WARNING!!!

Please follow attached instructions.

Grease-Pack Spindles

This replacement Spindle is designed to run with Air circuits for sealing as diagrammed. Failure to update machine to match Air Seal diagram as attached can lead to early Spindle failure.

1. **Grease Pack Spindles require upper and lower air input from an 80-90 PSI supply line.**
2. **For Grease Pack Spindles, a restrictive orifice must be installed at each head of the lower and upper branch circuits just past the "Wye" fitting as shown, and removed from the Air Valve output as noted.**
3. **Duty cycle for the Grease Pack Spindle is for RPM's over 8000, maximum 5 hours ON, and 20 contiguous minutes rest period OFF. This returns the grease to the bearings after extended run time at RPM's over 8000.**
4. **If there are insufficient components supplied to modify the machine to accept the Spindle, please order and install them as needed.**

Air/Oil Spindles

This replacement Spindle is designed to run with Air/Oil supply, Vacuum, Exhaust, and Air Seal circuits as diagrammed. Failure to update machine to match Air/Oil Lubrication and Seal diagram as attached can lead to early Spindle failure.

1. **For Air/Oil Spindles, verify that the various lines are not crossed and are connected as shown. If no plumbing exists for circuit 44, it MUST be added, including the restrictor orifice.**
2. **If there are insufficient components supplied to modify the machine to accept the Spindle, please order and install them as needed.**
3. **Air/Oil Spindles require Mobil DTE797 Steam Turbine Oil.**
4. **Air/Oil Spindles are not subject to a duty cycle.**

SERVICE BULLETIN 2007-08 Rev B October 8, 2007

SPINDLE EVALUATION

(Please return this query with the failed Spindle)

Spindle Part Number: _____ Serial number of Original Spindle: _____ Approx age: _____
New Spindle serial: _____ Machine serial number:_____Machine Model number: _____
System Control: Fanuc_____ CNC88HS_____ 104D_____ Siemens_____

Customer: _____ Distributor: _____ Technician: _____

FACILITIES AND APPLICATION

1. What is the Air Pressure of the building to the machine? _____
2. Air pressure after machine regulator? _____
3. On the building's Air Supply, is there a refrigerated drier?
4. What is average RPM used? _____
5. Maximum RPM used? _____
6. How long is the average part cycle time? _____

CONDITIONS OF EXISTING SPINDLE

7. Measure Spindle preload for failed spindle: _____
8. Is there any sign that Collar Jam Nut on top of OLD Spindle has been tampered with: YES___ NO__
9. What direction does Chiller Fluid flow around Spindle. Up or down? _____
10. Condition of the taper? NO SCARS_____ DAMAGED_____
11. Condition of Spindle Keys? NO SCARS_____ DAMAGED_____
12. If Grease Pack Spindle, has Fadal duty cycle restriction been violated? _____

AIR SEAL CIRCUIT

13. Verify Air Seal circuit to the diagram included for:
    - A. All TEE's and WYE's are oriented as shown and not installed backwards
    - B. Orifices are located and oriented as drawn, and not duplicated at the Air Seal Valve. YES__ NO__
    - C. Are any Air Seal hoses kinked or pinched? YES_____ NO____
14. Check Air Seal performance of existing Spindle:
    - A. Run Spindle at S0.1M3 for 10 seconds [Spindle will not rotate], and stop the Spindle. Will Air Seal operate for 2 additional minutes? YES_____ NO_____
    - B. Check the airflow around the Spindle nose. Is air flow curtain uneven? _____ Is it too strong _____ or weak? _____
    - C. Is the Air Seal Setscrew plug missing at the bottom of the Nose ring? YES_____ NO____
    - **D.** Does the customer direct coolant at the Spindle Nose, overpowering Air Seal system? YES___ NO___

CHILLER FLUID CIRCUIT

15. Does the Chiller run and exhaust heat from its condenser? YES_____ NO____
16. What is the fluid pressure on the Chiller Pump gauge? _____
17. Check Fluid flow. Is it GOOD_____ POOR_____?
18. Condition of Chiller Recirculation Pump strainer? CLEAN_____ CLOGGED_____
19. DowFrost fluid level in Chiller reservoir? FULL_____ HALF FULL_____ EMPTY_____
20. Any contamination in Chiller Fluid? YES_____ NO_____
21. When the Chiller is running, what is the temperature differential in degrees Fahrenheit between the INLET and OUTLET fittings on the Chiller? _____

AIR/OIL SPINDLES:

22. Is the correct lubricant used in the reservoir? _____ Should be Mobil Steam Turbine DT747
23. Perform the Air/Oil test listed on next page. Return sample oil spots with this form.
24. Are all the Vacuum, Air Seal and Air/Oil lines connected correctly at Spindle as shown on attached diagram? YES___ NO___ Check carefully as they can easily be crossed.
25. Verify flow rate for each port label on LUB-0091 Injector Block: 21 _____CC 22 _____CC.

BALANCING

26. Does Spindle vibrate and does vibration increase with RPM? _____
27. Inspect for lost balance weights. Rebalance as needed. Lock weights with BLUE Loctite.

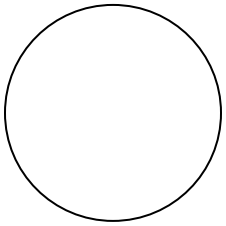
ROOT CAUSE OF FAILURE

28. Can you list the root cause of failure, in your opinion? _____
_____
_____
_____

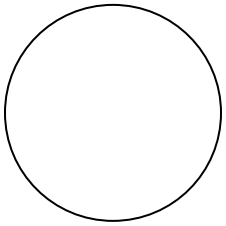
(Please return this query with the failed Spindle)

Oil Spot Test

1. With Spindle not running, [M3 S0.1] and air/oil system is operating, disconnect each Air/Oil line at the Spindle in turn.
2. Hold end of air line 1 inch [25mm] above below circles to collect oil spot.
3. Hold paper under hose for 10 seconds after RESET button has been pressed on 1980 Air/Oil Controller card.
4. Oil injection system cycles for 10 seconds approximately every 20 minutes. Residual oil in the lines vaporizes while air is flowing into the Spindle to provide Air/Oil mixture constantly.



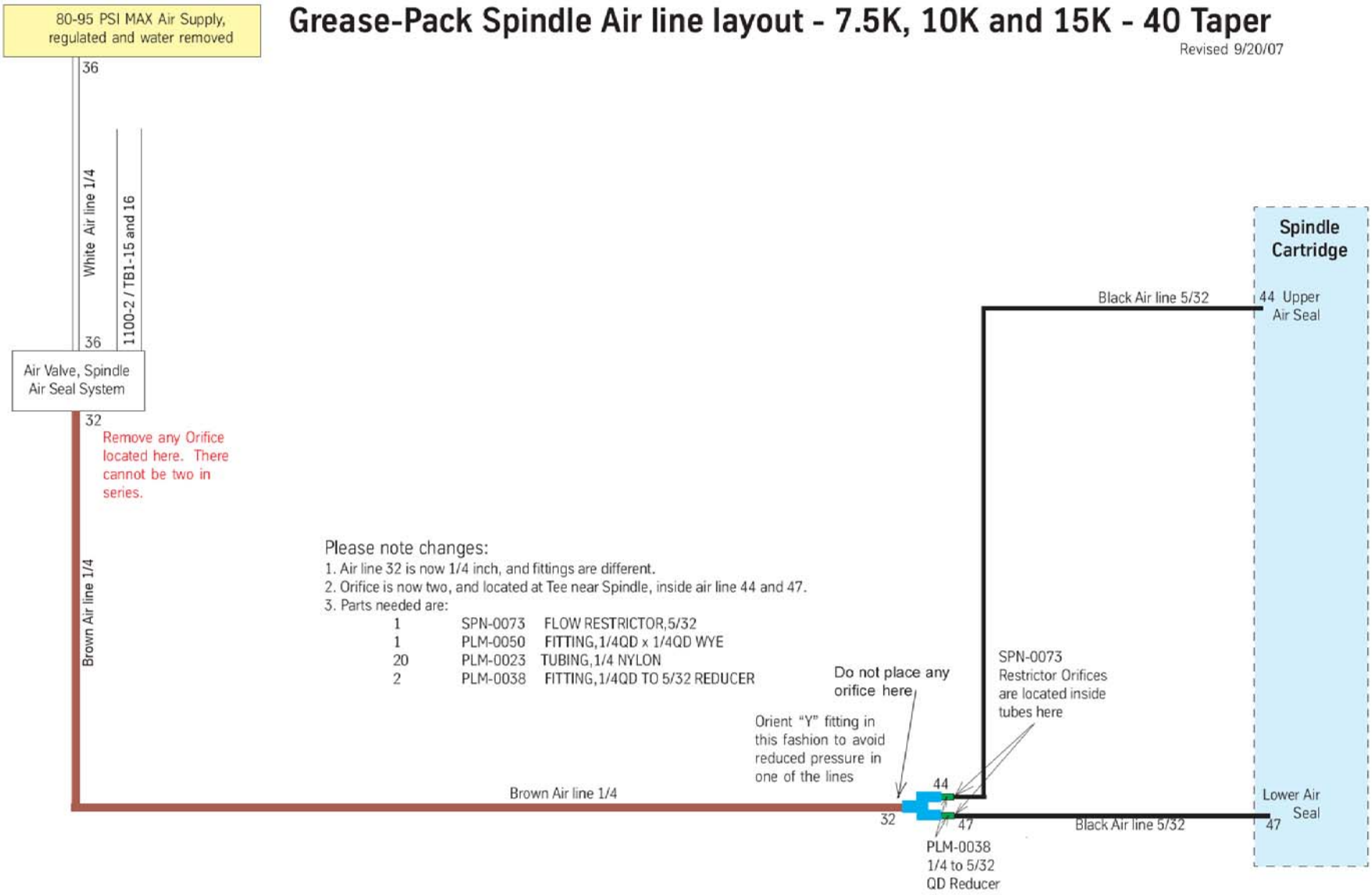
UPPER AIR/OIL LINE



LOWER AIR/OIL LINE

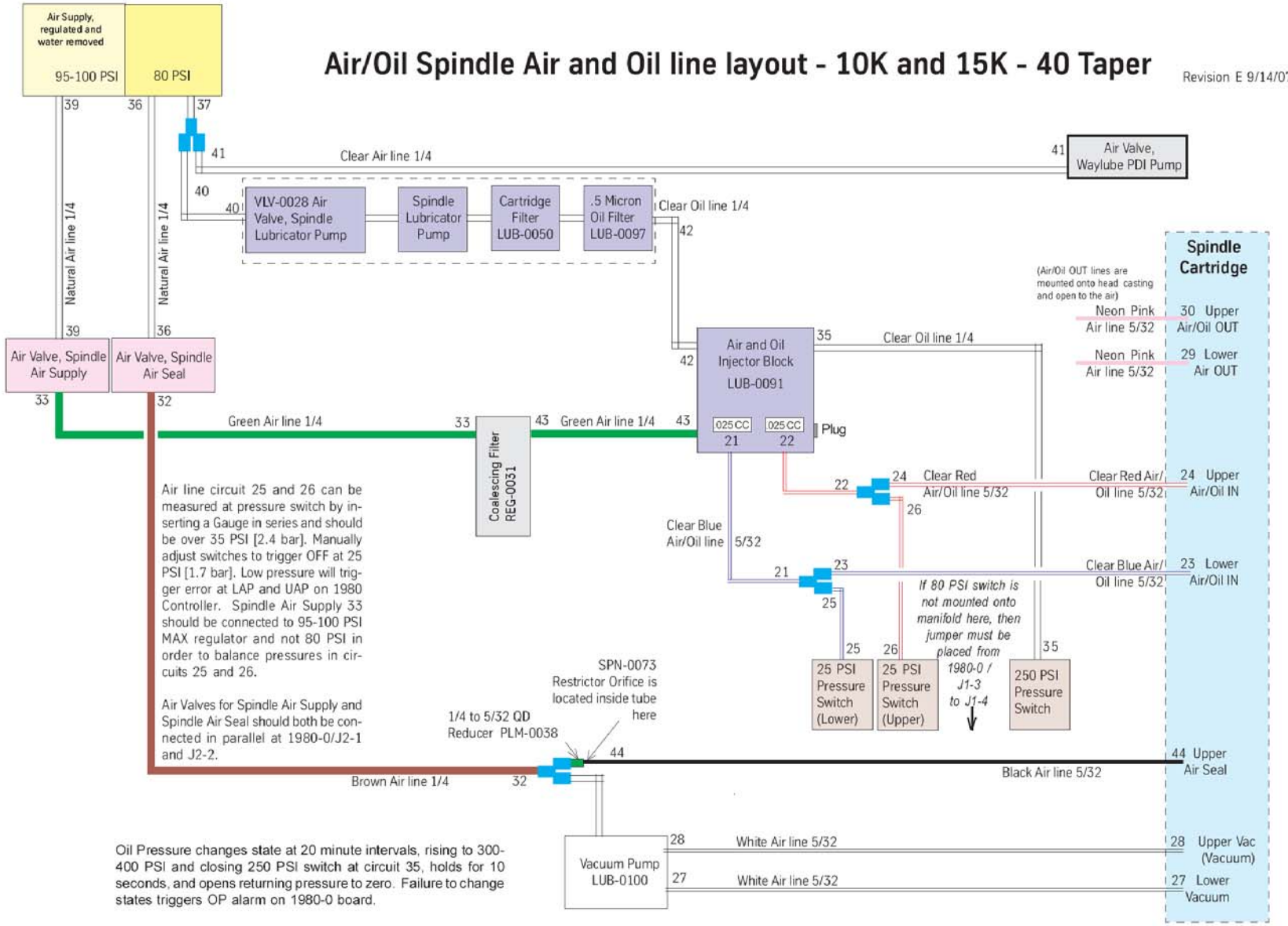
Grease-Pack Spindle Air line layout - 7.5K, 10K and 15K - 40 Taper

Revised 9/20/07



Air/Oil Spindle Air and Oil line layout - 10K and 15K - 40 Taper

Revision E 9/14/07



BREAK-IN PROCEDURE – AIR/OIL AND GREASE-PACK

1. Air/Oil Spindles operate with an extremely small amount of vaporized oil mixed with air. When they are manufactured, the oil inside is in liquid form. The Break-In procedure listed here is designed to break the liquid drops down and vaporize it internally once the Spindle is installed into the machine. The process will require constant observation in order to prevent running the Spindle at excessive temperatures because of operating with too much oil.
2. Start Spindle at 500 RPM, and run for 10 minutes. Using a thermometer, measure the temperature of the Spindle nose in the front—3 inches [75mm] above the bottom. If the room temperature or Spindle start temperature is about 75 degrees Fahrenheit [24 Celsius], then as this process proceeds through the steps given below, try to keep the Spindle temperature from climbing above 88 degrees [32 Celsius] by reducing to the next lower RPM given in a previous step.
3. Continue running the Spindle as in step 2 at the next listed RPM range for the time interval listed in the chart below. Again, if the Spindle shows signs of increasing temperature, reduce the RPM for an additional time period until it can be run at the faster RPM.
4. Repeat step 3 as needed until the RPM is increased to the last RPM entry in the table.
5. 7500 and 8000 RPM Spindles will not be able to run faster than the mechanical design limits.
6. 15000 RPM Spindles do not need to be run at RPM's higher than 10000 for Break-In.
7. Review time chart for examples of good and bad break-ins. Use correct table for Grease-Pack or Air-Oil Break-in schedule.

AIR/OIL BREAK-IN		
Step	*RPM*	*Time Interval*
1	500	10
2	1000	20
3	1500	20
4	2500	20
5	4000	20
6	5500	20
7	7000	20
8	8000	20
9	9000	20
10	10000	20

GREASE-PACK BREAK-IN		
Step	*RPM*	*Time Interval*
1	1000	20
2	2000	20
3	4000	20
4	8000	20
5	10000	20