



**MAINTENANCE  
AND  
SERVICE MANUAL**

**MODEL MD-800 SERPENTINE**

**CHASSIS  
DYNAMOMETERS**

<u>Revision</u>	<u>Release Date</u>	<u>Initial</u>
A	21 SEPT 18	NK

**MUSTANG DYNAMOMETER**



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## **Mustang Dynamometer**

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## NOTICE

This manual has been designed and written to provide useful information about Mustang Dynamometer equipment and systems. Every effort has been made to make this manual as complete as possible, but no warranty or fitness is implied.

The information contained in this manual is provided on an “as is” basis. Neither the author of this manual nor the management and owners of Mustang Dynamometer shall have either liability or responsibility to any person or entity with respect to any loss or damages arising from the information contained in this manual.

## **WARRANTY LIMIT OF LIABILITY**

Mustang warrants that the product(s) that is the subject of this sale is free from defects in material. The duration of this warranty is one year from date of shipment on all Mustang-related components. Components not manufactured by Mustang will carry the original manufacturer's warranty, typically 90 days for all electronic-related components. All warranty claims must be processed through Mustang.

If a problem arises within the applicable warranty period, it is the responsibility of the purchaser to (a) promptly notify Mustang in writing (b) obtain a RMA Number from Mustang (c) return to Mustang the component(s) that are claimed to be defective (transportation charges must be prepaid by the purchaser). RMA Number must be clearly marked on outside of package(s).

Within a reasonable time after such notification, Mustang will correct any defect(s) in component(s). If Mustang is unable to repair the component after a reasonable number of attempts, or if Mustang determines at any time the repair is impracticable, Mustang will provide a replacement with like or similar component(s). The purchaser is responsible for all transportation expenses to and from Mustang and all labor expenses associated with removal and replacement of the component(s) as well as labor involved to repair component(s). Mustang will bear the expense of parts only. These remedies are the Purchaser's sole remedies for breach of warranty.

The expiration of the warranty period, use of the product for purposes other than those for which it is designed, other abuse or misuse, unauthorized attachments, modifications, or disassembly, or mishandling of the product during shipping, shall end all liability of Mustang.

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Unless modified in writing and signed by officers of both parties, this agreement is understood to be the complete and exclusive agreement between the parties, superseding all prior agreements, oral or written and all other communications between the parties relating to the subject matter of the agreement.



GANZCORP INVESTMENTS INC. dba MUSTANG DYNAMOMETER

**DANGER**

Keep limbs, hair, jewelry and clothing away from the moving rolls. When operating a vehicle on the machine, remain inside vehicle until the rolls have stopped. Cover the rolls when the equipment is not in use.

**DANGER**

Do not operate or perform any maintenance on your equipment until you have carefully read this manual in its entirety making sure that you understand all of the material presented in each section.

**CAUTION**

Unsafe operating practices can lead to potentially dangerous situations when your machine is running.

**Only properly trained and responsible personnel should attempt to operate this machine.**

**CAUTION**

Removal and disassembly instructions in this manual have been reduced to a minimum for ease of readability.

**Only experienced maintenance personnel should attempt to install and/or make repairs to this machine.**



# INTRODUCTION

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**1.1 DESCRIPTION**

This manual contains maintenance and service information for Model MD-800-SE-DR Serpentine Chassis Dynamometers. Most maintenance and service procedures are similar for all model dynamometers.

Major system components include the dynamometer, and the control system. Major dynamometer components include the frame, rolls, wheelbase adjustment system, drive belt and Power Absorber Unit (PAU).

Refer to Figure 2.1 for an illustration of the major components of the MD-800 Serpentine Dynamometer.



## 1.2 GENERAL SAFETY ISSUES

**Be Knowledgeable** ... Do not attempt to operate, maintain or service your Mustang Chassis Dynamometer System until you have familiarized yourself with the equipment by reading the instructions in this manual.

**Act Responsibly** ... Exercise caution and discretion when operating or performing maintenance on the dynamometer. Always observe typical, common sense test area precautions.

**Beware of Projectiles** ... Tires that are rotating can throw off stones and other projectiles. Wear approved safety glasses when in the vicinity of the vehicle being tested.

**Protect Your Ears** ... Always wear approved ear protection when working near the dynamometer.

**Beware of Being Grabbed** ... Keep limbs, hair, jewelry, and clothing away from the moving dynamometer components.

**Pay Attention** ... Maintain acute awareness when the dynamometer rolls are in motion.

## 1.3 OPERATIONAL SAFETY ISSUES

For **ALL** types of testing, use chains, straps, Ratchet binders or strap ratchet binders of suitable size with floor anchors to safely perform testing. Be careful not over-tension the chains or straps. All of these safety devices should be used when testing a vehicle. The above items are not supplied by Mustang Dynamometer. We recommend a minimum of 3/8" diameter chain with 3/8" Ratchet binders. For front wheel drive vehicles, two chains and binders should be used to restrain the front axle and a minimum of one chain/binder for the rear axle. For rear wheel drive vehicles, 2 chains/binders should be used to secure the rear axle.

**Vent Engine Exhaust** ... Provide adequate room ventilation. High concentrations of engine exhaust can be deadly. Do not operate your dynamometer without proper ventilation. The ventilation system should provide four (4) air changes an hour in the shop and six (6) air changes an hour for the pit.

**Monitor Carbon Monoxide** ... Make sure you have installed a carbon monoxide monitor in the dynamometer bay.

**Guarding** ... Provide floor markings and protective guard railings for customer/operator protection. NEVER operate the dynamometer with any cover panels removed unless specifically directed to do so elsewhere in this manual.

**Keep Clear of Rolls** ... Stay away from the rolls when in operation.

**Check Tires** ... Before driving the test vehicle onto the dynamometer, be sure to check the vehicle's tires for proper inflation. Inspect the tires for any signs of damage and remove any embedded objects from the tread.

**Restrain Vehicle Movement** ... During dynamometer operation, make sure that the restraints are in position.

**Proper Clearance** ... Always ensure that there is a clearance of at least four (4) feet to the front, rear, and sides of the dynamometer.

**Stay Seated** ... The vehicle operator MUST remain in the driver's seat at all times during a drive-cycle test. Do NOT attempt to get in or out of the vehicle when the dynamometer rolls are moving.

**If in Doubt, STOP!** ... Stop the equipment immediately if you have any doubt about the safe operating condition of the dynamometer and/or the correctness of any procedures that you are performing.

## 1.4 MAINTENANCE SAFETY ISSUES

**Electrical Shock Hazard** ... Turn off electrical service to the system before performing any maintenance activity. Turn off the main breaker in your breaker box before working on anything related to the PAU or motor.

**No Jewelry** ... Remove any jewelry before performing any electrical or mechanical troubleshooting, repair, etc. on the dynamometer.

**Cover Panels** ... Use extreme caution around drive mechanisms and moving parts when operating the dynamometer with any of its cover panels removed from the chassis assembly.

**Avoid Straining Yourself** ... Be careful when lifting dynamometer cover panels. Be careful when replacing belts, couplings, or bearings.

**Air Pressure** ... Make sure that there is no shop air to the dynamometer when working on lift plates or air bags.

**Watch Your Hands** ... Never put your hand between the lift plate and roll when shop air supply is connected to the dynamometer.

**NEVER, NEVER, NEVER!** ... Never pull on the drive belt in order to spin the rolls.

**Check Tightness** ... Make sure that all bolts on the dynamometer are tight and all couplings are properly secured.

## 1.5 ENVIRONMENTAL DATA

This equipment is rated for the following environmental conditions:

Indoor use only.

Temperature: -10o to 49oC

Maximum Relative Humidity: 95% Noncondensing

Altitude: Up to 2000 meters

Pollution Degree 1 in accordance with IEC 664

## 1.6 INSTALLATION DATA

It is recommended that the circuit breaker supplying power to the dynamometer equipment be located in close proximity to the dynamometer, at minimum, within the same room.

Installation and mounting hardware are provided with every Dynamometer and shall be used regardless of a Pit or Floor mount installation. Hardware provided is 5/8 X 4.5" Thunderstud concrete anchors (MD# 20013614). Anchor stud holes should be located to match the holes in the mounting feet on the dynamometer frame.

Tools Required: 1 - Hammer Drill with 5/8" concrete or Masonry bit. 1 - Hammer. 1 - 3/4" Open end wrench. Various sizes flat Steel shim stock. 1 - 4' level.

Using hammer drill mark and drill holes in concrete a minimum of 4.5" deep for 4.5" thunderstud. Ensure holes are clean of any debris prior to attempting installation of Thunderstud. Place Dynamometer into pit or onto floor at installation site. Check level of dynamometer, use flat steel shim stock (customer supplied) as necessary to level dynamometer to floor. Level dynamometer in two planes; (1) Place level on top of rolls parallel with a roll and (2) place level across a front roll and rear roll. Shim unit by positioning shim near all the anchor locations as well as every 12" under the main frame rails. Insert thunderstud with flat washer and nut attached into anchor foot and hole previously drilled into concrete. Using hammer, pound thunderstud into hole until nut is flush with anchor foot. Ensure anchor foot is also in contact with dynamometer frame. Using 3/4" wrench, tighten nut to 50 ft-lbs.

Take care not to over tighten the nuts, as this may cause damage to the frame of the dynamometer, the thunderstud, or the concrete.

## 1.7 NAMEPLATE DATA

The nameplate on the dynamometer frame contains valuable information should it be necessary to contact Mustang. Besides the model number, date manufactured, and revision level data, the nameplate contains the dynamometer serial number. Have this number handy when contacting Mustang Dynamometer.

## 1.8 IF YOU NEED HELP

Much effort has been extended to make this manual complete and accurate. However, if there are any questions please contact a Mustang Dynamometer representative at:

### **Mustang Dynamometer**

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# PREVENTIVE MAINTENANCE

SECTION

**2**

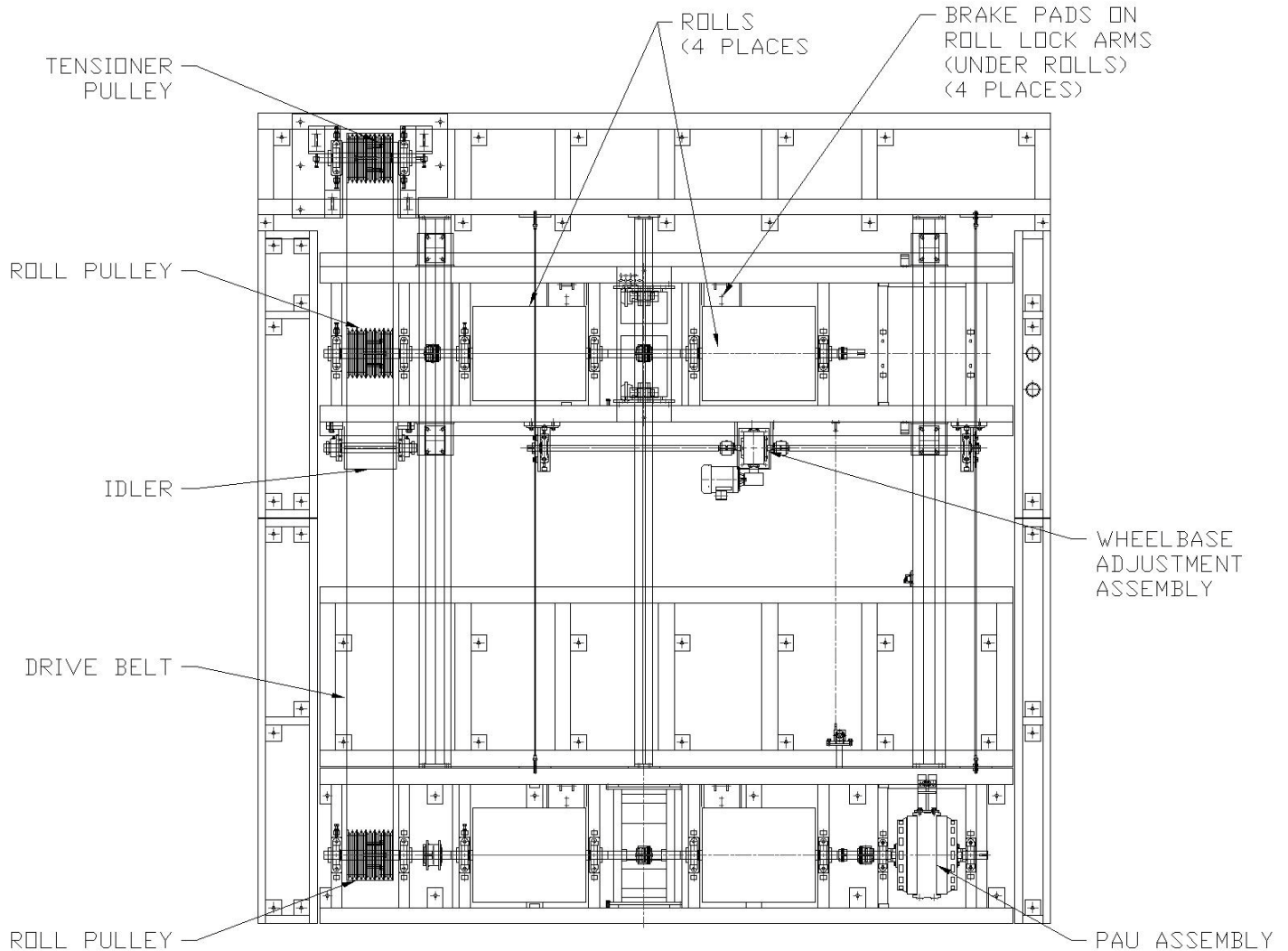
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## 2.1 INTRODUCTION

This section contains information and procedures for preventive maintenance of the dynamometer. Refer to Table 2.1 for a list of recommend tools and Table 2.2 for a list of consumable items necessary for maintenance of the dynamometer. A Preventive Maintenance Time Table, Table 2.3, provides recommended service intervals. Preventive maintenance procedures follow. Figure 2.1 below identifies the major components of the dynamometer.



**Fig 2.1**  
**MAJOR DYNAMOMETER COMPONENTS**

**Table 2.1 LIST OF RECOMMENDED TOOLS**

ITEM	USE ON
(2) 1-1/8-inch combination wrenches	Brake Pad Replacement Idler Attachment bolts
15/16-inch socket 15/16-inch wrench	2 and 2-3/16-inch Pillow Block Bearing Bolts PAU Bracket Bolts Pulley Bolts
3/4-inch socket 3/4-inch wrench	1-1/2-inch Pillow Block Bearing Bolts Load Cell Bolts
1/8-inch Allen wrench	Coupling set screws
9/64-inch Allen wrench	Speed sensor
5/32-inch Allen wrench	1-1/2-inch Pillow Block Bearing Set Screws
3/16-inch Allen wrench	2 and 2-3/16-inch Pillow Block Bearing Set Screws
1/4-inch Allen wrench	Coupling set screws
Torque wrench, 0-250 inch-pounds.	Torque Measurements
Torque wrench, 0-100 foot-pounds.	Torque Measurements
Pipe wrench	Brake Pad replacement
Feeler gauges	Speed Sensor
Belt Tension Tester	Belt Tension
Straight Edge	Belt Tension
Digital Multi-Meter	Electrical signals and connections

**Table 2.2 LIST OF CONSUMABLE ITEMS**

Item	Mustang Part Number	Designation
Coupling Grease	20010651	Mobil Mobilith AW 2
PAU Grease	20010651	Mobil Mobilith AW 2
Bearing Grease	20014314	Polyrex EM
Brake Cleaner	20014315	Brake cleaner
Thread Lock	20010654	Loctite 262
Teflon Tape	20014810	1/4-inch Teflon tape

## 2.2 PREVENTIVE MAINTENANCE

The activities listed in Table 2.3, Preventive Maintenance Time Table, should be performed at the time intervals indicated. Perform initial startup inspections after installation, after 8 hours of operation, and after the first forty hours of operation. After startup inspections are complete and the dynamometer is operating satisfactorily, perform the regular preventive maintenance inspections and lubrications as indicated.

Table 2.3

Preventive Maintenance Time Table

Maintenance Procedure	Initial Startup Inspections	Every Month	Every Three Months	Every Six Months
<b>LUBRICATION</b>				
Lubricate Pillow Block Bearings		•		
Lubricate Couplings		•		
Lubricate PAU		•		
<b>INSPECTION</b>				
Inspect Bearings	•	•		
Inspect Couplings	•	•		
Inspect Brake Pads		•		
Check Belt Tension		•		
Check PAU Bracket Bolts	•	•		
Inspect Pulley Bolts	•	•		
Inspect Idler Assembly	•	•		
Inspect Restraint Assembly	•	•		
Inspect Roll Lock Assemblies	•	•		
Inspect Air Bags			•	
Inspect Air Lines and Solenoid Valve			•	
Inspect PAU Load Cell Assembly	•	•		
Inspect PAU Bearings				•
Inspect PAU Clearance				•
Inspect Speed Sensors	•	•		
Inspect and Clean Dynamometer		•		
Inspect and Clean Pit		•		



## **2.3 LUBRICATION**

### **CAUTION**

**Bearings and couplings must be lubricated with recommended lubricants. Lubricants must be fresh and free from contamination. Failure to lubricate or to use incorrect or contaminated lubricants will result in reduced life expectancy and/or damage to bearings and couplings.**

**Too much grease can change parasitic losses of the dynamometer and will cause overheating of roll and PAU bearings in high-speed operation of the dynamometer.**

Adequate lubrication is essential for satisfactory operation of the dynamometer. Lubrication of the dynamometer pillow block bearings, couplings, and PAU should be done as a part of a planned maintenance schedule. The recommended lubrication intervals in the Preventive Maintenance Time Table should be used as a guide to establish this schedule. These intervals are based on 24 hours of actual machine usage per week. For extreme or unusual operating conditions, lubricate more often. Even if the dynamometer is used less than 24 hours per week, the lubrication schedule should be followed in order to purge the system of potential contaminants.

### **2.3.1 LUBRICATE PILLOW BLOCK BEARINGS**

Remove the plug or temperature probe and replace it with a zerk fitting.

Using a hand pump grease gun filled Polyrex EM grease, insert the gun into the fitting and add three grams of grease while rotating the dynamometer rolls by hand. Experiment with your particular grease gun to determine how many pumps equate to three grams of grease. It should be roughly equivalent to three pumps using a normal grease gun.

Remove the zerk fitting and carefully replace the plug or temperature probe.

Repeat for each of the 20 pillow block and flange mount bearings on the dynamometer. Dynamometers equipped with an optional second PAU will have 22 bearings to lubricate

When finished with greasing all the pillow block bearings, run the dynamometer with a vehicle properly restrained at approximately 20 mph for 15 minutes to evenly distribute the grease.

Run warm-up, parasitic, and coastdown tests.

**2.3.2 LUBRICATE COUPLINGS**

Remove the two (2) grease plugs from the coupling sleeves and insert a grease fitting into one of the holes.

Using a hand pump grease gun filled with Mobilith AW 2 grease, insert the gun into the grease fitting and pump the handle until grease comes out of the other hole.

Replace both grease plugs.

Tighten all plugs until they are snug and are approximately 1/16-inch above the surface - **DO NOT OVER-TIGHTEN THE PLUGS**. The plugs should not be flush with the coupling sleeves. If the plug falls below the surface of the coupling sleeve, remove it, wrap the threads with Teflon tape, and reinstall.

Remove excess grease.

**2.3.3 LUBRICATE PAU**

Locate the grease fitting located on the stator frame of the PAU. Wipe off any dirt or other contaminants that may be on the grease fitting.

Using a hand pump grease gun filled with Mobilith AW 2 grease, insert the gun into the fitting located on the PAU. Pump while rotating the power absorber until grease appears on the power absorber vent. Remove excess grease.

It is normal for the PAU to expel grease out of the vent tube, especially when hot.

**2.3.3 LUBRICATE ADJUSTMENT ASSEMBLY GEARBOX**

The wheelbase adjustment gearbox is factory filled with long life lubricant. Under normal operating conditions no additional lubrication is required.

Inspect gearbox for oil leaks when lubricating other items.

## 2.4 INSPECTION

Table 2.4			Torque Chart	
Description	Bolt Size	Socket/Key Size	Qty.	Torque
1-1/2-inch Pillow Block Bearing Set Screws	5/16-24	5/32 Allen	4	140 inch-pounds.
2-inch and 2-3/16-inch Pillow Block Bearing Set Screws	3/8-24	3/16 Allen	18	250 inch-pounds.
Coupling Set Screws	1/2-20	1/4 Allen	10	50 foot-pounds.
Coupling Set Screws (Wheelbase Adjust)	1/4-28	1/8 Allen	4	75 inch-pounds
1-1/2-inch Pillow Block Bearing Bolts	1/2-13	3/4	4	50 foot-pounds.
2-inch Pillow Block Bearing Bolts	5/8-11	15/16	4	70 foot-pounds.
2-3/16-inch Pillow Block Bearing Bolts	5/8-11	15/16	32	70 foot-pounds.
2-3/16-inch Flange Mount Bearing Bolts	5/8-11	15/16	6	70 foot-pounds.
PAU Bracket Bolts	5/8-11	15/16	4	70 foot-pounds.
Pulley Bolts	5/8-11	15/16	9	135 foot-pounds. Refer to procedure for torque method.
Pulley Set Screws	5/8-11	5/16 Allen	3	135 foot-pounds
Idler Attachment Bolts	3/4-10	1-1/8	4	240 foot-pounds.
Air Bag Mounting Bolts	5/8-11	15/16	4	70 foot-pounds.
Load Cell Bolts	1/2-13	3/4	4	50 foot-pounds.

### 2.4.1 INSPECT PILLOW BLOCK BEARINGS

#### NOTE

Three different size pillow block bearings are used. 1-1/2-inch bearings are used in two places on the adjustment assembly. Two 2-inch bearing are used on the PAU, and sixteen 2-3/16-inch bearings are used on the rolls and belt sheave and idler shafts.

Using a torque wrench with a 3/4-inch socket, check that the 1-1/2-inch roll bearing mounting bolts are torqued to 50 foot-pounds.

If bolts are loose, remove bearing mounting bolts and bearing plate, clean threads with brake cleaner, apply a few drops of Loctite 262, reassemble plate and bolts and torque to 50 foot-pounds.

Using a 5/32-inch Allen wrench, check to make sure all bearing set screws are tight.

If set screws are loose, remove, clean with brake cleaner, apply a drop of Loctite 262, insert set screws, and torque to 140 inch-pounds.

Using a torque wrench with a 15/16-inch socket, check that the 2-inch and 2-3/16-inch pillow block bearing mounting bolts are torqued to 70 foot-pounds.

If bolts are loose, remove bearing mounting bolts and bearing plate, clean threads with brake cleaner, apply a few drops of Loctite 262, reassemble plate and bolts and torque to 70 foot-pounds.

Using a 3/16-inch Allen wrench, check to make sure all bearing set screws are tight.

If set screws are loose, remove, clean with brake cleaner, apply a drop of Loctite 262, insert set screws, and torque to 250 inch-pounds.

#### 2.4.2 INSPECT CONDITION OF COUPLINGS

Using a 1/4-inch Allen wrench, check to make sure both set screws in each coupling hub is tight (five coupling assemblies).

If set screws are loose, clean with brake cleaner, apply a drop of Loctite 262, insert set screws, and torque to 50 foot-pounds.

Using a 1/8-inch Allen wrench, check to make sure the set screw in each coupling hub in the wheelbase adjustment assembly is tight (two coupling assemblies).

If set screws are loose, clean with brake cleaner, apply a drop of Loctite 262, insert set screws, and torque to 75 inch-pounds.

#### 2.4.3 INSPECT BRAKE PADS

##### WARNING

**Make sure that the roll lock arms will not be accidentally raised while performing this inspection. Failure to turn off shop air may allow the roll lock arms to raise and cause injury.**

Lower the brake arm and disconnect the shop air supply to the dynamometer.

Visually inspect the brake pads for wear.

If the average brake pad thickness is less than 1/8 inch or if any spot is less than 1/16 inch, replace the brake pad.

#### 2.4.4 CHECK BELT TENSION

Visually inspect the drive belt to ensure that there are no signs of wear, damage, or deterioration. The belt should have a snug fit, neither too taut nor too loose. Observe the belt during the dynamometer calibration sequence. The belt should not slip.

Using a belt tension tester, check the tension in the belt between the two roll pulleys when the moving rolls are placed in the longest wheelbase position. The belt should deflect 2.00 inches when a load of 30 pounds is applied to the middle of the belt span

#### 2.4.5 INSPECT PAU BRACKET BOLTS

Using a torque wrench with a 15/16-inch socket, check that four (4) PAU bracket bolts are torqued to 70 foot-pounds.

If bolts are loose, remove bolts, clean with brake cleaner, apply a few drops of Loctite 262, reassemble bolts and torque to 70 foot-pounds.

#### 2.4.6 INSPECT PULLEY BOLTS

Using a torque wrench with a 15/16-inch socket, check that the three (3) bolts on each pulley are torqued to 135 foot-pounds.

If bolts are loose, remove bolts, clean with brake cleaner, apply a few drops of Loctite 262, reassemble bolts and torque to 135 foot-pounds.

Using a 5/16-inch Allen wrench, check to make sure all set screws in the pulley bushings are tight.

If set screws are loose, remove, clean with brake cleaner, apply a drop of Loctite 262, insert set screws, and torque to 135 inch-pounds.

#### **2.4.7 INSPECT IDLER ATTACHMENT BOLTS**

Using a torque wrench with a 1-1/8-inch socket, check that the four (4) idler attachment bolts are torqued to 240 foot-pounds.

#### **2.4.8 INSPECT ROLL LOCK ASSEMBLY**

Using a torque wrench with a 9/16-inch socket, check that the two (2) center air bag attachment bolts are torqued to 70 foot-pounds.

If bolts are loose, remove bolts, clean with brake cleaner, apply a few drops of Loctite 262, reassemble bolts and torque to 70 foot-pounds.

#### **2.4.9 INSPECT AIRBAGS**

Remove the roll lock arms and visually inspect the airbags for any wear, cracks, or dry rot. If air bags need replacement, refer to the service section of this manual.

#### **2.4.10 INSPECT AIR LINES AND ROLL LOCK SOLENOID VALVE**

Inspect air lines for leaks. Replace faulty air lines if necessary.

Check all fittings on the lift solenoid to make sure they are secure and there are no air leaks.

Make sure all wire connections are secure.

#### **2.4.11 INSPECT PAU LOAD CELL ASSEMBLY**

Place a small level on top of the PAU bracket and make sure the PAU is level. If necessary, level the PAU using a 3/4-inch wrench to remove the mounting bolt and adjusting the rod end assembly up or down as necessary. Make sure rod ends do not touch center body of load cell.

Using a torque wrench with a 3/4-inch socket, check that the top PAU load cell mounting bolt is torqued to 50 foot-pounds.

If the bolt is loose, remove bolt, clean with brake cleaner, apply a few drops of Loctite 262, reassemble bolt and torque to 50 foot-pounds.

Using a torque wrench with a 3/4-inch socket, check that the bottom PAU load cell eye bolt (bearing) is torqued to 50 foot-pounds.

If the bolt is loose, remove bolt, clean with brake cleaner, apply a few drops of Loctite 262, reassemble bolt and torque to 50 foot-pounds.

Using a torque wrench with a 3/4-inch socket, check that the two load cell bracket mounting bolts are torqued to 50 foot-pounds.

If bolts are loose, remove bolts, clean with brake cleaner, apply a few drops of Loctite 262, reassemble bolts and torque to 50 foot-pounds. It may be necessary to use a 3/4-inch end wrench on one of the bolts.

Make sure load cell and PAU are not touching each other.

#### **2.4.12 INSPECT PAU BEARING END PLAY**

Refer to the figure 2.2. Measure the air gap between the rotor and a pole shoe with the rotor forced away from the pole shoe by means of two pry bars (ex. screw drivers) located 180° away from each other and 90° away from the pole shoe being checked. Measure the gap with a feeler gauge.

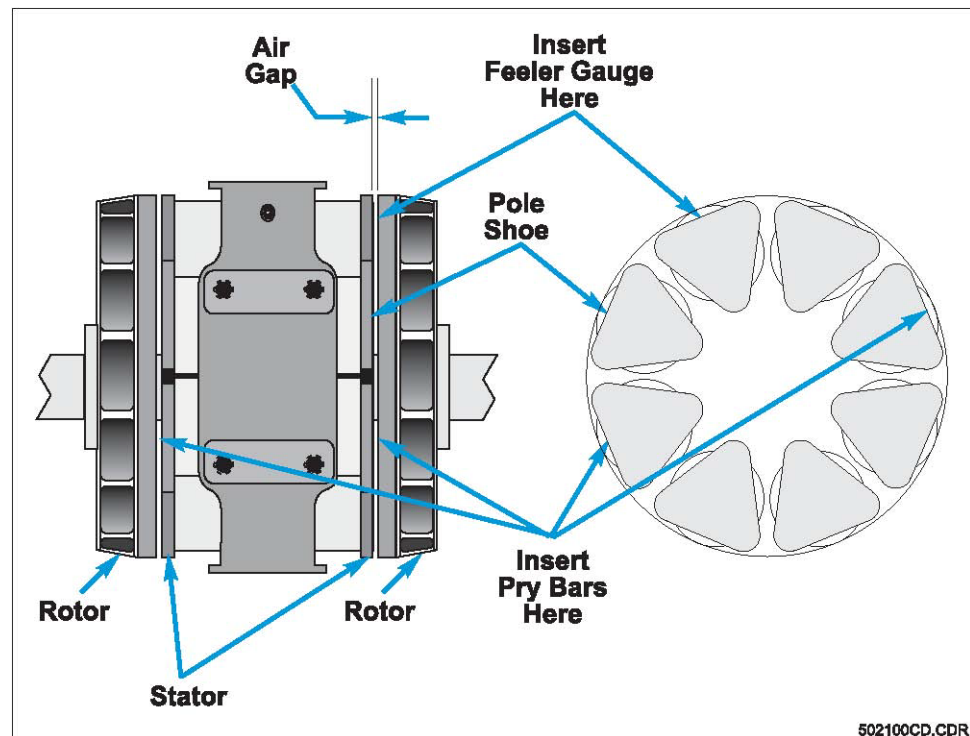
Measure the air gap between the same rotor and the same pole shoe, but with the rotor moved towards the pole shoe by two pry bars (ex. screw drivers) inserted in the air gap on the other side of the power absorber. Do not rotate the rotor when making the above two checks. Place a chalk mark on the pole shoe to prevent accidental rotating of the rotor.

The difference between the above two readings is the bearing end play. This value should not exceed 0.005". If the bearing end play exceeds 0.005" contact the factory for adjusting instructions.

#### 2.4.13 INSPECT PAU ROTOR AIR GAPS

Refer to the figure 2.2. Using feeler gauges, measure and average all air gaps on each side of the power absorber. The average air gap measurement per side should be between .053" and .057".

If the average air gap is out of range, contact a Mustang Dynamometer



502100CD.CDR

FIG 2.2  
PAU NOMENCLATURE

#### 2.4.14 INSPECT SPEED SENSOR ASSEMBLIES

Verify that the primary speed sensor is snug. Note: the notch must face up.

Using feeler gauges verify that the spacing between the primary speed sensor and the top of the speed gear teeth is between 0.020 and 0.030 inches.

Verify that the secondary speed sensor is snug. Using feeler gauges verify that the spacing between the secondary speed sensor and the top of the speed gear teeth is between 0.020 and 0.030 inches.

### **2.4.15 INSPECT AND CLEAN THE DYNAMOMETER, FRAME, CONTROL BOX, AND PIT**

Check to make sure the frame is level and shims and/or anchor bolts have not settled or moved. Level the dynamometer using steel shim stock as necessary.

Tighten frame anchor bolts (“Thunderstuds”).

Refer to Table 2.3 and check all torque values listed. If bolts are loose, clean bolts, apply a few drops of Locktite 262 on the threads, and torque to the specified value.

#### **CAUTION**

**Do not use pressurized water or compressed air to clean the dynamometer. Using pressurized cleaning techniques can force contaminants into bearings and cause bearing failure.**

Clean the dynamometer using a cloth that has been lightly wetted with water or a mild soap solution.

#### **CAUTION**

**Pay special attention to the air bags and the area surrounding them. A build-up of dirt in this area can cause wear and premature air bag failure.**

After cleaning the dynamometer, use an anticorrosive spray on all exposed metal to prevent damage from rust or corrosion.

Clean the pit of all foreign objects and debris. Use a small paint scraper to loosen any built-up dirt. Use a small vacuum cleaner to pick up any smaller debris. Wipe clean any excessive grease thrown from moving parts.

Make sure the drains are clear.

Clean the inside of the control box with a clean rag and small vacuum cleaner.

Check all terminals in the control box for loose wires. Tighten if necessary.

Make sure the motor, PAU, and signal cables are secure. Tighten if necessary.

Make sure the switches on the lid of the control box are secure. Tighten if necessary.



# TROUBLESHOOTING

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3.1 INTRODUCTION .....3-3

3.2 TROUBLESHOOTING GUIDE .....3-3





### 3.1 INTRODUCTION

This section contains information and procedures for isolating and correcting problems with the dynamometer. Table 4.1, the Troubleshooting Guide, lists problems, possible causes, and recommended corrections. Refer to the Repair section of this manual for repair instructions for major components of the dynamometer.

### 3.2 TROUBLESHOOTING GUIDE

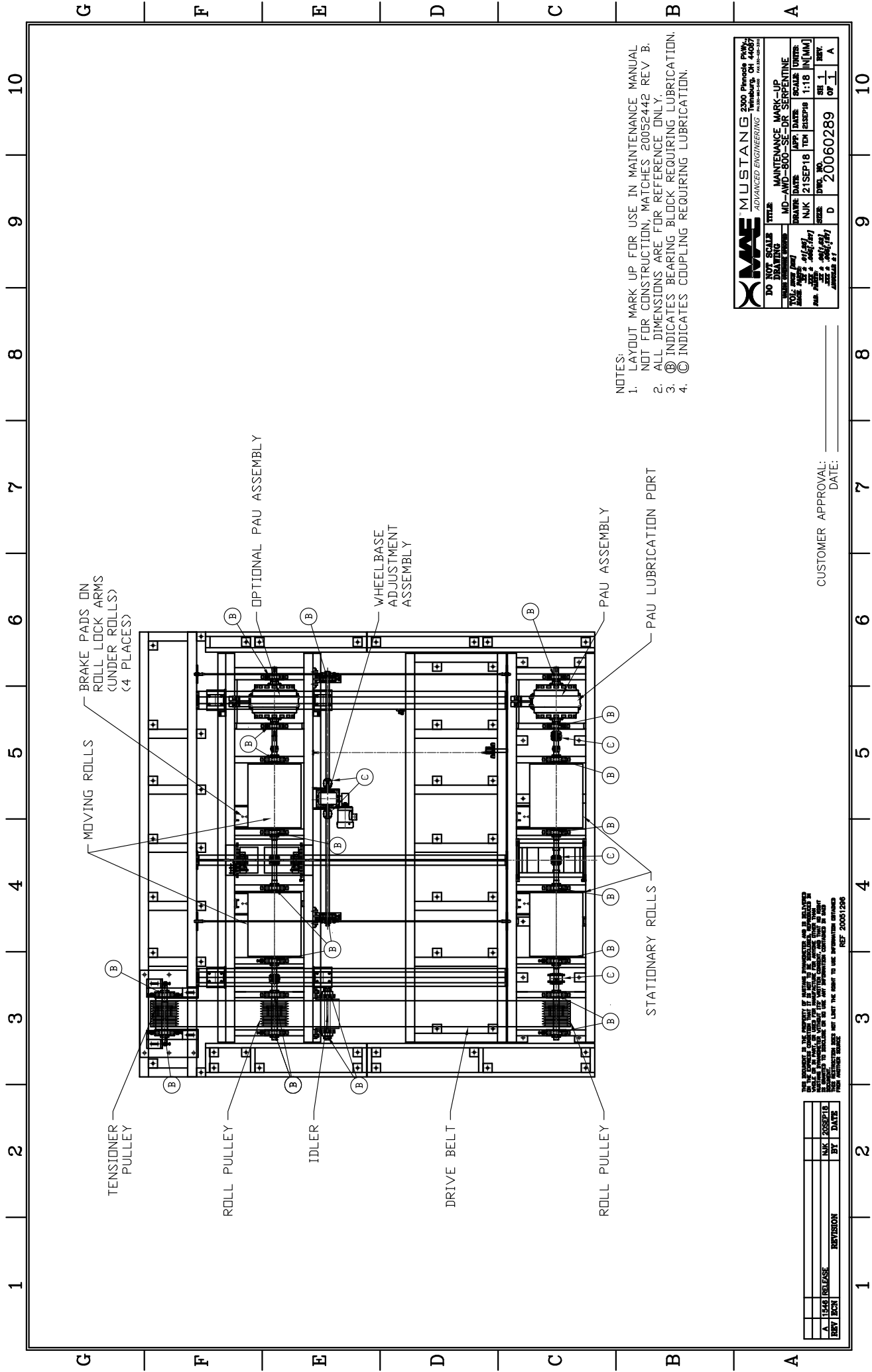
**TABLE 3.1**
**TROUBLESHOOTING GUIDE**

Problem	Possible Cause	Correction
Vibration and/or Noise	Structural frame of dynamometer is not secured to pit floor.	Check anchor bolts on dynamometer frame and tighten to proper specification.
	Dynamometer is not level to the floor.	Level dynamometer and be sure shims are in place under frame where needed.
	Roll coupling is out of tolerance or alignment.	Repair or realign couplings.
	Coupling between rolls is worn.	Replace coupling.
	Roll pillow block bearings not secured to the frame.	Tighten bolts to proper specification.
	Bearing failure on rolls.	Replace bearings.
	Bearing Failure on PAU.	Replace bearing.
	Roll has spun on bearing and is worn.	Check roller shaft for wear. Tighten setscrews to proper specification or replace roll.
	Roll is out of balance.	Check for loose weights on roll. Replace roll if necessary.
Roll Lock Arm Fails to Lower	Override switch is in "UP" position.	Turn Override switch to "DOWN" position.
	override module on solenoid valve is in the vertical position	Turn screw on override module to the horizontal position.
	No lubrication	Coat the pivot pins on the roll lock arms with Mobilith AW 2 grease.
Roll Lock Fails to Raise	Air supply to dynamometer has not been turned on.	Turn on air supply. Dry air, regulated to a MAXIMUM of 80 psi must be supplied to the dynamometer.
	Air solenoid Valve coil has failed.	Check for +12 VDC across pins 8 and 9 of the I/O board in the Control Unit. Replace coil if necessary.
	Roll lock valve has failed.	Replace valve.

**TABLE 3.1**

**TROUBLESHOOTING GUIDE**

Problem	Possible Cause	Correction
Roll Lock Fails to Raise (Continued)	Power supply failing to operate properly.	Check all connections in both control unit and solenoid valve cable. Repair or replace defective components if necessary.
	Air bag has ruptured.	Replace air bag.
	No lubrication	Coat the pivot pins on the roll lock arms with Mobilith AW 2 grease.
	Roll speed other than zero is being displayed.	Troubleshoot speed sensor and wiring. Perform zero calibration in control box and EIS system cabinet.
	Low air pressure.	Adjust dry, regulated air pressure supplied to dynamometer to a maximum of 80 psi.
	Defective or improperly wired air pressure switch.	Verify correct wiring and test opening and closing of pressure switch contacts.
	Defective cable or wiring.	Inspect all electrical wiring and replace any defective cables and/or contacts.
Rolls Do Not Lock	“Digital Enable” signal from host computer not present.	Troubleshoot software system. Troubleshoot dynamometer control unit.
	Brake pads are worn.	Replace brake pads.
	Air leak in pneumatic system.	Inspect and replace any defective tubing, connectors, and/or air bags.
Display Values Not Stable (Floating, Fluctuating, etc.)	Low air pressure	Adjust dry, regulated air pressure supplied to dynamometer to a maximum of 80 psi.
	Loose interface connection.	Make sure all cable connections are properly seated. Verify all connections inside the control box are secure.
No Speed Readout	Bad load cell connection.	Check all load cell connection. Repair if necessary.
	Bad electrical connection.	Check all electrical connections in the system.
	Incorrect Magnetic Pickup-to-gear air gap.	Verify that the air gap is set to 0.020 to 0.030 inches.
No Torque Readout	Magnetic Pickup failure.	Replace Magnetic Pickup.
	Bad electrical connections.	Check all electrical connections in the system.



NOTES:  
 1. LAYOUT MARK UP FOR USE IN MAINTENANCE MANUAL  
 2. NOT FOR CONSTRUCTION, MATCHES 20052442 REV B.  
 3. ALL DIMENSIONS ARE FOR REFERENCE ONLY.  
 4. (B) INDICATES BEARING BLOCK REQUIRING LUBRICATION.  
 5. (C) INDICATES COUPLING REQUIRING LUBRICATION.

<b>X MVE</b>		<b>MUSTANG 2300 Pinocle PAU</b>	
ADVANCED ENGINEERING		Timberlawn, OH 44087	
DO NOT SCALE	TITLE	MD-AMD-800-SE-DR SERPENTINE	MAINTENANCE MARK-UP
DATE	DATE	DATE	DATE
SCALE	SCALE	SCALE	SCALE
APP'D	APP'D	APP'D	APP'D
CHK'D	CHK'D	CHK'D	CHK'D
DATE	DATE	DATE	DATE
BY	BY	BY	BY
REV	REV	REV	REV
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10

CUSTOMER APPROVAL: \_\_\_\_\_  
 DATE: \_\_\_\_\_

REV	BY	DATE
A	NJK	20SEP18
1	BY	DATE

REF: 20052442