maneuver.

CAUTION

Do not contact vehicle with test bad. Damage to vehicle may result.

NOTE

Two soldiers are required to do step g.; one to operate crane and one to signal crane operator to ensure that bad does not hit side of vehicle.

g. Upon successful completion of steps a. through f, rotate the crane boom left, then right, stopping short of the load contacting the vehicle. Return the crane boom to initial test position. (See Figures 2-5 or 2-6).

h. Raise boom to maximum elevation. Raise and lower test bad with crane winch. Return boom to position parallel to ground. Retract and extend the boom. Do not exceed the rated load radius. (See Table 2-7). All crane movements should be smooth (without jerking). If not, determine the cause, repair, and retest.

i. End of test lower and disconnect bad. Return crane to stowage position and shutdown. (Refer to TM 9-2320-279-10 or TM 9-2320-354-10).

2-6. LOAD TEST PROCEDURE FOR THE HIAB 8108 & 8108-2 Cranes.

a. Park vehicle on a hard level surface.

b. Inspect crane in accordance with Appendix A of TB 43-0142. Equipment having defects should be repaired in accordance with the appropriate technical manual.

NOTE

Always use main control panel during the HIAB 8108 & 8108-2 Crane Load Test. Use of the remote controls may lead to a false overload indication.

c. Deploy outriggers. Exercise all crane functions without bad, to their full extent, for a period of 15 minutes. (Refer to TM 9-2320-355-10 and TM 9-2320-279-10).

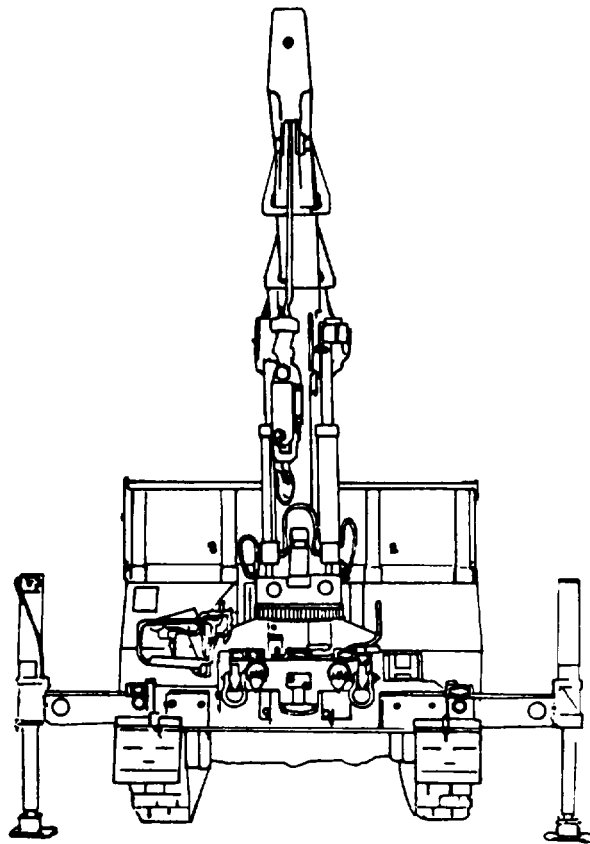


FIGURE 2-7. Boom in Line with Centerline.

d. Position the crane boom in line with the centerline of the vehicle. (See FIGURE 2-7).

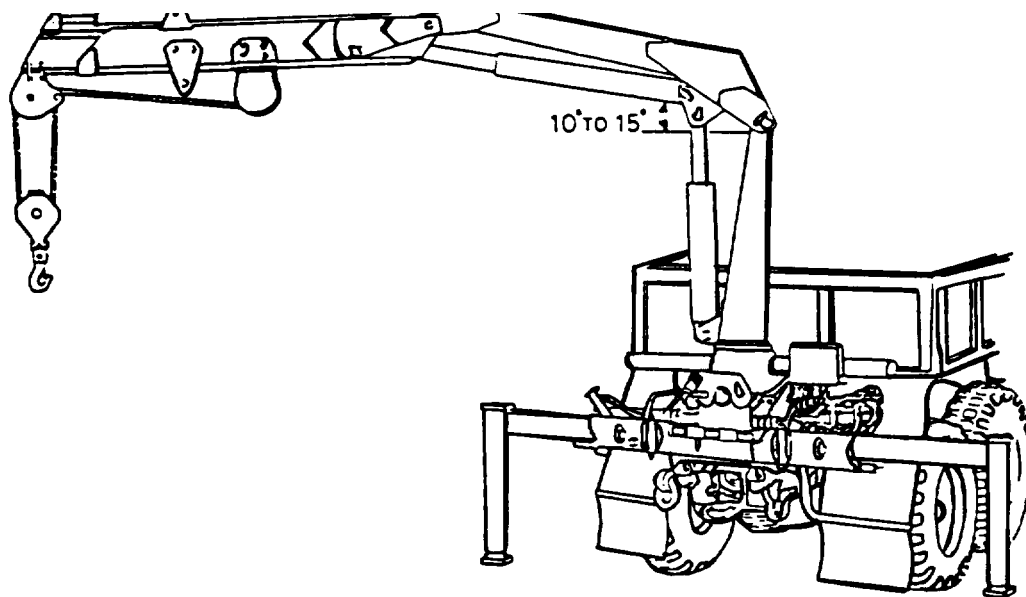


FIGURE 2-8. Boom Positions at Maximum Extension.

CAUTION

Do not contact vehicle with test bad. Damage to vehicle may result.

e. Position the inner boom 10 to 15 degrees from horizontal and the outer boom horizontal at the maximum boom extension.

f. Attach a certified load of 4,500 pounds (plus or minus 25 pounds) to the crane hook. Use the crane winch to raise the test load to a height of 18 inches (plus or minus three inches).

g. When test load stops swaying, measure and record the distance from the load to the ground.

h. Disengage the PTO and shut off the vehicle engine. (Refer to TM 9-2320-279-10).

i. Allow the vehicle and crane to set undisturbed for 30 minutes. Again, measure the distance between the load and the ground. Note the difference between the two measurements. The difference in the two measurements should not be greater than 12 inches. If the difference is greater than 12 inches, determine the cause, repair, and retest.

WARNING

Rotate crane either left or right but never over crane operator. Injury or death to personnel and/or damage to equipment may occur if crane fails during rotational maneuver.

CAUTION

Take care not to contact vehicle with test bad. Damage to vehicle may result.

NOTE

Always use main control panel during this crane load test. Use of the remote controls may lead to a false overload indication.

j. Upon successful completion of steps a. through i., rotate the crane boom left and right, stopping short of load contacting the vehicle.

k. Return boom to a position in line with centerline of vehicle. Raise boom to maximum elevation. Raise and lower test bad with crane winch. Return outer boom to a horizontal position. Retract and extend boom. All crane movements should be smooth (without jerking); if not, determine the cause, repair, and retest.

2-7. RECORDING LOAD RATING AND NEXT PERIODIC INSPECTION DUE DATE.

After satisfactory completion of load tests, stencil the bad rating including bad radius on the side of the boom or mast using one-half inch letters. Stencil markings will be the same color as other vehicle markings. (Refer to TB 43-0209).

APPENDIX A**REFERENCES****A-1. SCOPE.**

This appendix lists all forms, field manuals, technical manuals and other publications that are referenced in this bulletin.

A-2. FIELD MANUALS.

The following indexes should be consulted frequently for the latest change or revision and for new publications relating to material covered in this technical bulletin.

First Aid for Soldiers FM 21-11

A-3. TECHNICAL MANUALS.

Operator's Manual, M977 Series, 8x8 Heavy Expanded Mobility Tactical Trucks (HEMTT) TM9-2320-279-10

Operator's Manual for Controls and Equipment Found Only on the M985EI Cargo Truck TM9-2320-355-10

Operator's Manual for Controls and Equipment Found Only on the M984 Wrecker-Recovery Truck TM9-2320-354-10

Organizational Maintenance Manual, M977 Series, 8x8 Heavy Expanded Mobility Tactical Trucks (HEMTT) TM9-2320-279-20

Direct Support and General Support Maintenance Manual, M977 Series, 8x8 Heavy Expanded Mobility Tactical Trucks (HEMTT) TM 9-2320-279-34

Organizational, Direct Support, and General Support Maintenance Manual (including Repair Parts and Special Tools List) HIAB Model 8108 Crane TM 9-2320-355-24&P

Organizational, Direct Support, and General Support Maintenance Manual (including Repair Parts and Special Tools List) for M984 Wrecker-Recovery Truck TM9-2320-354-24&P

Repairs and Utilities: Concrete and Masonry TM 5-615

Consolidated Index of Army Publications and Blank Forms DA PAM 25-30

Index of Graphic Training Aids and Devices DA PAM310-5

Safety Inspection and Testing of Lifting Devices TB 43-0142

Warranty Technical Bulletin for M977 Series Vehicles TB 9-2300-295-15/19

APPENDIX A (CON'T)

Color, Marking, and Camouflage Painting of Military Vehicles, Construction
Equipment, and Materials Handling Equipment TB 43-0209

A-4. MISCELLANEOUS PUBLICATIONS

LUBRICATION ORDER for M977 Series, 8x8 Heavy Expanded Mobility Tactical
Truck LO 9-2320-279-12

APPENDIX B**PARAGRAPH 5.1.1.1. of MIL-STD-209F**

5.1.1.1. For equipment weighing less than 20,000 pounds. Each slinging provision, including the connection and the structural members, shall withstand without permanent deformation, a working load equal to its proportionate share of the MSW (maximum shipping weight) multiplied by 3.2 and shall have an ultimate strength not less than 1.5 times the working load. The proportionate share of the MSW is determined by a static test load or by analysis. A static test load is performed by selecting sling lengths so that the sling apex is over the center of gravity of the equipment and the true angle of each sling leg does not exceed 45 degrees from the vertical. Included in each sling length is a load cell to measure the static load in each leg when the equipment is lifted and held in a static position. For validation, the slinging eyes or provisions shall be tested and shall withstand the required working load for not less than 90 seconds. For external helicopter, transport the requirements for slinging provisions, as stated above, apply to equipment with a MSW to maximum projected frontal area of 60 pounds per square foot or greater. Equipment with a MSW to maximum projected frontal area ratio of less than 60 pounds per square foot shall meet the following requirements:

- a. Each slinging provision, including its connecting structural members, shall withstand without permanent deformation, a working load equal to its proportionate share of the MSW, multiplied by 5.6.
- b. Each slinging provision shall have an ultimate strength not less than 1.5 times the working load.
- c. For validation, the slinging provisions shall be tested and shall withstand the required working load for not less than 90 seconds. MSW for the purpose of this TB, is the value of the test weight.

By Order of the Secretary of the Army

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed LAW DA Form 12-38-R, (Block No. 268) Direct Support and General Support Maintenance Requirements for Truck, Cargo, 10-Ton, 8X8, Heavy Expanded Mobility Tactical Truck, HEMIT, M977, M978, M983, M984, M985 (TM 9-2320-279 Series).

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23 DEC 1988

Load Test Procedures for
HEMTT Cranes

BE EXACT... PIN-POINT WHERE IT IS

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1-1

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Reference to technical bulletin
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TEAR ALONG PERFORATED LINE

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 Grams = 2.2 Lb
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

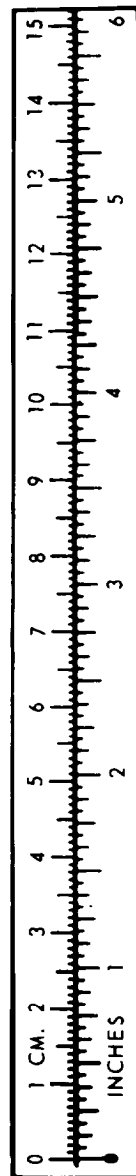
TEMPERATURE

$\frac{5}{9} (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212^o Fahrenheit is equivalent to 100^o Celsius
 90^o Fahrenheit is equivalent to 32.2^o Celsius
 32^o Fahrenheit is equivalent to 0^o Celsius
 $\frac{9}{5} \text{C}^{\circ} + 32 = \text{F}^{\circ}$

APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



TA089991