



DIAMOND DIESEL and TURBOCHARGER SERVICE, Inc.

Diesel Fuel Injection:

Fuel pumps

Injectors

Turbochargers

OAKLAND

SACRAMENTO

SPARKS, NV

1-800-4-DIESEL

SEIZURE OF HEAD AND ROTOR ASSEMBLIES

SERVICE BULLETIN #203 R1

SUBJECT: SEIZURE OF HEAD AND ROTOR ASSEMBLIES

Seizure, for whatever reason, is a serious failure type. It is imperative that the probable causes of pump seizure be determined and eliminated before reounting the repaired pump or installing a new one.

Some seizures are caused by careless assembly, but, more often, the cause of this type failure is exterior to the pump and is not the result of defective manufacturer by HMS.

We have carefully compiled the data which accompanies this bulletin to help the shops responsible for troubleshooting and repair of our pumps make a fair and accurate evaluation of seizure-type failures. The photos showing the location of seizure on the rotor should be compared with actual samples encountered and the data related to each photo carefully studied in order to eliminate the primary cause if possible.

In any case involving rotor seizure, no attempt should be made to determine cause without either pressing the rotor from the head (do not exceed 15 tons pressure) or sectioning the assembly as shown on page 7 so the rotor can be examined and the exact seizure location determined. No claims involving seizure will be approved for payment unless either the seizure location is indicated on the claim form or the complete head and rotor assembly is returned, prepaid, for our examination.

In cases where it is impossible to determine exact seizure cause, it will be the policy of our Authorized Distributors and Stations to give the customers the benefit of any doubt, initiate a proper claim and pass all details to the factory.

SERVICE DEPARTMENT

**DIAMOND DIESEL and
TURBOCHARGER SERVICE, Inc.**

Fuel Pumps ♦ Injectors ♦ Turbochargers

1-800-4-DIESEL

S/B #203
Page 2 of 7

EXAMPLE I

DIRT

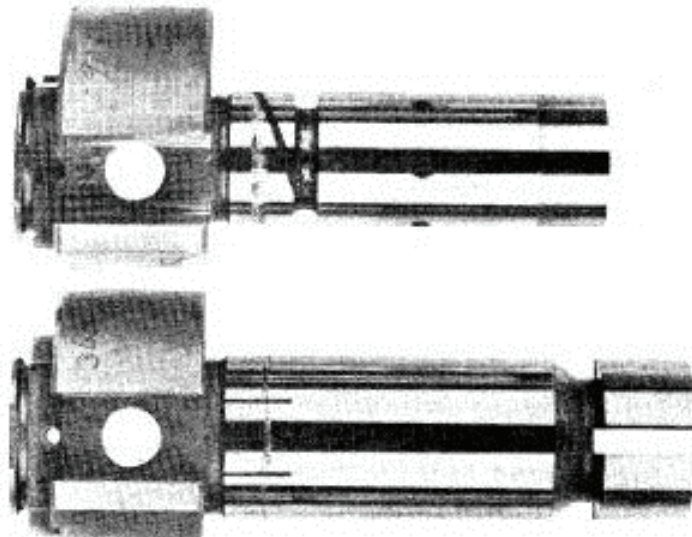
LOCATION: Dirt can seize any pump type and usually is found at the extremities of either the charging or discharge ports.

CAUSE: Large particles of dirt or other foreign matter wedged in rotor - head clearance or in leak-off and lubrication slots.

1. Dirt enters thru improper protection of fuel lines leading from final filter to the injection pump when this line is removed for any reason.
2. Incorrect or missing fuel filter element.
3. Improper cleaning of filter container when replacing.
4. Improper sealing of filter element so dirty fuel bypasses element.
5. Improper protection of fuel inlet to injection pump prior to installation of fuel inlet line.
6. Dirt entering transfer pump during field replacement of transfer pump or end plate parts.

CAUTION: Do not assume dirt or foreign material is cause of seizure unless it is visible in the hydraulic head.

REMEDY: Clean Fuel!!!



EXAMPLE I - DIRT

EXAMPLE II

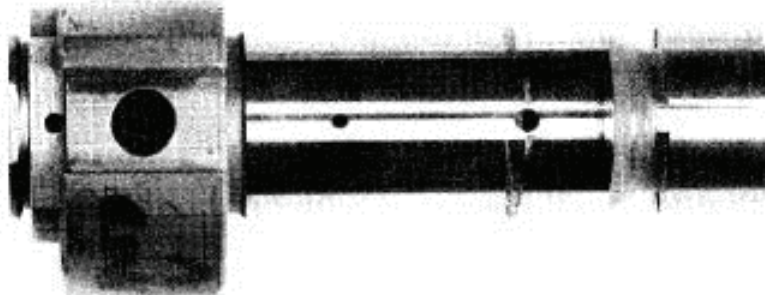
BOTTOMED CONNECTOR SCREW

LOCATION: Directly in line with or adjacent to a discharge port in the head.

CAUSE: Connector screw bottoms in discharge hole in head.

1. One or more connector screw washers missing.
2. Substitution of incorrect washers. (Too thin).
3. Washers reused. Each tightening of the connector screw successively makes each washer thinner and thinner until the screw ultimately bottoms.
4. Overtightening of connector screw (see torque valve chart)
Seizure usually occurs immediately on rotating the pump after bottoming the connector screw.

Examination of the discharge ports will usually show that the bottomed connector screw left a shiny mark in the bottom of the port. A similar shiny mark appears on the bottom of the connector screw.



EXAMPLE II - BOTTOMED CONNECTOR SCREW

EXAMPLE III

EXCESSIVE HYDRAULIC OR MECHANICAL SIDE THRUST AT THE TRANSFER PUMP

LOCATION: TRANSFER PUMP END OF ROTOR

- CAUSE:
1. Operating pump or engine at excessive speeds causing the transfer pump pressure to exceed 130 PSI.
 2. Wrong pressure regulating parts (spring or sleeve).
 3. Stretching or shimming the pressure regulating spring.
 4. Step plug too long. (Service Bulletin #153A).
 5. Ice in transfer pump (blades usually smashed).
 6. Over-tightening of transfer pump rotor (A, D & E pumps) causing restriction of endwise movement of blades.
 7. Tight transfer pump blades.
 8. Broken transfer pump blades.

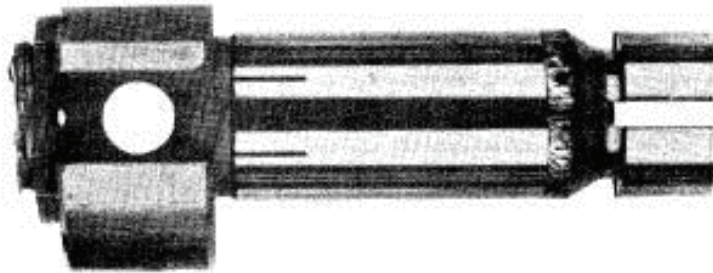
EXAMPLE III

EXCESSIVE SIDE THRUST (Continued)

9. Stuck regulating piston (rust, dirt or burrs).
10. Overtightened end plate screws.

On test stands carefully observe transfer pump pressures on the initial run-up in pump speed.

On engines, when adjusting stop screws be careful not to allow the engine to greatly overspeed.



EXAMPLE III - HYDRAULIC OR MECHANICAL SIDE THRUST AT TRANSFER PUMP

EXAMPLE IV

MECHANICAL SIDE THRUST OR MISALIGNMENT OF DRIVE

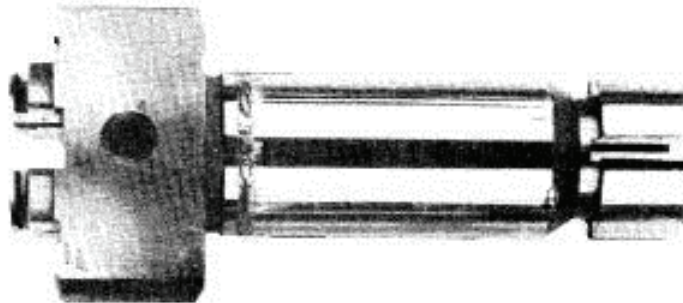
LOCATION: Plunger end of rotor

- CAUSE:
- A. Misalignment of pump to engine or test stand.
 1. Incorrectly designed, shop-made adaptors for test stand.
 2. Failure to use proper alignment bushings with test stand adaptors.
 3. Improper clearance of Oldham coupling on test stand or engine.
 4. Excessive end thrust on drive shaft due to improper thrust button and/or thrust button spring, or interference at engine end of drive shaft.
 5. Drive shaft 180° out of location when locating pin has not been removed. (Service Bulletin #79R1). Shaft off-set on vertical drives.
 6. Attempting to time injection pump when engine is operating.
 7. Burr or dirt on engine/pump mounting pad.
 8. Worn or improper drive shaft bushings in engine block. (Vertical pumps).
 9. Insufficient backlash in pump drive.
 10. Locating dowels for pump mounting bracket not used ("A" pumps).

EXAMPLE IV

MECHANICAL SIDE THRUST OR MISALIGNMENT OF DRIVE (Continued)

- B. Misalignment of internal pump parts.
1. Improper assembly.
 2. Incorrect parts used.
 3. Broken internal pump parts (shoe, leaf spring, leaf spring screw, etc.) jammed between cam and rollers.



EXAMPLE IV - MECHANICAL SIDE THRUST OR MISALIGNED DRIVE

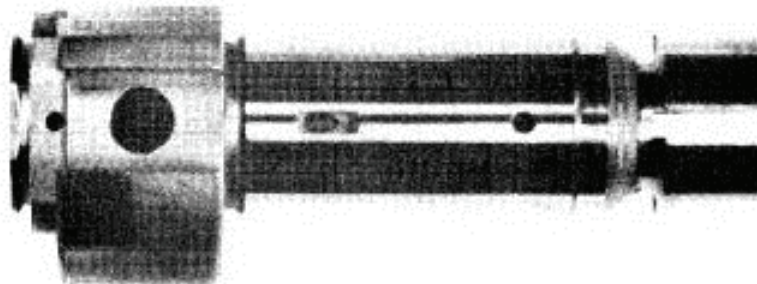
EXAMPLE V

DELIVERY VALVE STOP

LOCATION: Near transfer pump end of rotor.

CAUSE: Over-torquing of delivery valve stop screw or end plate screws. Tightening of this screw without a torque wrench can cause a swelling of the rotor at this point destroying the head and rotor clearance.

Use a new stop on reassembly of the delivery valve and its components. (Service Bulletin #157). Observe correct tightening torque (Service Bulletin #106R).



EXAMPLE V - OVERTIGHTENED DELIVERY VALVE STOP OR END PLATE SCREWS

**DIAMOND DIESEL and
TURBOCHARGER SERVICE, Inc.**

Fuel Pumps ♦ Injectors ♦ Turbochargers

1-800-4-DIESEL

S/B #203
Page 6 of 7

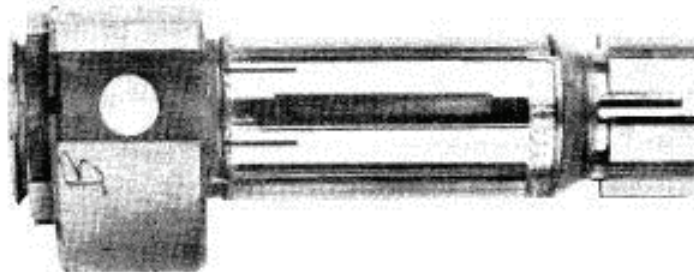
EXAMPLE VI

PLUGGED NOZZLE, INJECTION PIPE OR FITTINGS

LOCATION: Either end or both ends of rotor (DB). Both ends of rotor (A, E & D)

CAUSE: Nozzle pipe or fittings plugged closed. This causes excessive line pressure during discharge. As a result the head bore becomes barrel shaped and causes seizures at either or both ends of the rotor.

This type of seizure may occur after any number of hours operation with the defective nozzle.



EXAMPLE VI - PLUGGED NOZZLE, INJECTION LINE OR HIGH PRESSURE FITTINGS

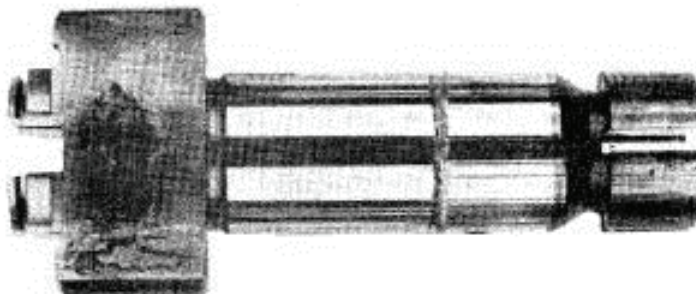
EXAMPLE VII

FUEL CONTAMINATION (Moisture)

LOCATION: Between charging and discharge ports in rotor. Look for rust, corrosion, stains or discoloration of the rotor also.

CAUSE: Contamination in the form of solutions used to clean fuel tanks, condensation in the tank and improper lay-up fuels are the main causes for this failure type.

REMEDY: Drain and flush tanks with clean diesel fuel, drain all supply and return lines, change all filters. Keep tanks filled overnight to preclude condensation formation during abrupt temperature changes. Consult your engine manual or the manufacturer for information on approved additives.



EXAMPLE VII - CONTAMINATED FUEL (Moisture)

DIAMOND DIESEL and TURBOCHARGER SERVICE, Inc.

Fuel Pumps ♦ Injectors ♦ Turbochargers

1-800-4-DIESEL

#203 R1
Page 7 of 7

REMOVAL OF ROTOR

A press of about 15 tons capacity is required to remove a seized rotor from the hydraulic head. Separation of the hydraulic head sleeve from the barrel can be prevented by supporting the inner sleeve with tool number 16313 as shown in Fig. 8.

Grooves running lengthwise along the rotor will be caused by the pressing operation and should not be construed as seizure marks.

If a press is not available, sectioning can be done on any grinder as long as the head and rotor is rigidly supported. Mount and cut as shown below:

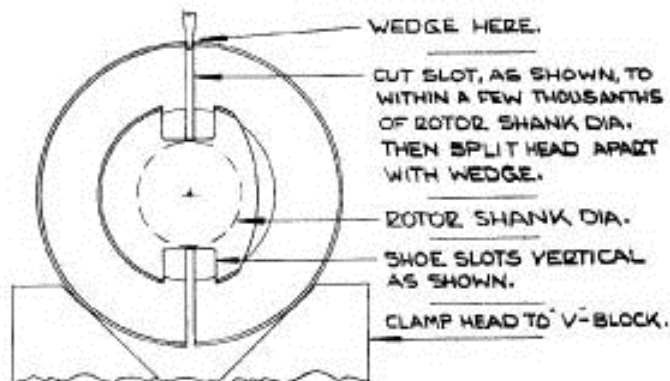
Two grinding wheels capable of this type of work are:

1. A600E7 6 X 1/16 x 5/8

Norton Company - Worcester, Mass.

2. 3A46N8 BJ2NS 6 X .062 X 5/8

Bay State Products - Westboro, Mass.



NOTE: Best cutting results are obtained by making a one-pass, fast cut. This will prolong cutting wheel life.