

'B' Reactor Recirculation Pump Vibration Troubleshooting Summary

'B' Reactor Recirculation Pump has had a history of high vibration. In any piece of rotating equipment high vibration can indicate a number of concerns. Below is a summary of these concerns and how they were evaluated on 'B' Recirc pump.

Indication	Concern	Evaluation
Elevated 1/2X frequency component	Internal rub in Pump or Motor	This component is very small and the mechanical seal was replaced this outage to ensure satisfactory performance during next cycle.
Elevated 1X frequency component	Pump or Motor Imbalance	Balance weights were added on two occasions, and the pump failed to fully respond as expected.
Elevated 2X frequency component	Motor to Pump misalignment	The alignment was corrected in RF09 and the resulted vibration data showed the alignment to be very accurate.
Elevated 5X frequency component	The Recirc pump impeller has 5 vanes and this indicates vane-passing concerns.	This component is very small.
Elevated 20-25X frequency components	Pump or Motor bearing degradation	Vender discussions reported that the first bearing to indicate wear is the lower motor bearing. This bearing was replaced in RF09 and the old bearing found to be good. It was inspected again in RF10 and found good.
Various	Instrumentation problems	The vibration levels were measured with hand held instrumentation. The levels were consistent at all locations except the flange where the installed probe measures vibrations. The readings at that flange were consistent with the installed instrumentation.

The Control Room indication is an overall vibration level. The predominant component of that vibration level is the 1X frequency component. This component turned out to be not an imbalance but the "egg" shaped condition of the outside of the flange face where the vibration probe was sensing vibration. This was corrected by moving the probe to a "non-egg" shaped location, which gives a more representative sample of the vibration levels of the pump.

'B' Recirc Pump
vibration Troubleshooting

The Goal for RFI0 was to remove/reduce the 8mils of runout on the coupling spacer

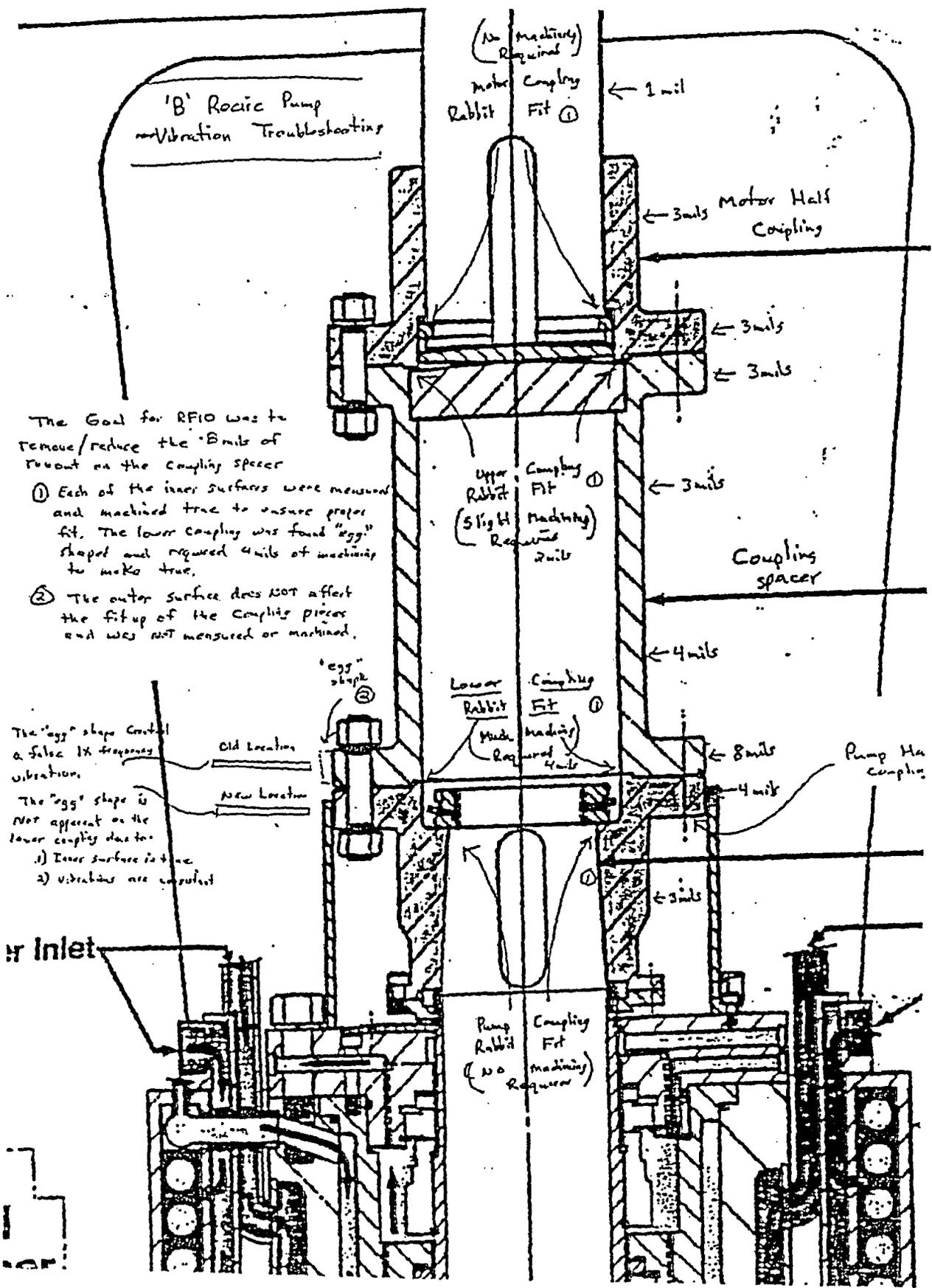
- ① Each of the inner surfaces were measured and machined true to ensure proper fit. The lower coupling was found "egg" shaped and required 4mils of machining to make true.
- ② The outer surface does NOT affect the fit up of the coupling pieces and was NOT measured or machined.

The "egg" shape caused a false 1X frequency vibration.

The "egg" shape is not apparent on the lower coupling due to:

- 1) Inner surface is true
- 2) vibrations are constant

Inlet



(No Machining Required)
Motor Coupling
Rabbit Fit ① ← 1 mil

← 3mils Motor Half Coupling

← 3mils
← 3mils

Upper Coupling
Rabbit Fit ①
(Slight Machining Required)
2mils

← 3mils
Coupling spacer

← 4mils

Lower Coupling
Rabbit Fit ①
(Much Machining Required)
4mils

← 8mils

Pump Half Coupling

← 4mils

← 3mils

Pump Coupling
Rabbit Fit
(No Machining Required)