Best Practices and Preventative Maintenance
Bearings and Gearboxes
Agenda

1. Mounted bearing basics
   1. Shaft attachment
   2. Sealing and Greasing
   3. Maintenance

2. Gearbox maintenance
   1. Lubrication
   2. Preventative maintenance
   3. Troubleshooting
Naked Bearings vs. Mounted Bearings

- **Unmounted bearings**
  - Internal to machine
  - Difficult to maintain
  - No interchange
  - Locking? Sealing?

- **Mounted bearings**
  - External to machine
  - Easier to maintain
  - Many types and purposes
  - Not all created equal
Types of Bearings - Ball

- Moderate radial load capacity
- Moderate thrust load capacity
- Up to 3-1/2” bore
- High speed range
  - Up to 12,000 RPM on Grip Tight adapter with labyrinth seal
- Ball and socket insert design
  - 2 degrees of static misalignment
Types of Bearings - Roller

- Spherical roller bearings
  - S-2000
  - USAF
  - Imperial

- Tapered roller bearings
  - Type E
  - EXL
  - Special Duty
Misalignment

- Ball bearing
- Spherical roller
- Tapered roller
Bearing Terminology – Load

Radial Load

Thrust or Axial Load
Alignment

Misalignment can cause excessive loads, heat, vibration and premature bearing failure.

(Static)

Swivel

DEFLECTION MISALIGNMENT (SIDE VIEW)

NON-VARYING STATIC LOAD

AXIS NOT CO-LINEAR (TOP VIEW)

SUPPORTS NOT IN THE SAME PLANE (SIDE VIEW)

BEND SHAFT

ROTATING LOAD, W, OR VARYING LOAD

(Dynamic)
DODGE Mounted bearings - OVERVIEW

Simple concepts:

1. **Housing**
2. Insert
3. Locking arrangement
4. Seal Package (Seal, Grease, Cage)
KEY POINTS:
1. Shaft is **PARALLEL** to the Mounting Surface.
2. Key dimension is the **BASE TO CENTER** height.
3. Secondary dimension is the left to right bolt pattern.
4. All Dodge BALL BEARING Pillowblocks are P2B, with the exception of the F&B-CC Fan and Blower pillowblocks.
5. FIVE examples of Dodge Pillowblock ball bearings.
HOUSINGS Styles - Flanges

KEY POINTS:
1. Shaft is **PERPENDICULAR** to the Mounting Surface.
2. Key dimension is the **BOLT PATTERN**.
3. In the FC (Flange Cartridge) and the F2BZ (Piloted two bolt flange, the key dimension also includes the **PILOT DIAMETER**, as well as #2 above.
4. Can be 2, 3, or 4 Bolt attached.
5. Example: SEVEN Dodge green painted Flange Housings
HOUSINGS Styles – Take Ups

KEY POINTS / TAKE UPS:

1. Shaft position can be **ADJUSTED** – by tightening or loosening a screw / rod attached to the Take Up Housing.

2. Key dimensions are the distance between the take up frame rails / and the Width of the Rail / Rails.

3. Industry standard is “**WIDE**” slot rails / legacy Dodge specific standard is “**NARROW**” slot rails.

4. Bulk Handling are larger cast iron housed bearings that ride upright on a larger Clyndrical rail – **TYPE G**.

NSTU – roll pin

WSTU – screw / nut

Type G
Simple concepts:

1. Housing
2. Insert
3. **Locking arrangement**
4. Seal Package (Seal, Grease, Cage)
Types of Shaft Attachment

- **Eccentric grip**
  - Set screw
    - Most common
    - 3 contact points
    - Easy to use
  - Eccentric lock
    - One direction of rotation
    - Creates a gap
    - Fretting corrosion

- **Concentric grip**
  - Tapered adapter
  - D-LOK
  - Grabs shaft evenly
  - No gap created
  - Easier removal?
<table>
<thead>
<tr>
<th>Eccentric – Setscrew and SXV</th>
<th>Concentric – D-LOK, GripTight, Imperial</th>
<th>Concentric – USAF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft</td>
<td>Shaft</td>
<td><img src="image" alt="Concentric - USAF" /></td>
</tr>
<tr>
<td>Causes fretting corrosion</td>
<td>No fretting corrosion</td>
<td>Stuck on the shaft</td>
</tr>
</tbody>
</table>

The table compares different shaft attachment methods and their associated conditions:
- **Eccentric – Setscrew and SXV**: Causes fretting corrosion.
- **Concentric – D-LOK, GripTight, Imperial**: No fretting corrosion.
- **Concentric – USAF**: Stuck on the shaft.
Inserts – SHAFT ATTACHMENT

**Set Screw**
- 65 Degree Set Screw Angle**
  - Improved Holding Power
  - Cup point set screws
  - Easy Installation

**Eccentric Locking Collar**
- Self Locking 1/4 turn

Eccentric Collar
- Secured in Position with single turn and setscrew

**Detail available upon request**
Inserts – SHAFT ATTACHMENT

Concentric Lock

360 Concentric fit to shaft
- Less Vibration at Higher Speeds
- No Marring of shaft during installation

Tapered Adapter Sleeve

360 Concentric fit to shaft
Entire Length of Bearing Bore
- Significantly Less Vibration at Higher Speeds
- No Marring of shaft during installation
- Reduces Fretting Corrosion

D-LOCK (Clamp Collar):
- DL
- DLM
- DLAH
- DLMAH
- DLH (expansion)
- DL-XXX-ABHS
- DLEZ

GRIP-TIGHT (Adapter Sleeve mounted):
- GT
- GTM
- GTAH
- GTMAH
- GTH (expansion)
- GT-XXX-ABHS
- GTEZ

Baldor-Dodge®
DODGE Mounted bearings - OVERVIEW

Simple concepts:

1. Housing
2. Insert
3. Locking arrangement
4. Seal Package (Seal, Grease, Cage)
Main Causes of Failure

- Most mounted bearings never reach their calculated L10 life
- Most bearings fail due to solid or liquid contamination and lubrication issues
- Better sealing provides added protection and helps prevent up to 80% of bearing failures
Seal function

- **Most important jobs of a seal**
  - Prevent contamination from entering
    - Closing the gap
  - Mechanical seal retention
    - Prevent seal from “blowing out”
  - Natural path for grease to purge
    - Clean grease comes into housing, stays in
    - Moisture, solid contamination forced out
Lubrication Failure

- **Gritty lubricant**
  - Due to ineffective lubrication and hard particle contamination
  - Must increase lubrication frequency

- **Milky lubricant**
  - Due to water or liquid chemical contamination
  - Must increase lubrication frequency

- **Frosty raceway**
  - Due to lubrication breakdown and SLIDING metal to metal contact
Grease Basics for Mounted Bearings

- **For new installations**
  - Dodge mounted bearings come standard with a 35% fill
    - No grease for SAF style bearings
    - More grease for washdown bearings
  - Low speed – fill the bearing
  - High speed – do not add more
    - Some will purge out on startup

- **Currently running**
  - Establish baseline interval
  - While running, keep adding grease until clean fresh comes out
  - If grease always dirty, shorten the time between greasing
# Greasing Interval – Spherical Rollers

## Table 3 - Re-Lubrication Intervals (Months) Based on 12 hours per day, 150° F M

<table>
<thead>
<tr>
<th>Shaft Size (inches)</th>
<th>250</th>
<th>500</th>
<th>750</th>
<th>1000</th>
<th>1250</th>
<th>1500</th>
<th>2000</th>
<th>2500</th>
<th>&gt;3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/8 to 2</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0.5</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>2-3/16 to 2-1/4</td>
<td>3.5</td>
<td>2.5</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
<td>0.5</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>2-3/8 to 3</td>
<td>3</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>3-3/16 to 3-1/2</td>
<td>2.5</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>-</td>
</tr>
<tr>
<td>3-11/16 to 4-1/2</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4-15/16 to 5-1/2</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5-15/16 to 6</td>
<td>1</td>
<td>0.5</td>
<td>0.5</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6-7/16 to 7</td>
<td>1</td>
<td>0.5</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Seals/Grease for Fan Applications

<table>
<thead>
<tr>
<th>Size Inches</th>
<th>L₁ Life Hours</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>250</th>
<th>500</th>
<th>750</th>
<th>1,000</th>
<th>1,300</th>
<th>1,500</th>
<th>1,700</th>
<th>1,800</th>
<th>2,000</th>
<th>2,200</th>
<th>2,600</th>
<th>2,750</th>
<th>3,000</th>
<th>3,400</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-11/16 to 4</td>
<td>10,000</td>
<td>29,919</td>
<td>24,302</td>
<td>21,518</td>
<td>18,461</td>
<td>14,995</td>
<td>13,278</td>
<td>12,180</td>
<td>11,258</td>
<td>7,757</td>
<td>10,387</td>
<td>10,211</td>
<td>9,893</td>
<td>9,614</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30,000</td>
<td>21,518</td>
<td>17,478</td>
<td>15,476</td>
<td>13,278</td>
<td>10,785</td>
<td>9,549</td>
<td>8,760</td>
<td>8,097</td>
<td>7,757</td>
<td>7,471</td>
<td>7,344</td>
<td>7,115</td>
<td>6,915</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40,000</td>
<td>19,739</td>
<td>16,033</td>
<td>14,197</td>
<td>12,180</td>
<td>9,893</td>
<td>8,760</td>
<td>8,036</td>
<td>7,427</td>
<td>7,115</td>
<td>6,853</td>
<td>6,737</td>
<td>6,527</td>
<td>6,343</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>60,000</td>
<td>17,478</td>
<td>14,197</td>
<td>12,571</td>
<td>10,785</td>
<td>8,760</td>
<td>7,515</td>
<td>6,655</td>
<td>6,104</td>
<td>5,642</td>
<td>5,405</td>
<td>5,206</td>
<td>5,117</td>
<td>4,958</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100,000</td>
<td>14,995</td>
<td>12,180</td>
<td>10,785</td>
<td>9,252</td>
<td>7,515</td>
<td>6,655</td>
<td>6,104</td>
<td>5,642</td>
<td>5,405</td>
<td>5,206</td>
<td>5,117</td>
<td>4,958</td>
<td>4,818</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard seals are OK

MUST USE LABYRINTH SEALS
You Cannot Blow a Dodge Seal - Video
Tapered Roller Bearings

- Medium – Heavy Loads
  - Light: 0-3% C
  - Medium: 3-70% C
  - Heavy: > 70% C

- Low – High Speeds
- Pure Radial Load
- Pure Thrust Load
- Combination Loads
- No Minimum Load
- Static Misalignment

2007 Catalog: B6, B7
Self Aligning Tapered Roller

- Ball & socket
- 4 degrees misalignment
- Available in several dimension types
  - Type E – EXL
  - SAF – TAF
  - Others – Type K and Double Interlock
Dodge USAF bearings

- SAF style bearing
  - Spherical Anti Friction
- Modular, interchangeable
- Can use in oil bath
- Available in total split arrangement
- Must use feeler gauges to set clearances
- Must pack grease
Dodge USAF: *SPLIT-SPHER*

- Split bearing clamped to shaft
  - Eases installation vs standard SAF
  - No shaft stripping required for replacement
  - Placed in standard USAF 500 series housing

- Split Seal
  - Positive contacting on shaft
  - Polyurethane material
  - Labyrinth design
Imperial: Shorter Install, Easy Dismount

Features
- Patented adapter mounting system
- Multiple housing designs
- Choice of triple lip or labyrinth seals
- Expansion / Non Exp. Convertible
- Misalignment up to 1.5 degrees

Benefits
- Easier to install / remove than conventional adapters
- Less vibration & higher speeds versus set screw
- Application versatility
Imperial Installation Demo – 1-15/16”

Mounting
Install the Non-Expansion unit first.

Dismount
Mount

Table 1 - Locknut Rotation from “Zero Reference Point”

<table>
<thead>
<tr>
<th>Shaft Size (inches)</th>
<th>Locknut Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/8 - 1 7/16</td>
<td>3/4 to 7/8 turn</td>
</tr>
<tr>
<td>* 1-1/2</td>
<td>3/4 to 7/8 turn</td>
</tr>
<tr>
<td>** 1-1/2</td>
<td>7/8 to 1 turn</td>
</tr>
<tr>
<td>1-5/8 - 2</td>
<td>7/8 to 1 turn</td>
</tr>
<tr>
<td>2-3/16 - 3</td>
<td>1 to 1-1/4 turns</td>
</tr>
<tr>
<td>3-3/16 - 4</td>
<td>1-1/4 to 1-1/2 turns</td>
</tr>
<tr>
<td>4-7/16 - 4 1/2</td>
<td>1-1/8 to 1-3/8 turns</td>
</tr>
<tr>
<td>4-15/16 - 5 1/2</td>
<td>1-3/8 to 1-5/8 turns</td>
</tr>
<tr>
<td>5-15/16 - 6</td>
<td>1 to 1-1/4 turns</td>
</tr>
<tr>
<td>6-7/16 - 7</td>
<td>1-1/8 to 1-3/8 turns</td>
</tr>
</tbody>
</table>
Imperial Bearing Insert

- Easy change between expansion/non-expansion

- Mechanically retained seals
  - Tapered seal surface maintains contact in misalignment

- Push pull tapered adapter

- More shafting tolerance
  - Imperial → +0.000 – 0.004
  - Setscrew → + 0.000 – 0.001
Concentric Grip Reduces Fretting

- **Set screw bearing**
  - 500 hours in service
  - Shaft corrosion
  - Fretting corrosion
  - Setscrew scarring
  - Easy to remove

- **Imperial bearing**
  - 2500 hours in service
  - No shaft corrosion
  - No fretting/scarring
  - No scarring from setscrews
  - Easy to remove!
Dismounting

1. Remove weight off bearing via slings or jacks.
2. Remove mounting bolts from bearing.
3. Remove button head screws and lock plate from locknut.
4. (Figure 3) Rotate locknut counter clockwise until bearing freely slides from the shaft.
Imperial Product Size Range

- 2 and 4 bolt pillow blocks: 1 1/8” - 5”
- 4 bolt flanges: 1 1/8” - 4”
- Piloted flanges: 1 1/8” - 5”
- Wide slot take ups: 1 1/8” - 4”
- ISAF: 1-7/16” - 15”
- ISN (Metric): 30mm - 125mm
Preventative Maintenance

- **Determine lubrication intervals**
  - Table in instruction manuals
  - Consult Bearing Solutions
  - Every application is different
    - Fans and conveyors require different schedule and regreasing strategy

- **Purging method**
  - Always match grease types
  - Keep going until you see fresh clean grease come out
  - You cannot blow a Dodge seal

- **Proper storage**
  - For long term storage, completely fill with grease
  - Rotate periodically
Common shaft attachment issues

- **Improper set screw torque**
  - The set screw should deform at the corners to show proper torque
  - Can lead to shaft spinning inside the bearing

- **Fretting corrosion**
  - Shaft diameter smaller than recommended
  - Excessive shock and vibration in a set screw application
  - Bearing could become frozen on the shaft
## Table 2: Set Screw Torque Values

<table>
<thead>
<tr>
<th>Shaft Size</th>
<th>Socket Set Screw Size</th>
<th>Tightening Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3/8 - 1-3/4 in.</td>
<td>5/16 in.</td>
<td>165 Inch Pounds</td>
</tr>
<tr>
<td>1-15/16 - 2-7/16 in.</td>
<td>3/8 in.</td>
<td>290 Inch Pounds</td>
</tr>
<tr>
<td>2-11/16 - 3-7/16 in.</td>
<td>1/2 in.</td>
<td>620 Inch Pounds</td>
</tr>
<tr>
<td>3-15/16 - 4-15/16 in.</td>
<td>5/8 in.</td>
<td>1325 Inch Pounds</td>
</tr>
</tbody>
</table>
# Recommended Shaft Tolerance

<table>
<thead>
<tr>
<th>Shaft size</th>
<th>Over</th>
<th>Incl</th>
<th>Min</th>
<th>Max</th>
<th>Min</th>
<th>Max</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Setscrew, Eccentric, Concentric Collar</td>
<td></td>
<td>Tapered Adapter Sleeve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1.1/2</td>
<td>0.0000”</td>
<td>-0.0005”</td>
<td>0.0000”</td>
<td>-0.002”</td>
<td>0.0000”</td>
<td>-0.002”</td>
</tr>
<tr>
<td>1.1/2</td>
<td>1.1/2</td>
<td>2.1/2</td>
<td>0.0000”</td>
<td>-0.0010”</td>
<td>0.0000”</td>
<td>-0.003”</td>
<td>0.0000”</td>
<td>-0.003”</td>
</tr>
<tr>
<td>2.1/2</td>
<td>2.1/2</td>
<td>4</td>
<td>0.0000”</td>
<td>-0.0010”</td>
<td>0.0000”</td>
<td>-0.004”</td>
<td>0.0000”</td>
<td>-0.004”</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>6</td>
<td>0.0000”</td>
<td>-0.0015”</td>
<td>0.0000”</td>
<td>-0.005”</td>
<td>0.0000”</td>
<td>-0.005”</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>8</td>
<td>0.0000”</td>
<td>-0.0020”</td>
<td>0.0000”</td>
<td>-0.006”</td>
<td>0.0000”</td>
<td>-0.006”</td>
</tr>
</tbody>
</table>
Detecting Problem Bearings First

- **Bearings that will fail first**
  - Due to contamination
    - Solid contamination
    - Liquid contamination
    - SAF bearings installed in open environment
  - Due to installation
    - Improper alignment or preloading
    - Too little or too much torque used
    - Improperly sized shaft
    - Failure to set clearance on SAF style
    - Not using an expansion bearing
  - Due to misalignment
    - Wrong bearing for the application
    - Bent shaft
Special Duty – *When nothing else works*

- Rollers: Tapered, heavier loading than Type E family. Replaceable units
- Housings: Split, pillow blocks & flanges
- Shaft Attachment: Tapered Adapter
- Seals: Dual piston rings (metal)
- Seals: Dual piston rings (metal)
- 1-3/8 to 12” shaft size range
- Great for heavy loads and harsh environments
Special Duty: **Housing**

- Split, Cast Iron
- Pillow blocks & Flanges
- Expansion / Non-expansion specific
- Seals: Dual piston rings (metal)

- P2B-E-207R = 20 lbs
- P2B-SD-207 = **57 lbs**

- RTV sealant can be applied to adapter groove to seal off contaminants
Improper or contaminated lubrication is the leading cause of reducer failure.

Follow manufacturer’s recommendations when choosing an oil type:

- Synthetic oils can extend oil life up to 4 times over standard mineral oil.
- Extreme pressure additives protect gear and bearing surfaces to extend service life.
- Most large gear reducers are shipped without oil.

**Best Practice:** Ensure reducer seals and backstops are compatible with synthetic and extreme pressure oils.
Oil lubrication of gear reducers

Oil level

Maintaining the correct oil level is critical for long life.

Overfilling results in:
- Overheating due to oil churning
- Leaking seals

Under filling results in:
- Inadequate lubrication – gear and bearing failure

**Best Practice:** Ensure reducer oil fill level is correct and adjusted for the actual mounting position.
Gearbox damage – Lack of lubrication

- Teeth are scored and highly worn
- Bearing race pitted and discolored from excessive heat
- Input shaft discolored from excessive heat
- Bearing race shows spalling
- Cracks and flakes that start in the surface and can quickly lead to failure
Oil fill levels

Oil capacities

Oil levels provided in manuals are references for approximate volumes.

Actual oil level must be confirmed before operation by using visual confirmation of level at fill holes, dipsticks, oil sight tubes, or oil sight glasses.

**Best Practice:** Final fill level should be visually confirmed.
If over 20° in position “B” & “D” or 5° in position “A” & “C”, either way from sketches, the oil level plug cannot be used safely to check the oil level.

Slow speeds: consult engineering.

Check with Dodge when incline angle is 10 degrees or greater. Oil level may need to be adjusted.

Check with Dodge when incline angle is 4 degrees or greater. Oil level may need to be adjusted or a pressure lube system may need to be added.
Oil fill levels – Shaft mount reducers

Mounting position is critical
Oil change interval recommendations

Any oil: change after a 500 hour gear reducer break in period

Mineral oil: change every 6 months or 2,500 hrs

Synthetic oil: change every 18 months or 8,000 hrs

Mineral oil useful life declines by 50% for every 10 degrees above 200F

What if you treated your car like your gear reducer?

The recommended oil change interval for a gear reducer is 2,500 hours

At an average speed of 30 MPH, a car will travel 75,000 miles in 2,500 hours

Auto manufacturers would recommend 15 to 25 oil changes
Protecting the Lubricant

Sealing systems

Critical in motors, bearings and gear reducers
- Keeps lubrication in and contaminates out
- Materials and design are both critical

End covers

Available for bearings and gear reducers
- Protects sealing systems from harsh environments
- Improves safety

Breathers

Recommended for gear reducers
- Removes particulates and moisture from the air as gear reducers “breathe”
- Visual cues improve maintenance

Best Practice: A minimal investment in lubrication protection can improve system uptime and extend equipment life
Excessive Noise & Vibration
- Low Oil Level
- Excessive Gear Wear
- Driven Shaft Undersized
- Driven Shaft not Projecting Thru Output Bore
- Driven Shaft Bent
- Tapered Reducer Bushings Improperly Tightened
- Worn or Cracked V-Belts
- Driven Equipment Noise
- Torque Arm Attachment Loose
Overheating (Exceeds 210° F)
- High Oil Level
- Low Oil Level
- Improper Reducer Size
- Excessive V-Belt Tension (Worn Grooves)
- Excessive Reducer Operating Speed
- Located Near Heat Source
- Application Requires Cooling Fan
Oil Leakage (Locate Leak)
- Plugged Air Breather
- High Oil Level (Check Mounting Position)
- Loose Drain, Breather, or Plugs
- Breather Below Oil Level
- Seal Wear or Shaft Damage
Typical Branch House Views

All branches maintain Fitting Shops—Shafting Rack to right

Micah Goff – Field Sales Engineer
micah.goff@baldor.abb.com • (864) 315-7427