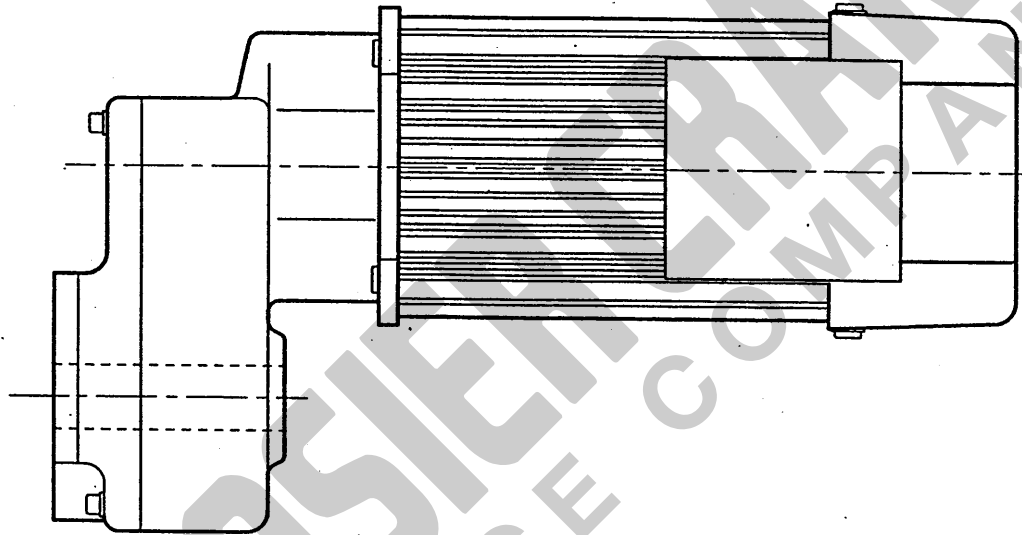


TM DRIVES

Types TM3, TM4 and TM5



INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

SERIAL NO.: _____



R&M
MATERIALS HANDLING

IMPORTANT

Read this manual before proceeding with the installation, operation, or maintenance of the product to ensure the safe and efficient use of the product.

It is strongly recommended that the personnel responsible for the operation, inspection, and maintenance of this product, read and follow the Safety Standard ANSI B30.-1993 (or current revised edition) covering Overhead Hoists (underhung) as promulgated by the American National Standards Institute and published by the American Society of Mechanical Engineers. Copies of this publication are available from the Society at United Engineering Center, 345 East 47th Street, New York, NY 10017.

If any instructions are unclear, contact the manufacturer or distributor of the product before attempting to install or use the product.

Manufactured by: R&M Materials Handling, Inc.
4501 Gateway Blvd.
Springfield, Ohio 45502
Tel. (937) 328-5100
Fax (937) 325-5319



TABLE OF CONTENTS

| Section | Page |
|---|------|
| Foreword | ii |
| Authorized Stocking Parts Distributors | iii |
| 1. Installation | |
| General | 1-1 |
| Receiving and Storage | 1-1 |
| Location | 1-1 |
| Lubrication | 1-1 |
| Mounting Positions | 1-1 |
| Installation Hardware | 1-1 |
| Power Connection | 1-1 |
| 2. Initial Start-up | |
| Proper Motor Rotation | 2-1 |
| Operation of Brake | 2-1 |
| 3. Maintenance | |
| Gearcase Assembly | 3-1 |
| Motor/Pinion | 3-1 |
| Brake | 3-1 |
| Inspection/Preventative Maintenance Schedule | 3-2 |
| Recommended Lubricants & Capacities | 3-2 |
| Recommended Bolt Tightening Torque | 3-2 |
| Troubleshooting | 3-3 |
| 4. Spare Parts Identification, Replacement and Adjustment Instructions | |
| Motor | 4-1 |
| Brake | 4-3 |
| NM340 Brake | 4-3 |
| NM311, 312, 313 Brakes | 4-6 |
| Gear Reducer | 4-9 |
| TM3 Double Reduction | 4-9 |
| TM3 Triple Reduction | 4-10 |
| TM4 Triple Reduction | 4-11 |
| TM5 Triple Reduction | 4-12 |

FOREWORD

This manual has been prepared to acquaint you with the procedures necessary for the installation, operation, and maintenance of the product you have purchased.

Proper installation is important to ultimate performance of this equipment. Careful study and adherence to the instructions will help assure safe, dependable operation. It is recommended that you keep this manual readily accessible in case of an emergency.

Information in this manual is subject to change without notice.

STANDARD WARRANTY. Consult R&M Materials Handling's current Sales Policy for a detailed definition of the product warranty support procedures. If you need a current copy, contact the Warranty Administrator at the factory.

REPAIR or REPLACEMENT PARTS. The Illustrated Parts Breakdown in this manual define the parts that are available for repair or replacement. In order to obtain parts, please proceed as follows:

- 1) Locate your nearest R&M Authorized Stocking Parts Distributor and provide the below details. A list of Authorized Stocking Parts Distributors is located on the following page of this manual for your convenience.
- 2) Locate the serial number on the product name plate. This must be provided to insure proper replacement parts.
- 3) Obtain the reference number / numbers from the illustrated parts breakdown for the part / parts that you need.
- 4) Define the quantity for each part.
- 5) Description.
- 6) Power Supply.
- 7) Provide ship to address. Specify street address not Post Office Box number.

A minimum charge of \$100 net is required on all orders.



SECTION 1 – INSTALLATION

General

Your hoist trolley or crane endtruck is equipped with a TM type drive. To quickly identify the type drive installed on the equipment, a TM drive is shaft mounted with a hollow output bore. A TM drive consists of a gearbox, motor, and brake.

Receiving and Storage

Inspect the drive immediately on receipt and verify that no damage has been caused during shipment. Check the ratings on the motor nameplate to ensure the information matches your specifications. Store drives in a dry location at room temperature.

Location

Drive should operate where environment has an ambient temperature range of -4 to 104°F (-20 to 40°C) and altitude does not exceed 3,280 feet (1000m) above sea level. Contact factory if conditions are more severe. The flow of cooling air to motor shall not be obstructed.

Lubrication

Gearcases and motors are shipped from factory completely charged with lubrication. To avoid any potential damage from low oil or grease levels resulting from leakage during shipping/handling, all levels must be checked and oil or grease added where necessary. See Section 4 for Recommended Lubricants & Capacities.

Mounting Position

Motor shaft shall be located either above or at the same level as the gear shaft. Never mount drive where motor shaft is below the gear shaft.

Installation

To mount the drive to endtruck or trolley, use the following recommended procedures:

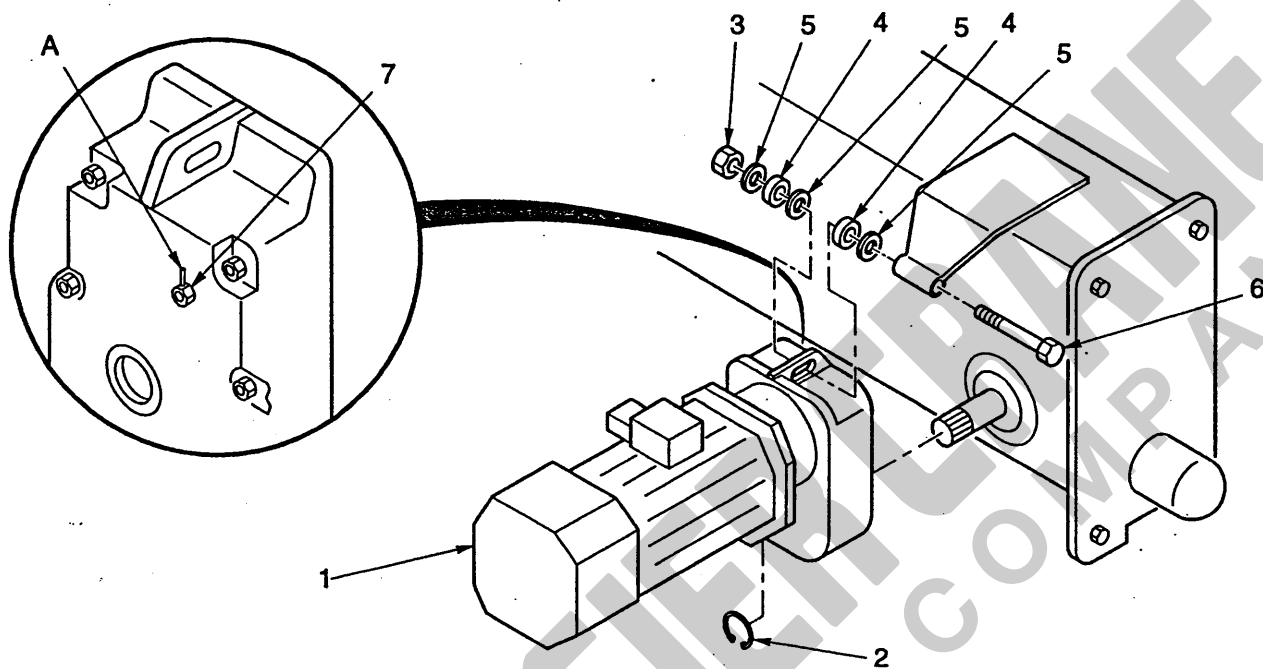
- Remove dirt or rust protection wax from mounting surface of endtruck or trolley.
- Lubricate drive shaft splines with grease.
- Install drive and tighten mounting bolts. (See Section 4 for recommended bolt tightening torques)
- If drive has been shipped with solid plug, replace it with a breather plug. Or if drive has a breather plug, remove the pin from the plug. This is to prevent oil leakage due to pressure build up.

Power Connection

Make sure that power supply voltage is same as that shown on the motor nameplate. The power source and wires must be sized sufficiently to maintain the voltage at motor within 10% of nameplate rating and frequency within 5% of nameplate rating. Improper voltage maintenance can cause motor overheating or sluggishness, and inoperative motor brakes.

For wire sizes and electrical connections refer to National Electric Code - Article 430 and/or local area codes.

SECTION 1 — INSTALLATION OF TM DRIVE

[illegible]

HOIST SERIAL NUMBER AND PART REFERENCE NUMBER MUST BE PROVIDED WHEN ORDERING REPLACEMENT PARTS.

SECTION 2 – INITIAL START-UP

CHECK THE FOLLOWING BEFORE PUTTING INTO SERVICE:

Proper Motor Rotation

The direction of rotation of any three-phase A.C. motor can be changed by reversing any two leads of the three power lines feeding the motor. It is important to insure that the motor/s respond to the direction indicated on the push button insert being depressed.

Operation of Brake

Check motor brake to insure that it is operating properly. The friction plate must turn freely when motor is energized. Refer to adjustment procedures for proper setup.

SECTION 3 – MAINTENANCE

Gearcase Assembly

Drive consists of precision cut gears and pinions, keyed or splined to steel shafts, supported on bearings. Gears and bearings operate in an oil-bath or semi-fluid grease and requires no additional lubrication. Under normal use, lubrication of gearcase is life-time rated. If the need for relubrication becomes necessary, see Lubrication Schedule and Recommended Lubricants for your drive.

It is recommended that the gearcase cover gasket be replaced whenever inspection or servicing of gearcase requires cover removal.



Fill gearcase to level with lubrication as recommended in Lubrication Schedule, this section, prior to putting drive back in service.

Motor/Pinion

Standard motors are enclosed for protection against normal hazards of dust and moisture.

For TM5 drive type, motor pinion is pressed fit to the shaft of motor. Motor pinion must be replaced when motor replacement has been established. On replacement motor, pinion is fitted to shaft at factory.

For TM4 drive types, motor coupling slides onto shafts of motor and gears. Lubricate splines of coupling with grease before assembling motor to gear.

Brake

The type of brake on motor may vary with the type of drive and size of motor. Pay careful attention to the type of brake on your drive motor before adjusting or servicing brake. Rectifier for brake is located in motor terminal box. Proper maintenance and adjustment of the motor brake is essential to the reliable operation of the drive. Heat is generated and wear occurs each time the motor is stopped. The brake life and serviceability will be greatly extended by adequate maintenance. The frequency of brake wear adjustment depends on the duty cycle. For brake adjustment, see Section 5.

Inspection/Preventative Maintenance Schedule

The intervals between inspections will vary due to the wide range of applications, duty cycles, and environmental conditions encountered by the equipment. The following schedule lists *minimum* requirements, based on intermittent operation on an eight (8) hour day, five (5) days per week work schedule, under normal environmental conditions. If duty is heavier, or environment severe, inspections should be more frequent.

The operator should also bring to the attention of maintenance personnel any unusual operating conditions that occur between inspection periods, and *not* operate equipment until drive has been repaired and is functioning properly.

INSPECTION/PREVENTATIVE MAINTENANCE SCHEDULE

| Time Interval | Inspection Function |
|----------------------|--|
| Start of each shift | <ul style="list-style-type: none">• Brake function – Test the brake in operation, by accelerating and braking. |
| Monthly to Quarterly | <ul style="list-style-type: none">• Check for loose or broken connections.• Brake – Check that brake is clean and remove dust.• Check air gap with feeler gauge for proper air gap. Adjust as required. Refer to Section 5 for instructions. |
| Annually | <ul style="list-style-type: none">• Check for loose bolts.• Check for oil leaks. |

RECOMMENDED LUBRICANTS & CAPACITIES

| Type of Lubricant | Type and Size of Drive | Capacity |
|------------------------------|------------------------|------------------------|
| MOBILUX EP 004 or Equivalent | TM2 | 13 fl. oz. (0.4 liter) |
| | TM3 | 13 fl. oz. (0.4 liter) |
| | TM4 | 30 fl. oz. (0.9 liter) |
| | TM5 | 40 fl. oz. (1.2 liter) |

RECOMMENDED BOLT TIGHTENING TORQUES

| Gear Type | Bolts to Fasten Gear to Structure | Bolts to Fasten Motor to Gear |
|-----------|-----------------------------------|--|
| TM2 | 30 lb-ft (40 N.m) | 7 lb-ft (8.5 N.m) |
| TM3 | 30 lb-ft (40 N.m) | 7 lb-ft (8.5 N.m) |
| TM4 | — | 7 lb-ft (8.5 N.m) |
| TM5 | — | 7-3/4" Bolt Circle 15 lb-ft (20 N.m) 8-15/16" Bolt Circle 30 lb-ft (40 N.m) |

TROUBLESHOOTING

| PROBLEM | DIAGNOSIS | POTENTIAL SOLUTION |
|---------------------------|---|---|
| No traverse motion. | No power. | Check connections. |
| | Brake not releasing. | Check adjustment. Check for loose connection. Check auxiliary contacts. Check voltage supply. Check rectifier. |
| Moves in wrong direction. | Phase reversal of three phase power supply. | Interchange any two of the three lead connections either at the power source or at the lead connections to the hoist. |
| Motor overheats. | Excessive load. | Check weight of load. |
| | Incorrect voltage or frequency. | Check for correct power supply. Voltage should be within 10% of nameplate rating. |
| | Wrong voltage. | Check current rating on motor nameplate against power supply. Check motor connections. |
| | Brake does not release. | Check rectifier for proper voltage. Check resistance of brake coil. Check that coil is energizing and de-energizing. Check that armature disc moves freely. Check brake lining for wear and corrosion. Check air gap. |

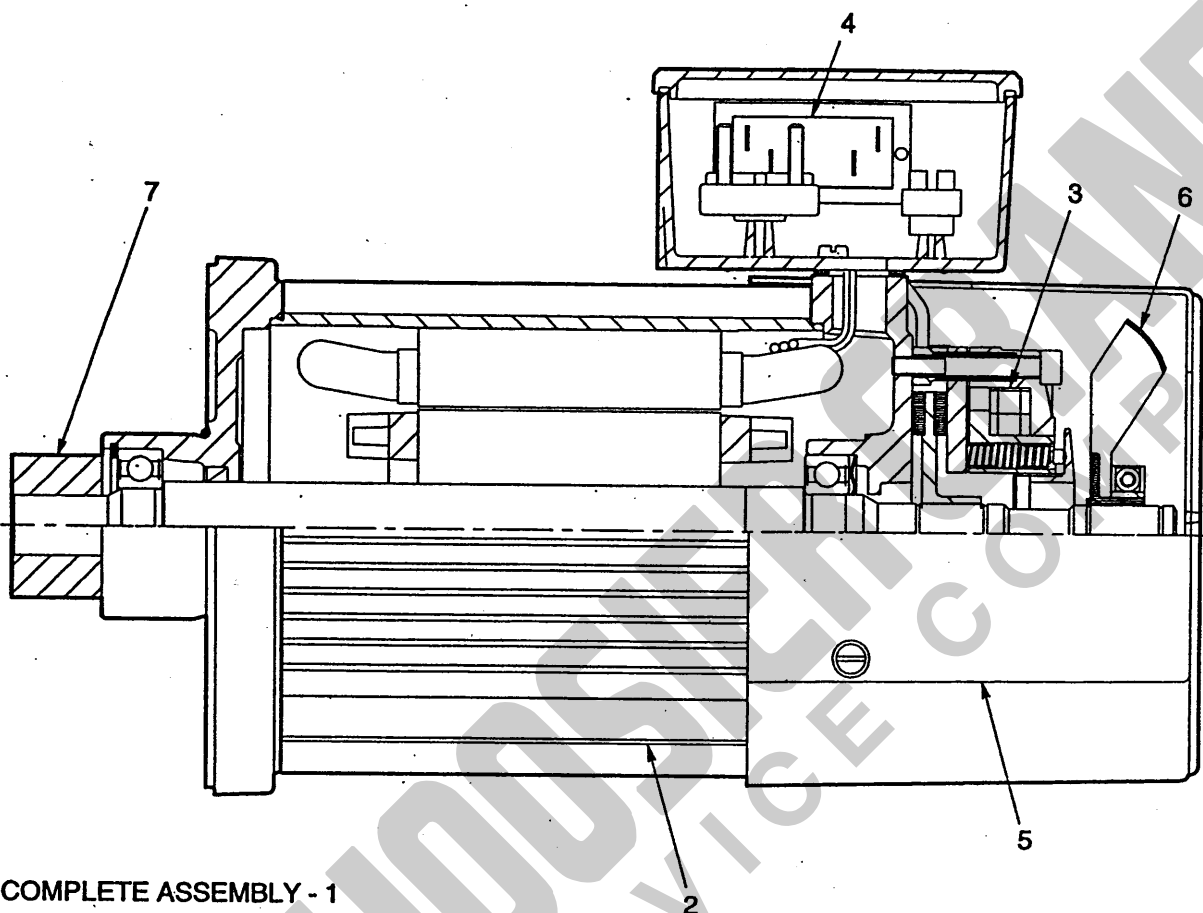


[illegible]

Bulletin TM-1999-1 4-1

MOTOR FOR TM5 DRIVE

SECTION 4 – SPARE PARTS IDENTIFICATION



COMPLETE ASSEMBLY - 1

[illegible]

HOIST SERIAL NUMBER AND PART REFERENCE NUMBER MUST BE PROVIDED WHEN ORDERING REPLACEMENT PARTS.

COMPLETE BRAKE ASSEMBLY - 5

NOTE: THIS BRAKE USED ONLY WITH TM5 DRIVES.

[illegible]

Bulletin TM-1999-1 4-3

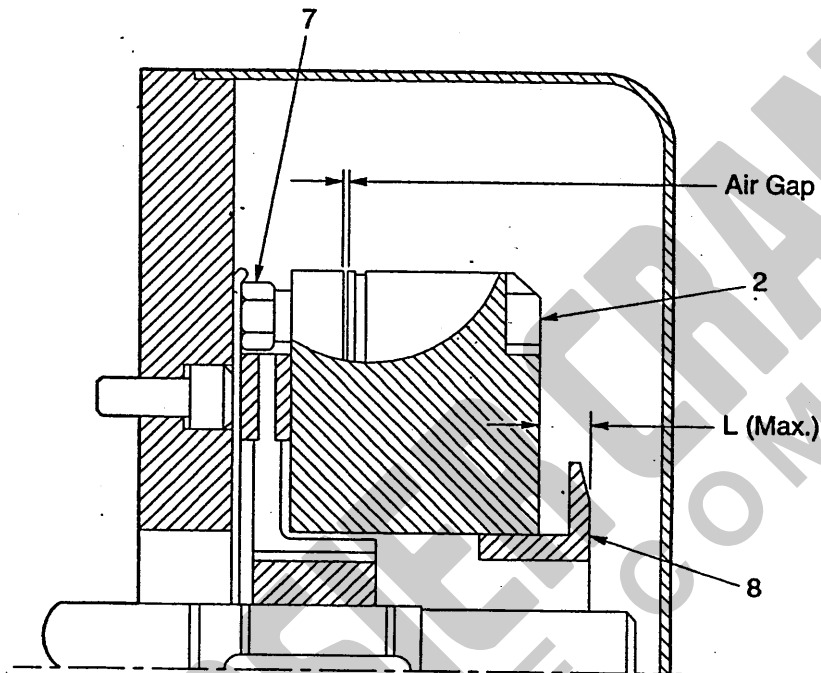
| Brake Type Identification | Torque (lb-ft) | L Max (inch) | Torque reduction/step (lb-ft) | Nominal air gap (inch) | Maximum air gap (inch) |
|---------------------------|----------------|--------------|-------------------------------|------------------------|------------------------|
| NM34002 | 3 | 0.24 | 0.074 | 0.008 | 0.020 |
| NM34003 | 3 | 0.26 | 0.118 | 0.008 | 0.020 |
| NM34003A | 6.6 | 0.26 | 0.265 | 0.008 | 0.020 |
| NM34004 | 12 | 0.33 | 0.443 | 0.008 | 0.020 |
| NM34005 | 12 | 0.39 | 0.443 | 0.012 | 0.028 |
| NM34005A | 25 | 0.39 | 0.885 | 0.012 | 0.028 |

Installation of Brake

- Install friction plate. Friction plate must slide freely along shaft.
- Install magnet and anchor disc.
- Tighten mounting bolts.
- Adjust air gap.
- Connect wires.



NM340 BRAKE
SECTION 4 – ADJUSTMENT INSTRUCTIONS



The brake is adjusted for proper torque when shipped from the factory and should not require adjustment in the field. If necessary, torque rating can be reduced by unscrewing torque adjustment ring (8) with a spanner tool. The torque adjustment ring has detent action with a torque reduction per step as indicated in chart below.

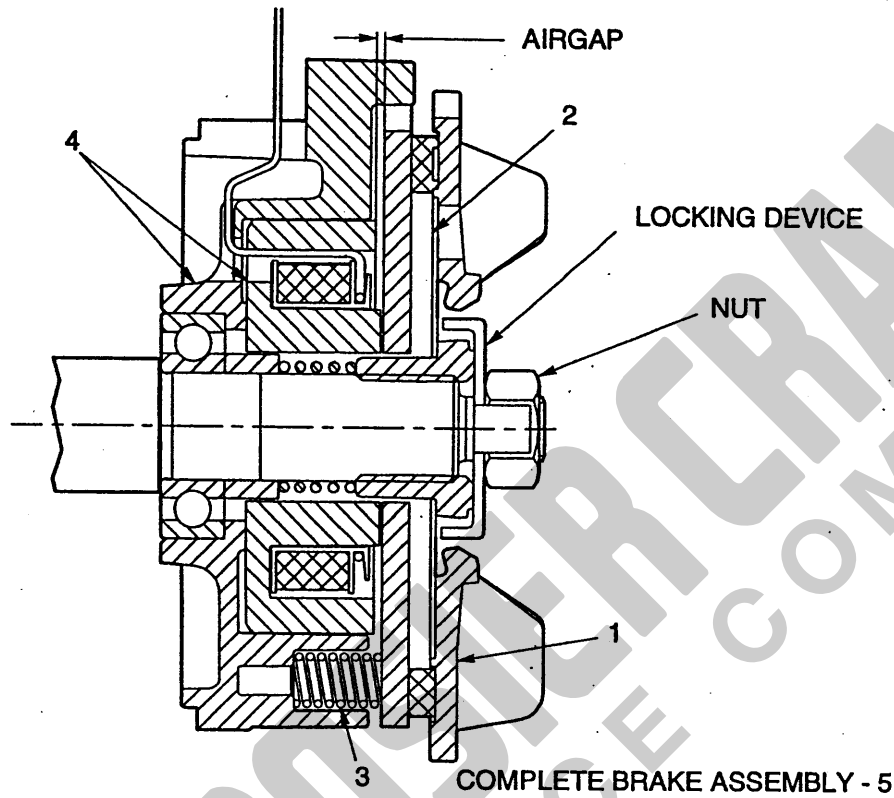
The air gap between the magnet and anchor plate will require adjustment from time to time, depending upon frequency of operation and wear of friction material. See chart below for proper air gap for your brake.

To adjust the air gap

- The air gap should be checked in 3 positions using feeler gauge.
- Loosen mounting bolts (2), rotate adjustment tubes (7) approximately 1/4 turn, retighten bolts (2) and re-measure air gap.
- Repeat this procedure with 1/4 turn intervals until the proper air gap is reached in each of 3 measuring positions.

HOIST SERIAL NUMBER AND PART REFERENCE NUMBER MUST BE PROVIDED WHEN ORDERING REPLACEMENT PARTS.

NM311, NM312, NM315 BRAKE SECTION 4 – SPARE PARTS IDENTIFICATION

[illegible]

HOIST SERIAL NUMBER AND PART REFERENCE NUMBER MUST BE PROVIDED WHEN ORDERING REPLACEMENT PARTS.

**NM311, 312, 313 BRAKE
SECTION 4 – ADJUSTMENT INSTRUCTIONS**

The brake is adjusted for proper torque when shipped from the factory and should not require adjustment in the field. If necessary, torque rating can be reduced by removing springs or increased by adding springs. Refer to Page 4-8 of this section for spring arrangement.

The air gap between the magnet and armature disc will require adjustment from time to time, depending upon frequency of operation and wear of friction material. Adjust brake before air gap exceeds 0.035 in. (0.9 mm). See chart below for proper air gap for your brake.

To adjust the air gap

- The air gap should be checked in 3 positions using feeler gauge.
- Bend flap of locking device away from nut.
- Turn nut clockwise to decrease air gap. One (1) full turn of nut equals 0.039 in. (1 mm) of air gap. Adjusting nut must be turned at 60° intervals or 1/6 of full turn.
- Adjust air gap back to nominal. (See chart below)
- After air gap adjustment, bend one flap of locking device against nut to prevent loosening.

| Brake Type Identification | Torque (lb-ft) | Nominal air gap | Maximum air gap |
|---------------------------|----------------|--------------------|--------------------|
| NM311 | 1.5 | 0.012 in. (0.3 mm) | 0.035 in. (0.9 mm) |
| NM312 | 2 | 0.012 in. (0.3 mm) | 0.035 in. (0.9 mm) |
| NM313 | 3 | 0.012 in. (0.3 mm) | 0.035 in. (0.9 mm) |

Installation of Brake

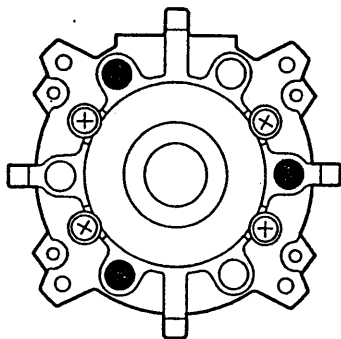
- Insert brake springs into end shield. Install armature disc and brake wheel together against brake springs.



Refer to Page 4-8 of this section for proper location of springs for your brake.

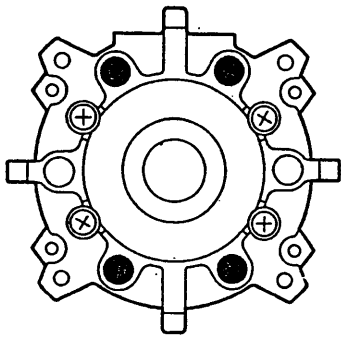
- Insert washer and tighten nut to adjust air gap.
- Insert locking device.
- Tighten mounting bolts.
- Connect wires.

NM311, 312, 313 BRAKE
SECTION 4 – SPARE PARTS IDENTIFICATION, REPLACEMENT
AND ADJUSTMENT INSTRUCTIONS



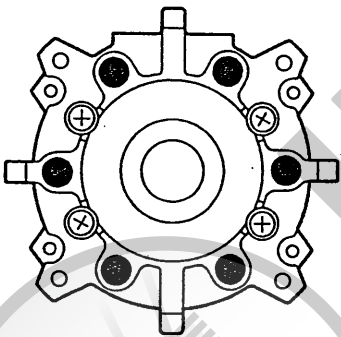
A

Braking torque 1.5 ft-lb (2 N.m)
 No. of springs: 3



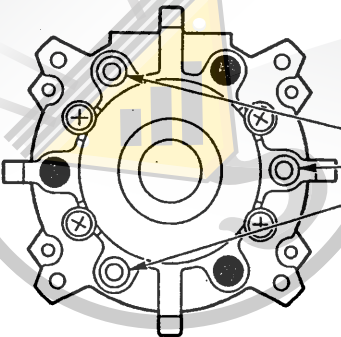
B

Braking torque 2.0 ft-lb (2.6 N.m)
 No. of springs: 4



C

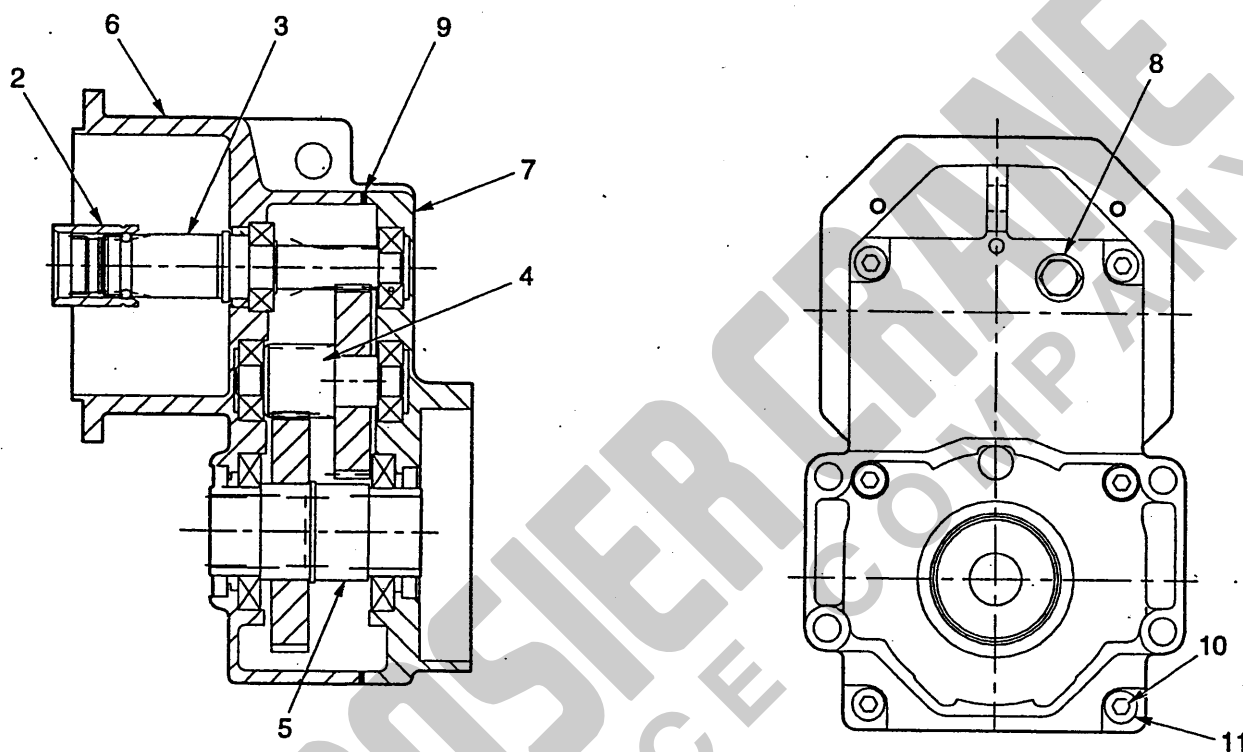
Braking torque 3.0 ft-lb (4 N.m)
 No. of springs: 6



D

Braking torque 4.1 ft-lb (5.6 N.m)
 No. of springs: 6 + 3 = 9

COMPLETE ASSEMBLY - 1

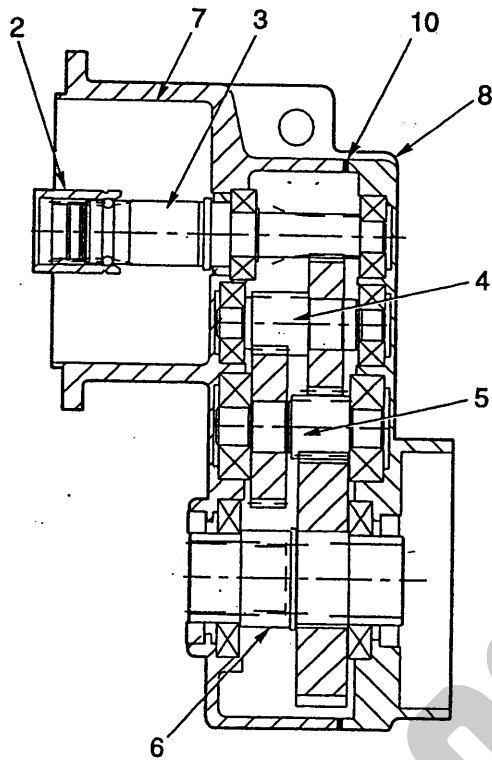


NOTE: SHAFT ASSEMBLIES INCLUDE BEARINGS.

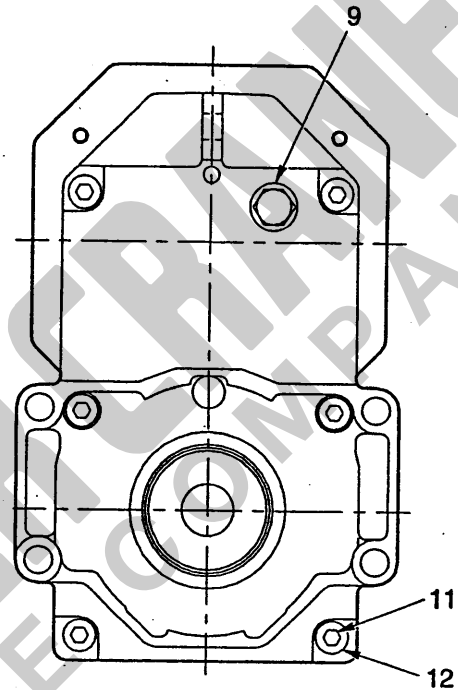
[illegible]

Bulletin TM-1999-1 4-9

TM3 GEAR REDUCER – TRIPLE REDUCTION SECTION 4 – SPARE PARTS IDENTIFICATION



COMPLETE ASSEMBLY - 1

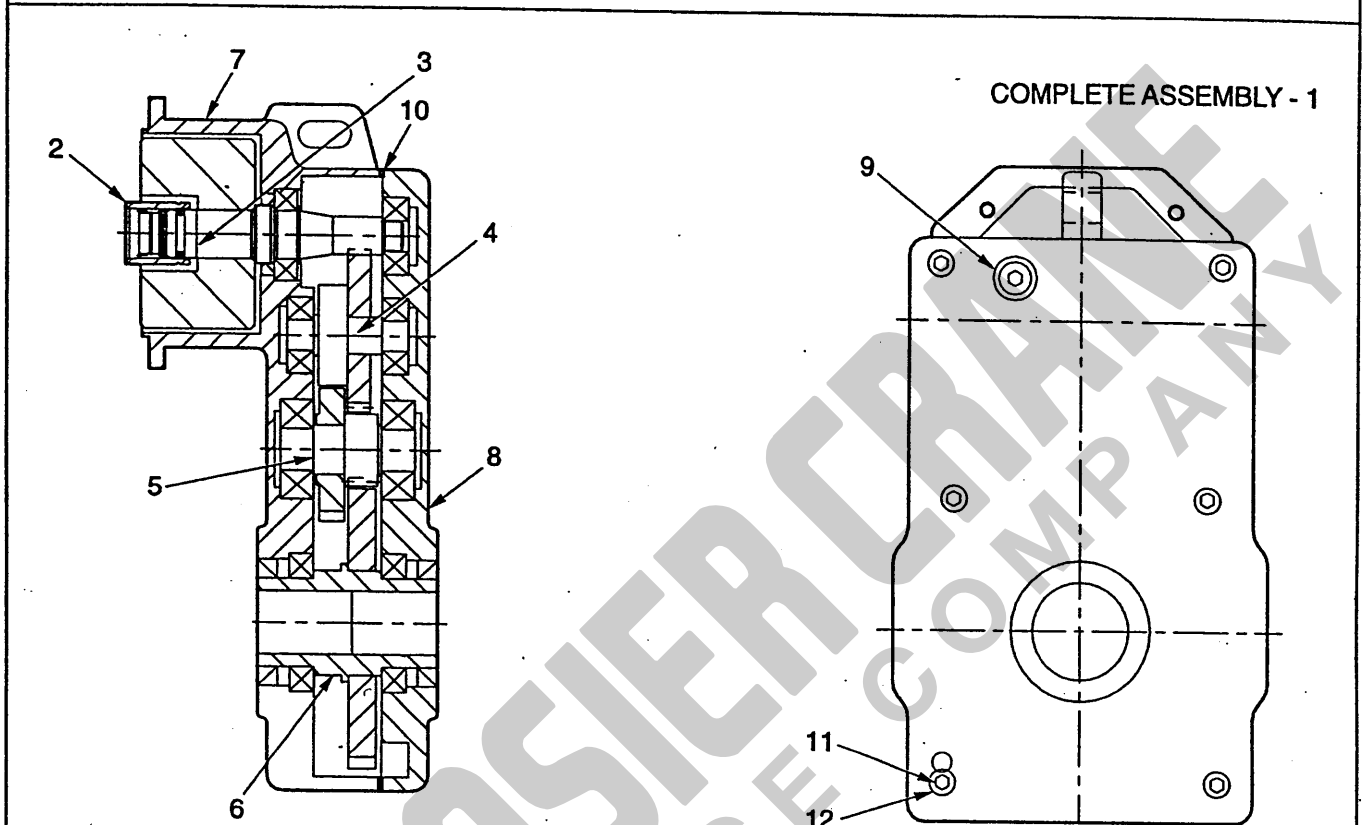


NOTE: SHAFT ASSEMBLIES INCLUDE BEARINGS.

[illegible]

HOIST SERIAL NUMBER AND PART REFERENCE NUMBER MUST BE PROVIDED WHEN ORDERING REPLACEMENT PARTS.

TM4 GEAR REDUCER – DOUBLE REDUCTION
SECTION 4 – SPARE PARTS IDENTIFICATION



NOTE: SHAFT ASSEMBLIES INCLUDE BEARINGS.

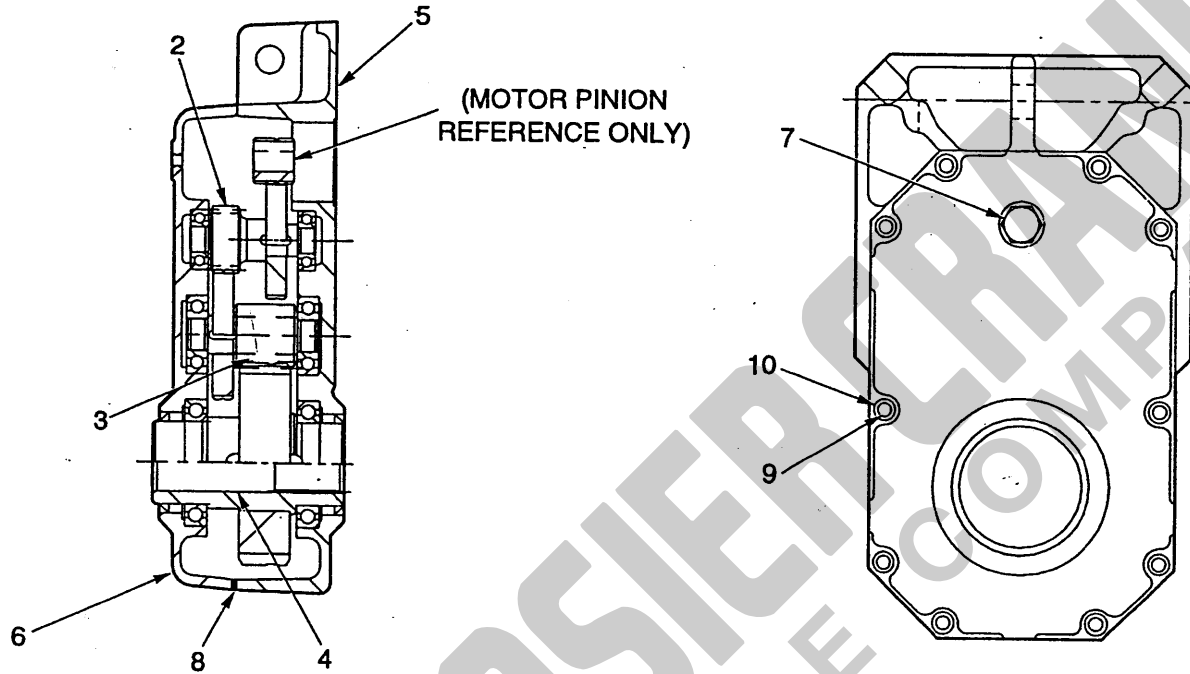
[illegible]

HOIST SERIAL NUMBER AND PART REFERENCE NUMBER MUST BE PROVIDED WHEN ORDERING REPLACEMENT PARTS.

TM5 GEAR REDUCER – TRIPLE REDUCTION

SECTION 4 – SPARE PARTS IDENTIFICATION

COMPLETE ASSEMBLY - 1



NOTE: SHAFT ASSEMBLIES INCLUDE BEARINGS.

[illegible]