

Vibration Diagnostics

M-170-003

(July 2001)

Valid for

All Mack CXU,CHU,GU,MRU,LEU

Case description

Investigating vibration complaints requires a systematic approach to diagnosing the problem. Attempting to locate a source of vibration through trial and error methods results in unnecessary replacement of parts, unnecessary expense and a dissatisfied customer.

Repair

Because of the difficulty in diagnosing vibration complaints, a Vibration Diagnostic Flow Chart (Figure 1) and a Vibration Diagnostic Worksheet have been developed (Figure 2, Figure 3, Figure 4 and Figure 5). The flow chart and worksheets provide the technician with diagnostic procedures arranged in a logical sequence to aid in determining the source of vibration. Additionally, the Vibration Diagnostic Worksheet provides a means of tracking a vibration complaint for warranty purposes. When a vibration complaint is encountered, the Vibration Diagnostic Flow Chart and the accompanying worksheet **MUST** be used when attempting to locate the source of vibration. The technician should become familiar with the flow chart and worksheets before beginning the diagnostic procedure.

Before investigating the vibration complaint, complete the preliminary information at the beginning of the worksheet. Each category shown on the flow chart also appears on the worksheet. As the vibration problem is investigated, record all data on the worksheet. It is extremely important that all data is recorded accurately.

After identifying the source of the vibration, a Mack Trucks, Inc. service representative must be contacted before replacing any major components.

For a vibration complaint warranty claim to be considered for payment, the Vibration Flow Chart Worksheets attached to this bulletin must be completed and faxed to the Warranty Department along with the accompanying repair order. If a claim is submitted without proper documentation, the claim will not be processed.

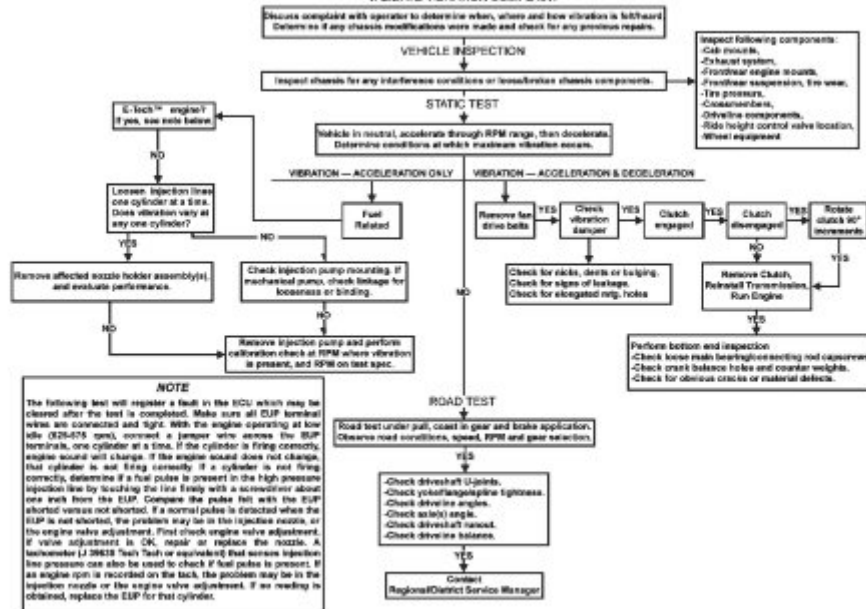
If a total of eight-hours diagnostic time has accumulated to diagnose a vibration complaint, the District or Regional Service Manager **MUST** be contacted and the findings up to that point reported. Any claims submitted having eight or more hours diagnostic time that was not reported to the RSM or DSM will not be processed.

In those instances where the source of the vibration cannot be determined, it will be necessary to contact the RSM or DSM and fax the Vibration Diagnostic Worksheet to his attention for further review and investigation.

Vibration Diagnostic Flow Chart
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VIBRATION DIAGNOSTIC FLOW CHART

VALIDATE VIBRATION COMPLAINT



Vibration Flow Chart Worksheet — 1 of 4

VIBRATION FLOW CHART WORKSHEET
(Must be completed in detail prior to District Service Manager Involvement)

Date: _____ Distributor: _____ Service Writer: _____

Customer: _____ Operator: _____ RWFA: _____
 Application: _____ Chassis Model: _____ Serial # _____
 Chassis Mileage: _____ Engine Model: _____ Serial # _____

VIBRATION COMPLAINT

Previous Vibration Related Repairs:

VEHICLE INSPECTION (Chassis Components and Tire Wear)
 COMPONENTS (Code: Intolerance = I, Loose = L, Broken = B):

Coil Mounts _____ Crossmembers _____
 Exhaust System _____ Driveline _____
 Front Engine Mounts _____ Wheel Equipment _____
 Rear Engine Mounts _____ Ride H.C.V. Location-R.F. _____ R.R. _____
 Front Suspension _____

TIRE WEAR (Code: Yes = Y, No = N):

Front Tire Wear L.H. _____ R.H. _____ SIZE _____ PSI _____
 Front Rear Tire Wear L.H. _____ R.H. _____ SIZE _____ PSI _____
 Rear Rear Tire Wear L.H. _____ R.H. _____ SIZE _____ PSI _____

STATIC TEST

Vibration in Acceleration Only _____ YES _____ NO _____
 Vibration in Acceleration and Deceleration _____ YES _____ NO _____

ACCELERATION ONLY (Fuel System Type)

In-Line Pump, Mech. Gov. _____ In-Line Pump, Elect. Gov. _____
 E-Tech™ Unit Pumps _____

In-Line Pump System Data:

Injection Pump Part No. _____ Serial No. _____

Loosen Injection Lines and determine if vibration varies:

Cylinder #1	Yes	No	Cylinder #4	Yes	No
Cylinder #2	Yes	No	Cylinder #5	Yes	No
Cylinder #3	Yes	No	Cylinder #6	Yes	No

Inspect Injection Pump Mounting if vibration did not vary:

Loose Mounting _____ Yes _____ No Broken _____ Yes _____ No

Injection Pump Linkage, Mechanically Governed Only:

Loose _____ Yes _____ No Broken _____ Yes _____ No

FO 101 (Not Available from Stock — Please copy this form.) Sheet 1 of 4

Vibration Flow Chart Worksheet — 2 of 4

Vibration Flow Chart Worksheet — 3 of 4

Vibration when Engine is Run without Clutch: Yes No

Bottom End Inspection:
 Code: Loose = L, Fretting = F

Main Bearing Capscrews #1 #4
 #2 #5
 #3 #6

Connecting Rod Capscrews #1 #4
 #2 #5
 #3 #6

Crankshaft Counterweight(s) Have Evidence of:
 Balance Holes Yes No
 Weights # _____

Material Defects or Cracks _____

ROAD TEST

Under Pull: Note when vibration occurs with the following conditions —
 Road Condition(s) _____
 Speed(s) _____
 RPM(s) _____
 Gear Selection(s) _____

Coast in Gear: Note when vibration occurs with the following conditions —
 Road Condition(s) _____
 Speed(s) _____
 RPM(s) _____
 Gear Selection(s) _____

Brake Application: Note when vibration occurs with the following conditions —
 Road Condition(s) _____
 Speed(s) _____
 RPM(s) _____
 Gear Selection(s) _____

CHECK DRIVELINE COMPONENTS

Code: Loose = L, Brinnelled = B

Driveshaft U-Joints: #1 _____ #2 _____ #3 _____

Yoke Flange: Torque= _____

Intermediate Shaft U-Joints: #1 _____ #2 _____

Strap Bolt: Torque= _____

Spline Loose: Yes No

Suspension Ride Height: _____ Inches

Nozzle Removal for Performance Evaluation:

Performance Code: Acceptable = A, Unacceptable = U

Cylinder #1 _____ Cylinder #2 _____
 Cylinder #3 _____ Cylinder #5 _____
 Cylinder #4 _____ Cylinder #6 _____

E-Teck™ Unit Pump Fuel System Data

Unit Pump Part No. _____

Serial Numbers: Cylinder #1 _____ Cylinder #4 _____
 Cylinder #2 _____ Cylinder #5 _____
 Cylinder #3 _____ Cylinder #6 _____

Jump unit pump terminals, note change in engine sound:

Code: Change in engine sound = C, No change in engine sound = N

Cylinder #1 _____ Cylinder #4 _____
 Cylinder #2 _____ Cylinder #5 _____
 Cylinder #3 _____ Cylinder #6 _____

Determine if fuel pulse is present:

Code: Yes = Y, No = N

Cylinder #1 _____ Cylinder #4 _____
 Cylinder #2 _____ Cylinder #5 _____
 Cylinder #3 _____ Cylinder #6 _____

Engine Valve Adjustment: Yes _____ No _____

Nozzle(s) Replacement: Yes _____ No _____

If yes, record cylinder number(s) _____

If unit pump(s) replaced, record cylinder number(s) _____

VIBRATION — ACCELERATION/DECELERATION

Fan Belts:

First Belt: Worn Yes No Frayed Yes No
 Second Belt: Worn Yes No Frayed Yes No

Vibration Damper:

Nicks: Yes _____ No _____ Leaks: Yes _____ No _____
 Bents: Yes _____ No _____ Bulged: Yes _____ No _____
 Elongated Mounting Holes: Yes _____ No _____
 Vibration Damper Replaced: Yes _____ No _____

Clutch Related:

Engaged: Yes _____ No _____ Disengaged: Yes _____ No _____

Clutch Rotated:

90-degrees: Yes _____ No _____ 270-degrees: Yes _____ No _____
 180-degrees: Yes _____ No _____

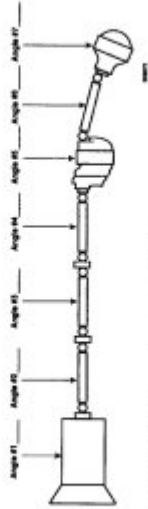
Clutch Replaced: Yes _____ No _____

Vibration Flow Chart Worksheet — 4 of 4

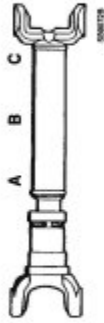
Record Driveshaft/Axle Angles:

NOTE

Essential tool J 38460-A, Driveline Angle Gauge, must be calibrated and used to measure and record the driveline angles.



- Steer Axle Loaded _____ In/kip
- Front Rear Axle Loaded _____ In/kip
- Rear Rear Axle Loaded _____ In/kip
- Fifth-Wheel Offset _____ Inches/mm
- Driveline Series No. _____
- Driveshaft Runout Check: _____



Record in Thousands A= _____
 B= _____
 C= _____

Driveshaft Balance: Yes _____ No _____

NOTE

Balancing must be done at a minimum of 3500 rpm, and unbalance to be 1 oz-in for each 10 lbs. of weight divided equally at each end, less the flange and end yokes.

DISTRICT SERVICE MANAGER CONTACT

Name _____
 Date Contacted _____

Service Technician Signature _____