TB 9-2320-279-34

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
M984E1 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
M985E1 CARGO TRUCK W/WINCH W/HIAB MODEL 8108/8108-2 CRANE	2320-01-194-7032
M985E1 CARGO TRUCK W/O WINCH W/HIAB MODEL 8108/8108-2 CRANE	2320-01-194-7031

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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.

**CHANGE
NO. 2**

**HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 August 2006**

TECHNICAL BULLETIN

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 8108/8108-2 CRANE	2320-01-194-7032
M985E1 CARGO TRUCK W/O WINCH W/HIAB MODEL 8108/8108-2 CRANE	2320-01-194-7031

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2-9 - 2-10	2-9 – 2-10
2-13 – 2-18	2-13 – 2-18
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CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *15 February 2002*

TECHNICAL BULLETIN

TEST PROCEDURES

DIRECT SUPPORT AND GENERAL SUPPORT

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

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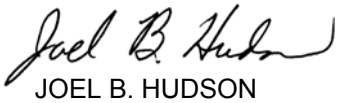

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TECHNICAL MANUAL

HEADQUARTERS
DEPARTMENT OF THE ARMY

No. 9-2320-279-34

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
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TABLE OF CONTENTS

CHAPTER 1

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 HEMTT technical manuals and are to be employed to safety certify applicable HEMTT 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.

1-4. REQUIREMENTS FOR TURNTABLE BEARING INSPECTION PROCEDURE.

GROUND CONDITIONS AND LEVELING OF THE CRANE.

a. Park the truck on a level surface and use a carpenters level and the crane outrigger system to level the crane from side to side. Rotate the crane as necessary to obtain a surface on the superstructure that can be used to place the level.

CLEANING BEFORE INSPECTION.

b. Surfaces where magnetic base mounts and dial indicator plunger or telescope gage indicates off of must be free of grease and dirt, and must be smooth. Clean surfaces as required and if needed, use sand paper to smooth out the surfaces. Surfaces that are not clean or are rough will affect the true dial indicator reading or telescope gage reading.

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 Ill (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 Ill is a static lift 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	4,500	20'6"
HIAB 8109 (on M984)	10,000	12'

2-2. TEST LOADS.

Test toads 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 HEMTT 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.

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)				4,950
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 bad 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 GR0VE 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 sl 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).

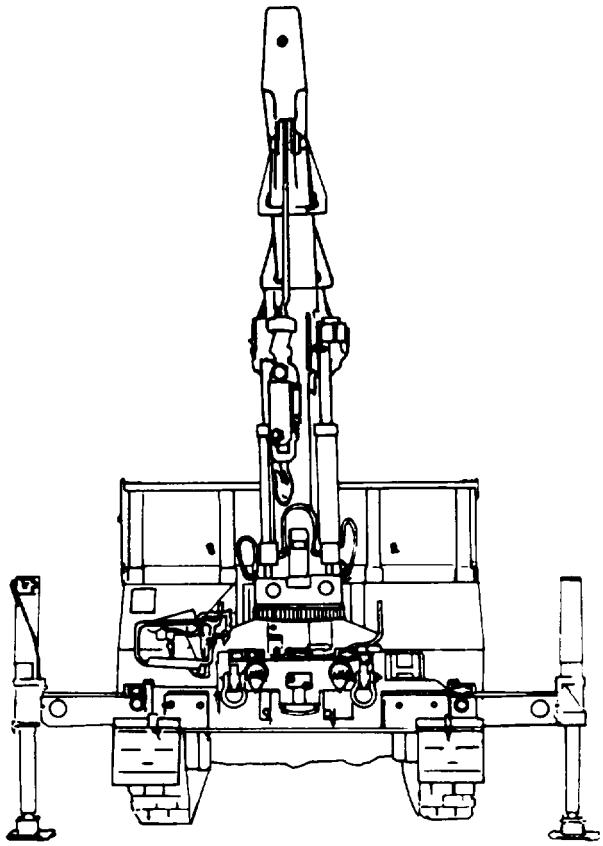


FIGURE 2-1. Boom In Line With Centerline.

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 ll: Static Proof Test.

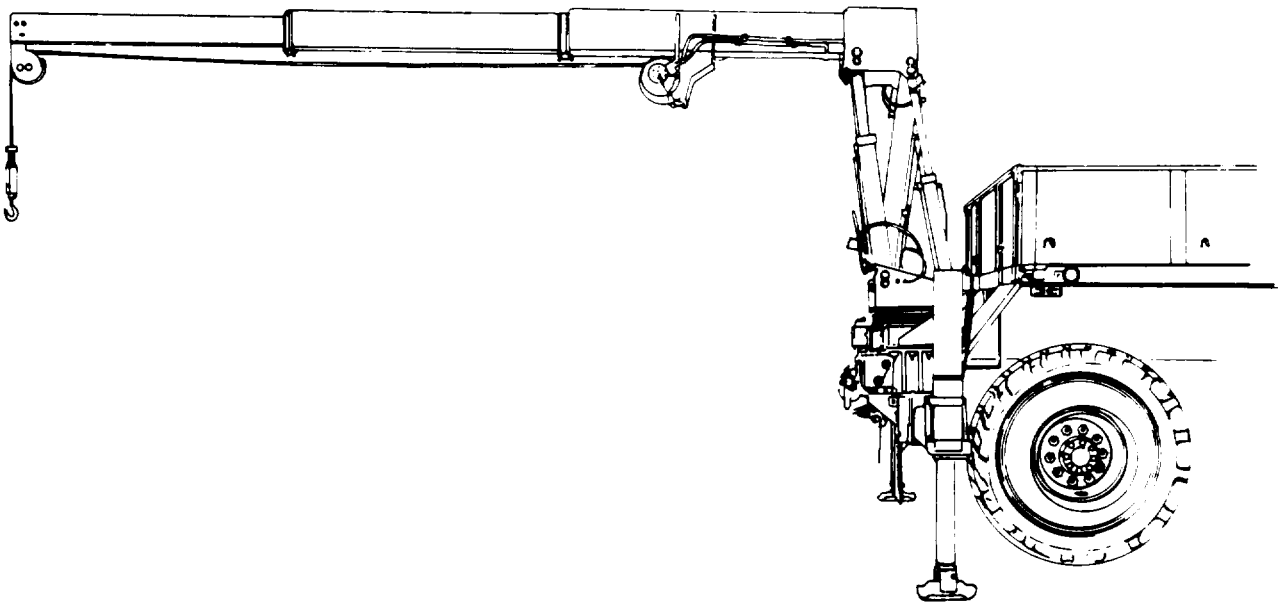


FIGURE 2-2. Boom Parallel to Ground.

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.

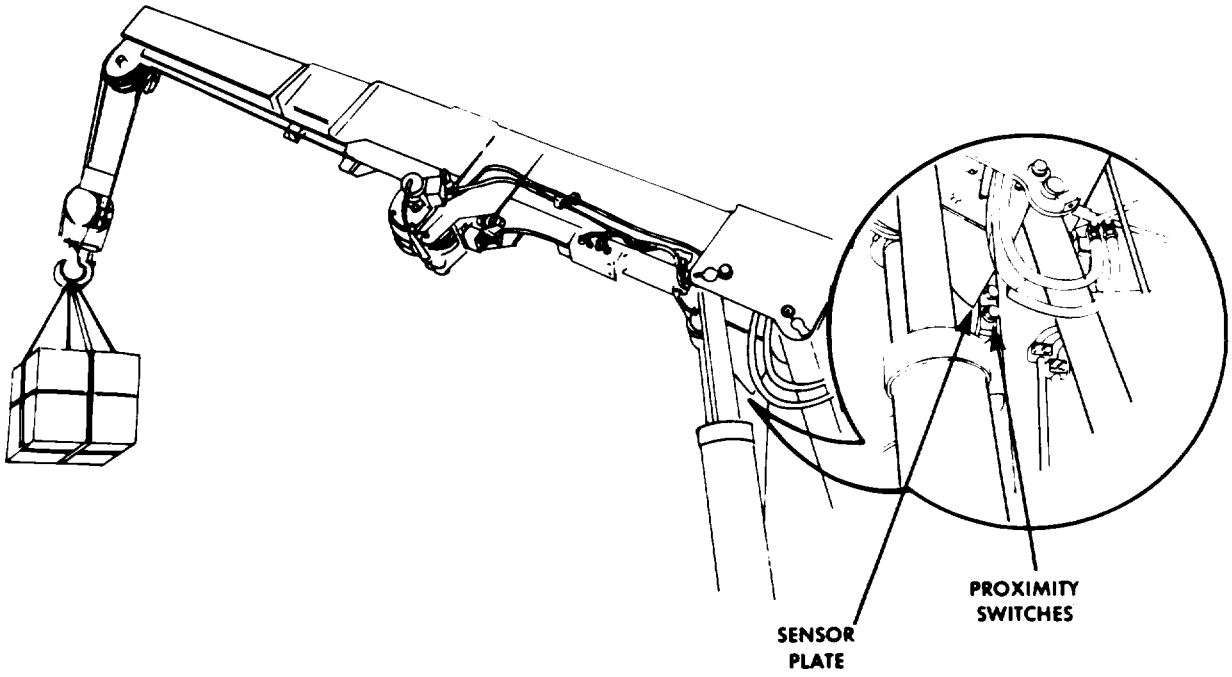


FIGURE 2-3. M984 Crane Sensor Plate.

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.

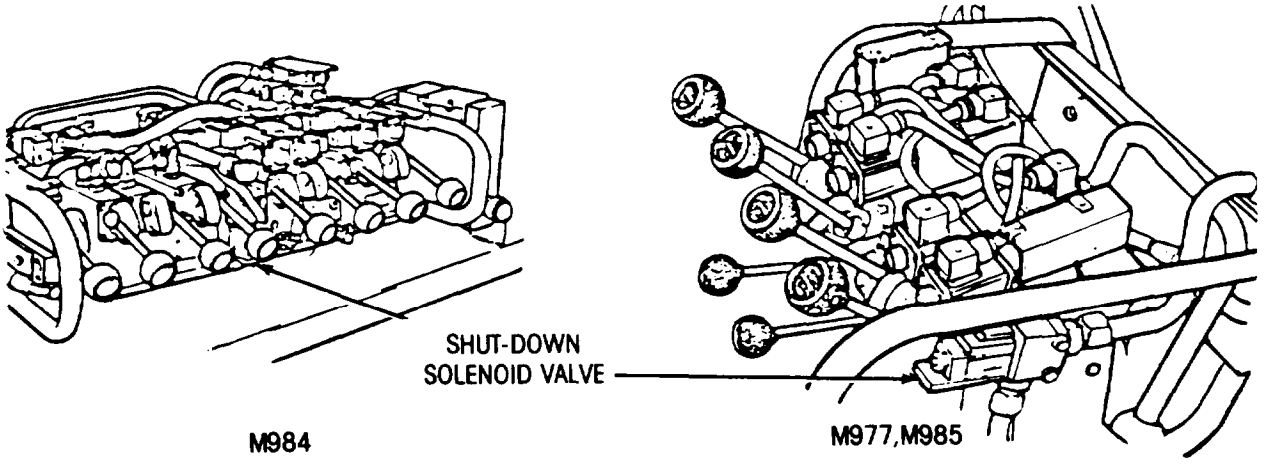


FIGURE 2-4. M977, M984, and M985 Shutdown Solenoid Valve.

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 1 inch. If difference is greater than 1 inch, 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).

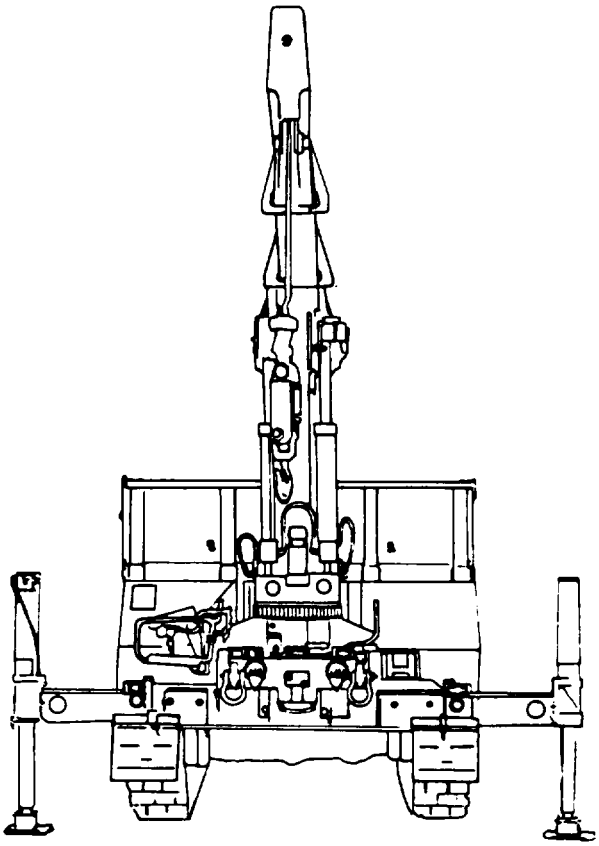


FIGURE 2-5. Boom In Line With Centerline.

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

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

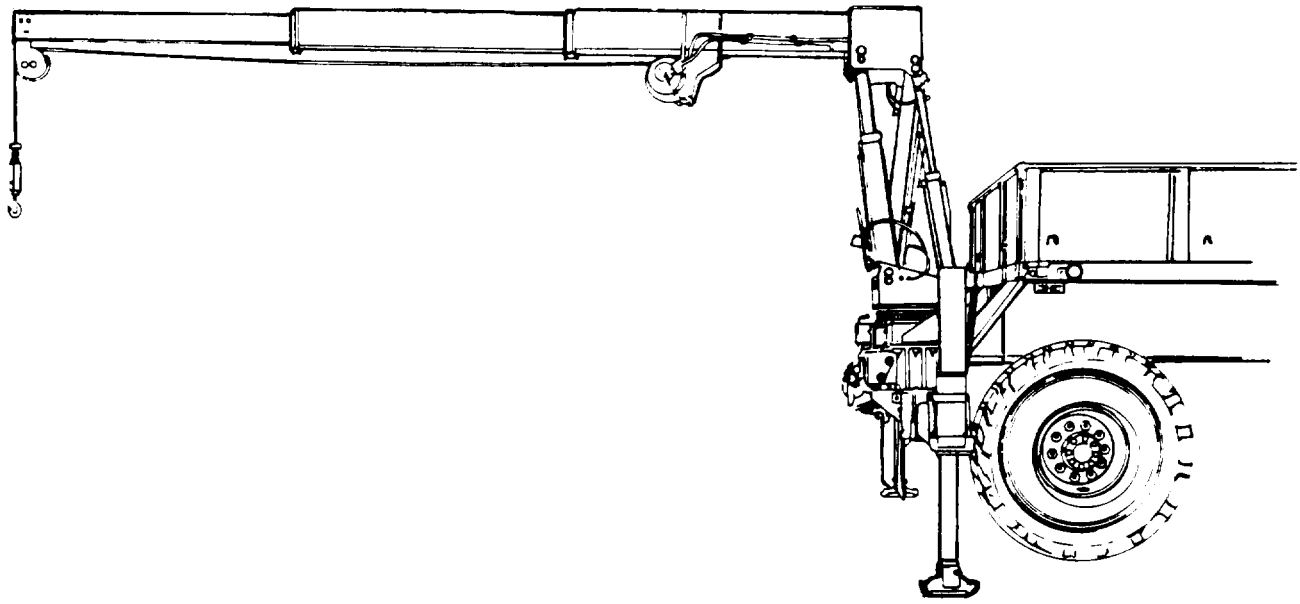


FIGURE 2-6. HIAB 8109 Crane with boom in line with centerline.

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 Ill 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)

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

NOTE

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

l 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 A of TB 43-0142.

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 load.

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 load attached.

** Test load is 100 percent of load rating.

c. Use the crane winch to raise test load 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 shut off 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 1 inch. If the difference is greater than 1 inch, 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.

N O T E

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).

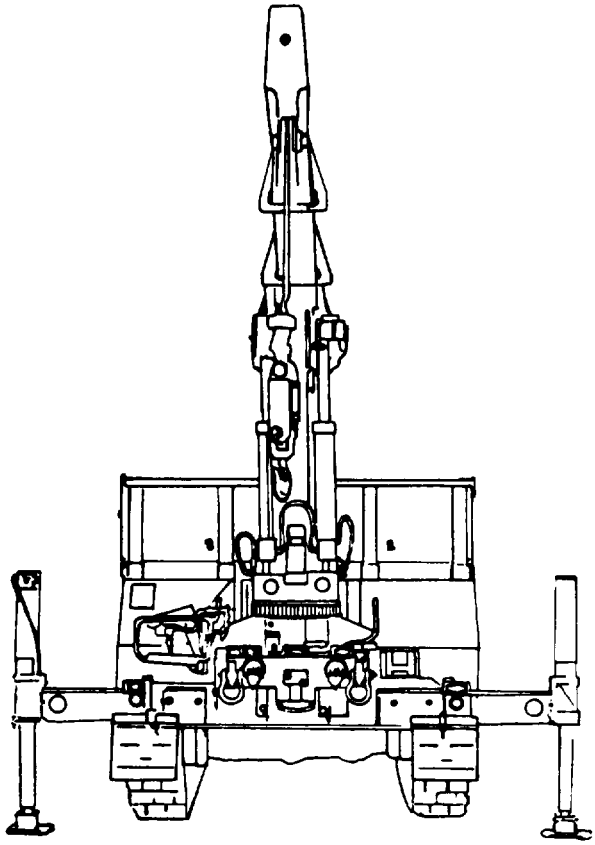


FIGURE 2-7. Boom in Line with Centerline.

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

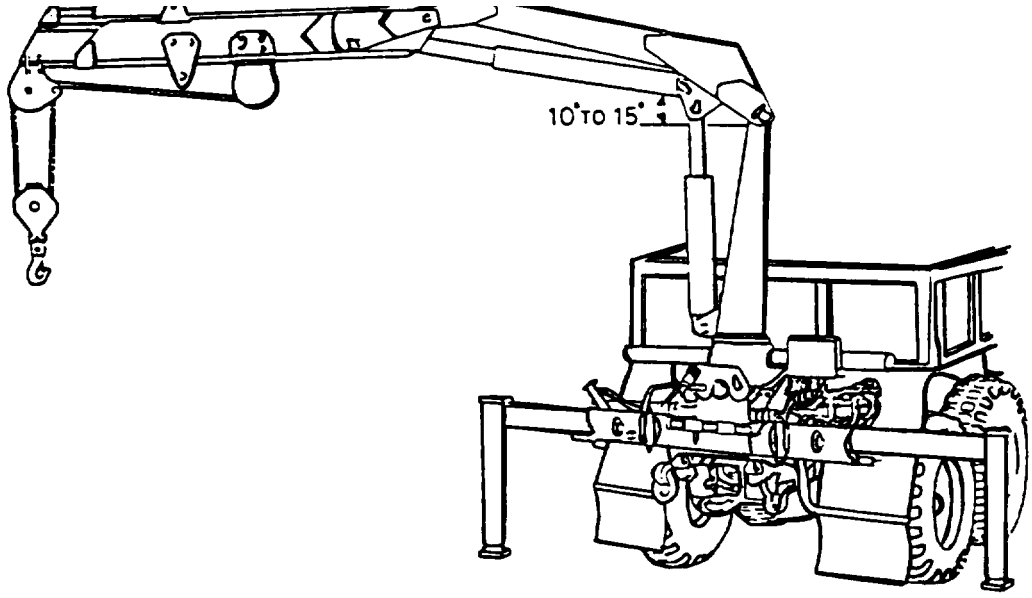


FIGURE 2-8. Boom Positions at Maximum Extension.

CAUTION

Do not contact vehicle with test load.
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 4,950 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 1 inch. If the difference is greater than 1 inch, 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 load 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).

2-8. TURNTABLE BEARING INSPECTION PROCEDURES FOR GROVE M977, GROVE M984, AND GROVE M985 CRANES.

2-8.1. Initial Setup.

NOTE

- Ensure that the turntable bearing is lubricated and that all the turntable mounting bolts have been tightened to the recommended torque.
- Operate the crane controls smoothly to avoid any jerking or harsh movement that could affect the dial indicator reading.
- Perform steps a. through c. for GROVE M984 cranes.
- Perform steps b. and d. for GROVE M977 and M985 cranes.

a. Lower fairlead into operating position (Refer to TM 9-2320-279-10).

b. Place crane in operating position and level side to side with outriggers (Refer to TM 9-2320-279-10).

c. Keeping boom level, lower mast until approximately one inch (24.4 mm) clearance is present between the erection cylinder and the crane outrigger cover. Rotate the crane in both directions to ensure no contact will be made with the outrigger cover by either the cylinder or the tension links. Adjust the clearance if contact might occur.

d. Keeping boom level, lower mast until approximately one inch (24.4 mm) clearance is present between the erection cylinders and the rear cargo body panel. Rotate the crane in both directions to ensure no contact will be made with the rear cargo body panel by either cylinder. Adjust the clearance if contact might occur.

2-8.2. Placement of Dial Indicator.

NOTE

- To obtain a true reading of bearing vertical movement, the dial indicator and magnetic base must be positioned correctly.
- Perform step e. for placement of dial indicator for M977 and M985 trucks.

a. Ensure that the plunger of the dial indicator is straight up and down in all directions, front to back and side to side. It is not necessary to measure this, but try to get it as close as possible with a visual inspection from different angles.

b. Ensure that the dial indicator is pre-loaded at least one turn by allowing the needle to complete one turn around the dial before zeroing the dial.

c. Ensure that the magnetic base is secure at its attachment point so it will not move and contribute to a false indicator reading.

d. The dial indicator must be in line with the axial centerline of the boom for all measurements.

e. Due to the position of the crane power/remote control junction box, it is not possible to position the boom at exact 90 degree and 180 degree positions and have a mounting spot for the magnetic base. Position the magnetic base first and then rotate the boom to place the boom axial centerline over the magnetic base, then install the dial indicator.

f. To ensure a consistent reading, the dial indicator plunger must be as close as possible to the outside diameter of the swing gear tooth tip, as the allowable bearing movement only applies at the tip of the gear tooth. The indicator reading will be magnified if the plunger contact point is off of the outer diameter of the swing gear tooth tip.

g. Always verify that the dial indicator reading is correct by lowering the boom from the 60 degree boom angle to the level boom angle, then check that the dial indicator returns to the zero position. Repeat the procedure if the dial indicator does not return to the zero position.

2-8.3. Placement of Telescoping Gage (M977 and M985 only).

NOTE

To obtain a true reading of bearing vertical movement, the telescoping gage must be positioned correctly.

a. Ensure that the gage is straight up and down in all directions, front to back and side to side. It is not necessary to measure this, but try to get it as close as possible with a visual inspection from different angles.

b. The telescoping gage must be in line with the axial centerline of the boom for all measurements.

c. To ensure a consistent reading, the telescoping gage must be as close as possible to the outside diameter of the swing gear tooth tip, as the allowable bearing movement only applies at the tip of the gear tooth. The gage reading will be magnified if the contact point is off of the outer diameter of the swing gear tooth tip.

d. Always verify that the reading is correct by measuring at least twice.

2-8.4. Turntable Bearing Inspection Procedures.

WARNING

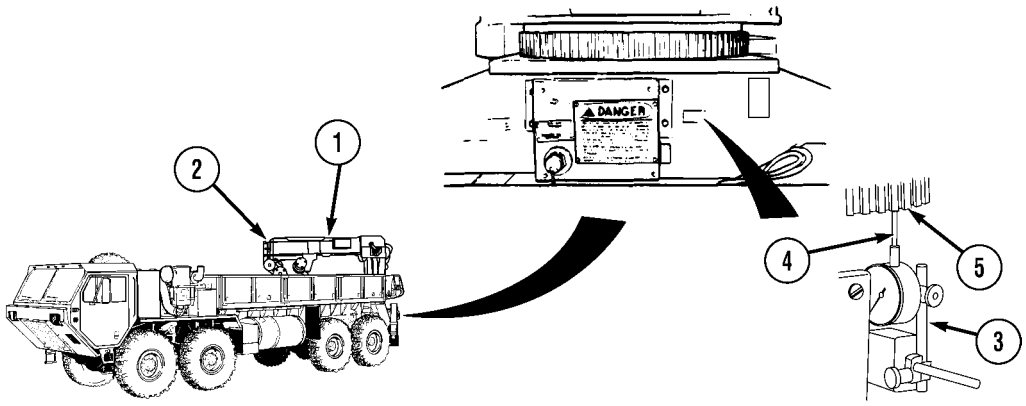
When performing these inspection procedures, do not position yourself underneath the boom when the crane controls are being operated. Failure to comply could result in severe injury or death to personnel.

Tools Required (or equivalent)

1. Dial indicator with at least one inch of plunger travel with .001 inch graduations. NSN 5210-00-794-9178
2. Magnetic base for dial indicator. NSN 5210-01-368-5829
3. Carpenters level. NSN 5210-00-239-0892
4. Telescoping gage (M977 and M985 only). NSN 5210-00-221-2087
5. Micrometer (M977 and M985 only). NSN 5210-00-554-7134
6. Magnetic protractor. NSN 5210-01-415-0075

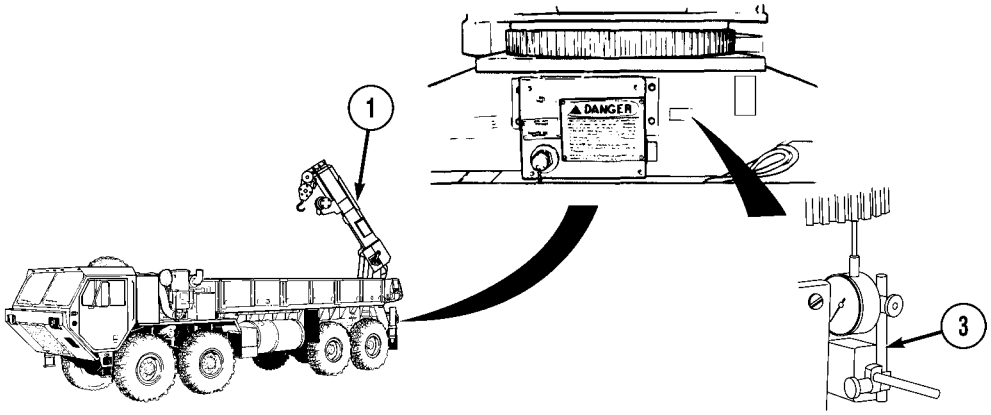
NOTE

- Any reading equal to or over .065 inch (1.65 mm) will require a new bearing to be ordered and installed as soon as possible. If that reading occurs on the first step of the inspection, it is not necessary to continue the inspection. However, even if the first reading is within the specifications, it is still necessary to complete all of the remaining steps in the inspection procedure.
- For measurements with the boom nose positioned over rear and front of M977, M984A1, and M985, perform steps b. through g.
- For measurements with the boom nose positioned over driver and passenger side of M984A1, perform steps b. through g.
- For measurements with the boom nose positioned over driver and passenger side of M977 and M985, perform steps i. through n.



a. With boom angle level, rotate boom (1) and position boom nose (2) to the front of the truck (Refer to TM 9-2320-279-10).

b. Install a dial indicator (3) with magnetic base. Plunger (4) of dial indicator (3) must be in line with the axial centerline of the crane boom (1), with the plunger tip centered as close as possible under or over the tip of the swing gear tooth (5).



c. Adjust dial indicator (3) to preload the dial, then zero the dial indicator (3).

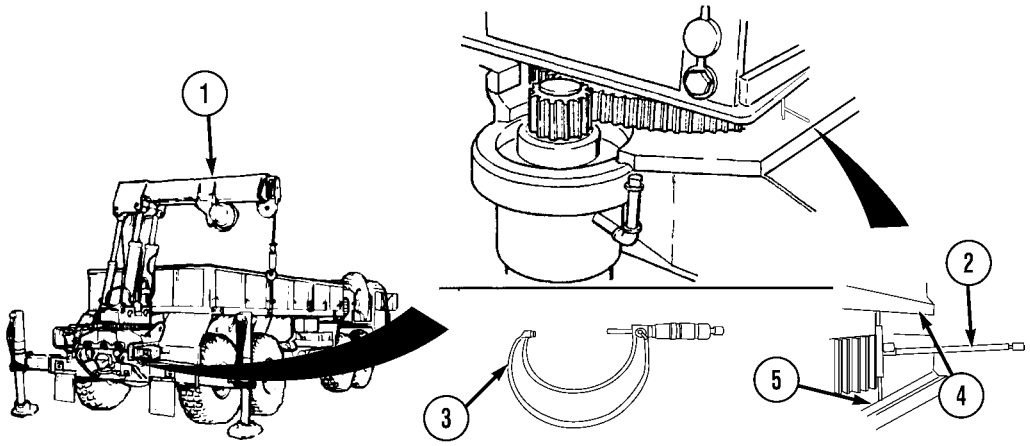
d. Operate boom up control until boom angle is 60 degrees.

e. Record dial indicator (3) reading.

f. If reading is equal to or over .065 inches (1.65 mm), institute bearing replacement procedures. If reading is under .065 inches (1.65 mm), continue the inspection procedure.

g. If all readings are under .065 inches (1.65 mm), the inspection procedure is complete, return crane to service.

h. Level boom angle and rotate boom to the passenger side of the truck. Repeat steps b. through g. for measurements with boom positioned to both passenger and driver side.



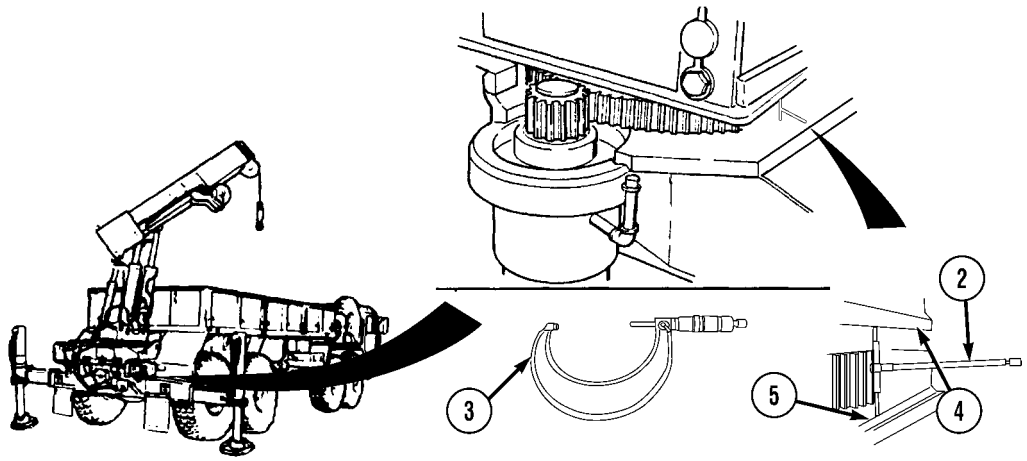
NOTE

Measurements with boom nose positioned over passenger side shown.

i. Lower boom (1) to obtain a level boom angle.

j. Use the telescoping gage (2) and micrometer (3) to measure the distance between the bottom of the superstructure (4) and the subframe (5). The telescoping gage (2) must be in line with the axial centerline of the crane boom, with the gages barrel just touching the swing gear tooth. Record measurement.

k. Operate boom up control until boom angle is 60 degrees.



l. Use the telescoping gage (2) and micrometer (3) to measure the distance between the bottom of the superstructure (4) and the subframe (5). The telescoping gage (2) must be in line with the axial centerline of the crane boom, with the gages barrel just touching the swing gear tooth. Record measurement.

m. If the difference between the two readings is equal to or over .065 inches (1.65 mm), institute bearing replacement procedures. If the difference between the two readings is under .065 inches (1.65 mm), continue the inspection procedure.

n. If the differences in readings for both passenger and driver side are under .065 inches (1.65 mm), the inspection procedure is complete, return crane to service.

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 4-25.11

A-3. TECHNICAL MANUALS.

Operator's Manual, M977 Series, 8x8 Heavy Expanded Mobility Tactical Trucks (HEMTT)……TM 9-2320-279-10
TM 9-2320-315-14&P (IETM)

Operator's Manual for Controls and Equipment Found Only on the M985EI Cargo Truck……..TM 9-2320-355-10

Operator's Manual for Controls and Equipment Found Only on the M984 Wrecker-Recovery Truck……TM 9-2320-354-10

Organizational Maintenance Manual, M977 Series, 8x8 Heavy Expanded Mobility Tactictal Trucks (HEMTT)……TM 9-2320-279-20

Direct Support and General Support Maintenance Manual, M977 Series, 8x8 Heavy Expanded Mobility Tactical Trucks (HEMTT)……..TM 9-2320-279-34
TM 9-2320-315-14&P (IETM)

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……TM 9-2320-354-24&P

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

Index of Graphic Training Aids and Devices……..DA PAM 310-5

Safety Inspection and Testing of Lifting Devices……...TB 43-0142

Warranty Technical Bulletin for M977 Series Vehicles……TB 9-2320-279-14

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

By Order of the Secretary of the Army

CARL E. VUONO
General, United States Amy
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).

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
US Army Readon-6
443rd Battalion (Attn: SSG Doe)
Fort Cold, Alaska 10012

DATE SENT
23 January 1986

PUBLICATION NUMBER	PUBLICATION DATE	
TB9-2320-279-34	23 DEC 1988	Load Test Procedures for HEMTT Cranes

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PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
1-1	1-1		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Reference to technical bulletin is wrong; should be TB43-0142 not TB43-0143.

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SSG John Doe AV 798-8686	John Doe

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Warren, Michigan 48397-5000

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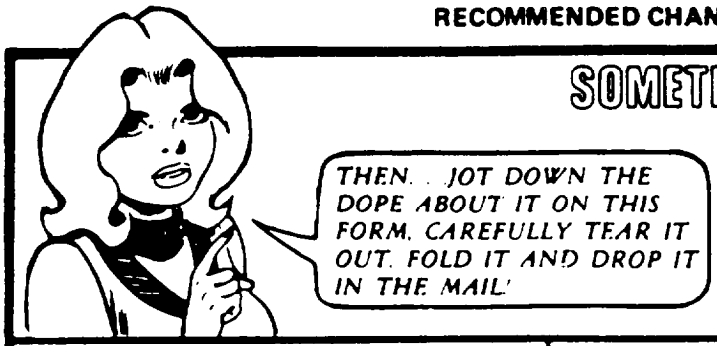

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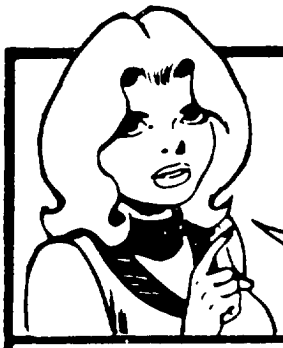

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THE METRIC SYSTEM AND EQUIVALENTS

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

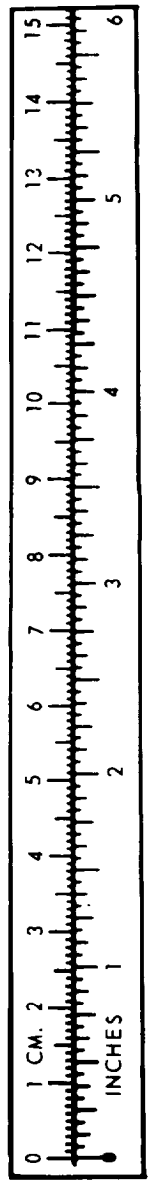
TEMPERATURE

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

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
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

TO CHANGE	TO	MULTIPLY BY
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



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