The 6TH International Conference on Information Quality, Cambridge, Mass, USA

IQ-2001

Information Products for Remanufacturing: Tracing the Repair of an Aircraft Fuel-Pump

(Research-in-Progress)

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Points to be Made

- Increasing importance of remanufacturing.
- Two types of supply chains
  - Initial manufacturing (planned and predictable)
  - Remanufacture (unpredictable)
- Just-in-Time inventory management is difficult or impossible.
- Good forecasting of parts need will allow inventory management to approach JIT.
- Forecasting relies upon data and experience
  - Information quality is critical for performance of the system.
- Additional research

Increasing Importance of Remanufacture

- **Remanufacture is becoming increasingly important, particularly for products involving large initial investment.**
  - **Heavy construction equipment**
  - **Aircraft**
    - **Aircraft are flying far longer and logging far more flying hours than anticipated in original design.**
      - **747-200, 727, B52, C135, C141**
  - **Trucks & Automobiles**
- **Environmental requirements will cause this need to spread to other products.**

Two Supply Chains

- One of the distinguishing features of Remanufacture is the existence of two supply chains for parts and components.
  - Parts arrive on the 'carcass'.
    - Condition usually unknown until disassembly.
  - Parts delivered through 'normal' supply chain.
    - Need usually unknown until disassembly.

‘Normal’ Supply Chain

- **Uncertainty of need disallows the use of ‘Just-in-Time’ inventory management.**
  - **Need unknown until disassembly and testing of parts arriving via ‘carcass’.**
  - **Uncertainty can be reduced through use of forecasting.**
    - **Good forecasting allows us to approach Just-in-Time inventory control.**
    - **Forecasting based on historical record.**
      - **Quality of historical record dependent upon quality of information on which it is based.**

Importance of Forecasting

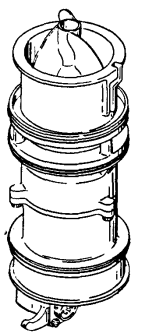
- **Inventory management totally dependent upon performance of forecasting model.**
  - **Effective forecasting reduces uncertainty in inventory need.**
  - **If forecasting were perfect, 'JIT' would be attainable.**
- **Goal is therefore to come as close to JIT as possible.**
  - **Attainment of this goal heavily dependent upon validity of input data.**

The Submerged Fuel Pump

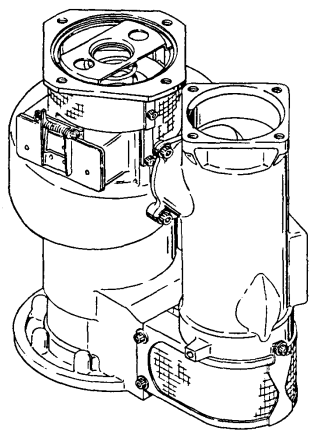
- **Single part tracked through replacement and remanufacture process.**
  - **Study uncovered complaints of ‘dirty data’ arriving at point of entry into historical record.**
  - **Corrections entered based on judgment of experienced personnel.**
  - **Study initiated to determine sources of ‘dirty data’.**

The Submerged Fuel Pump

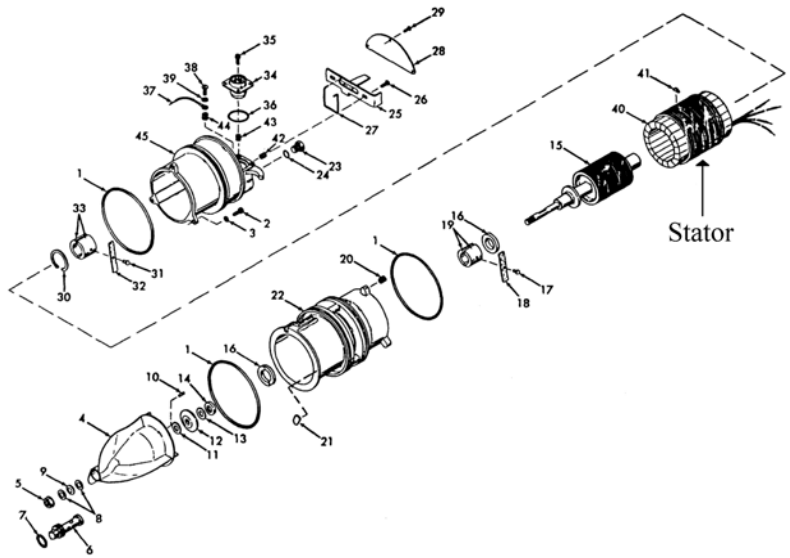
- Similar part used on many aircraft.
- Two major components.
  - Pump.
  - Stator.



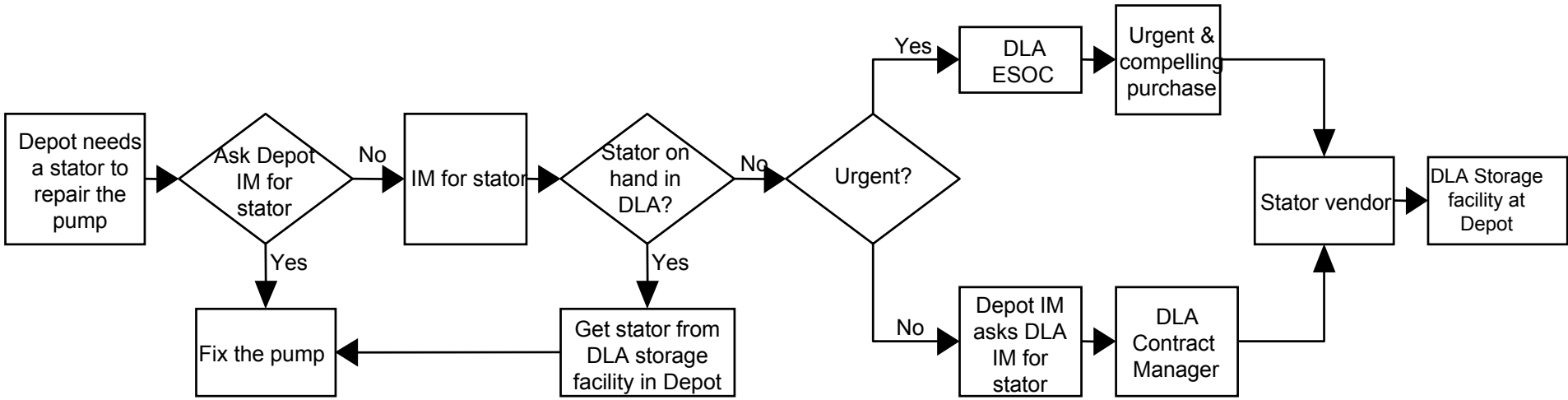
FUEL BOOSTER PUMP



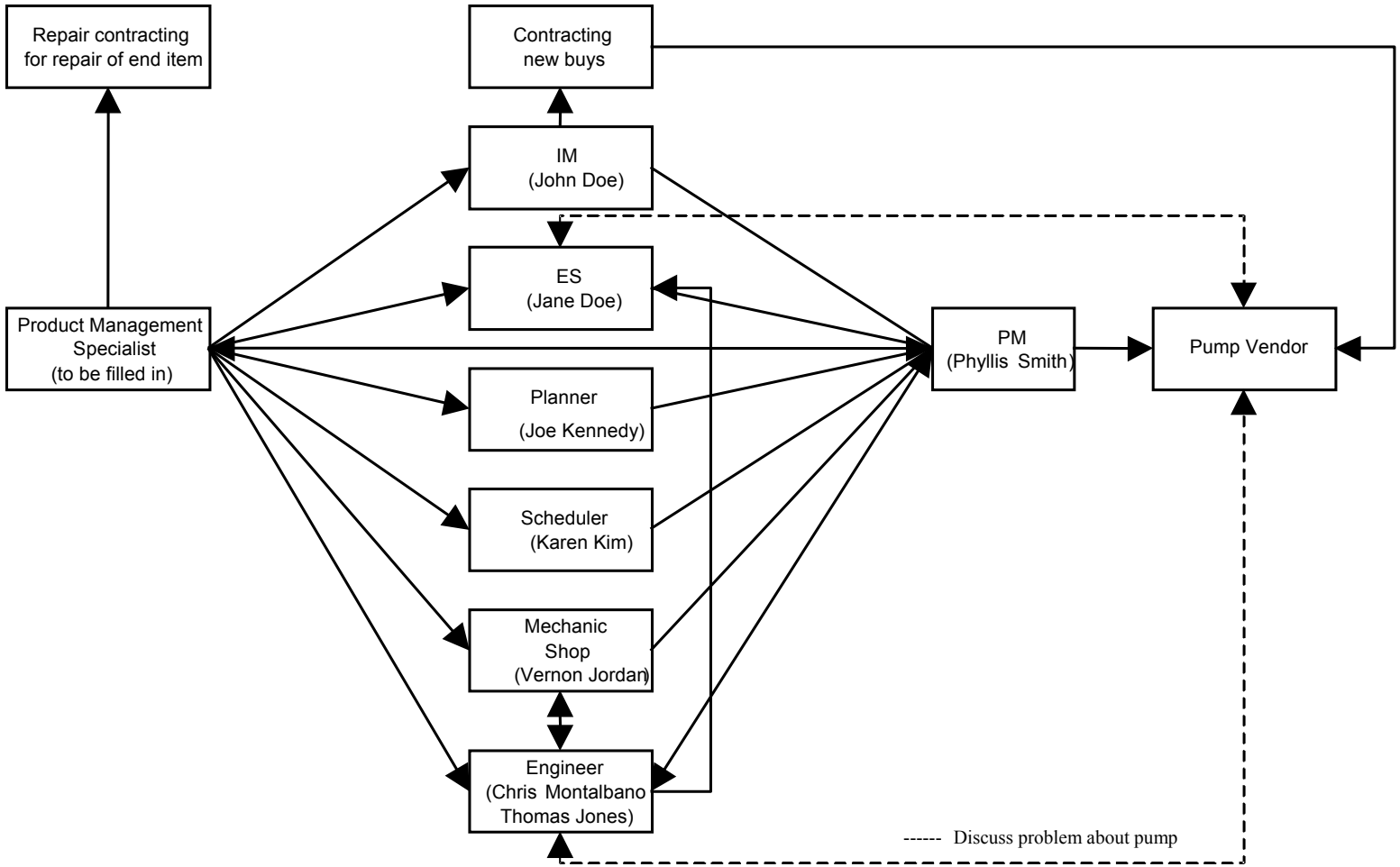
PUMP HOUSING



Stator (Physical) Flow



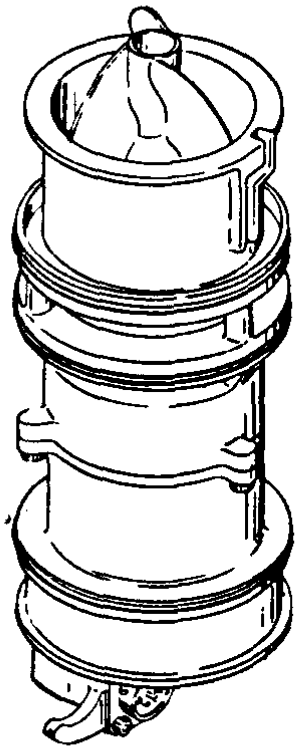
Pump Constituents by Roles & Contacts



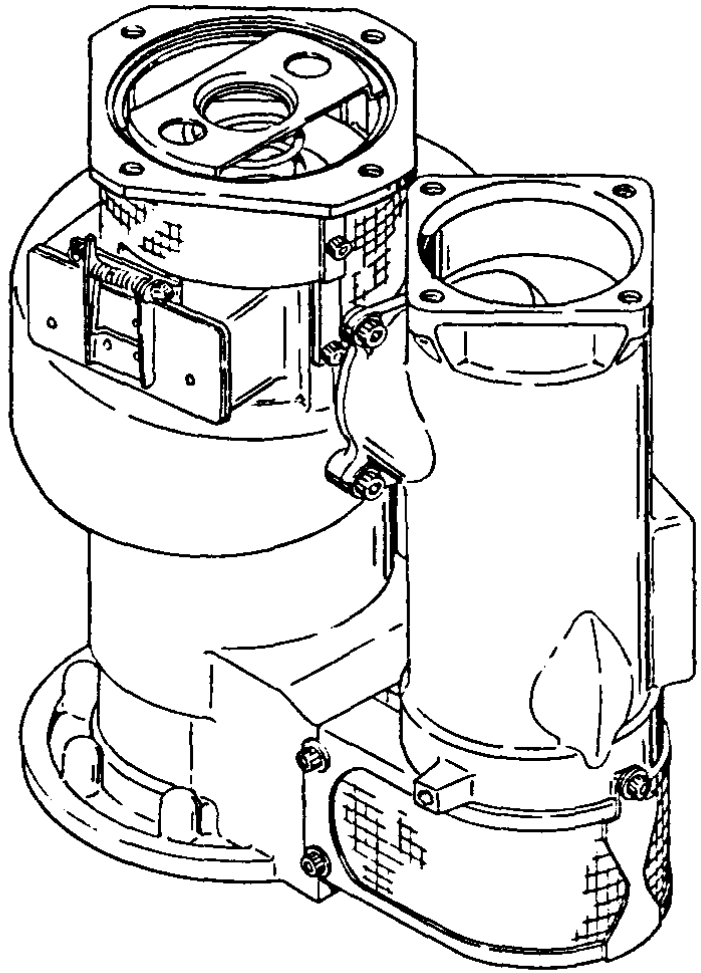
ADDITIONAL RESEARCH

1. Map physical flows, functional responsibilities, people, roles.
2. Map information flows, computer systems, people.
3. Determine information input/output, queuing/process time, dollar/performance costs, decisions made at each point.
4. Collect historical data on use of parts.
5. Test the sensitivity of the forecasting model to errors in the data.
6. Conduct Cost/Benefit analysis of possible improvements.

Tracing the Fuel Booster Pump

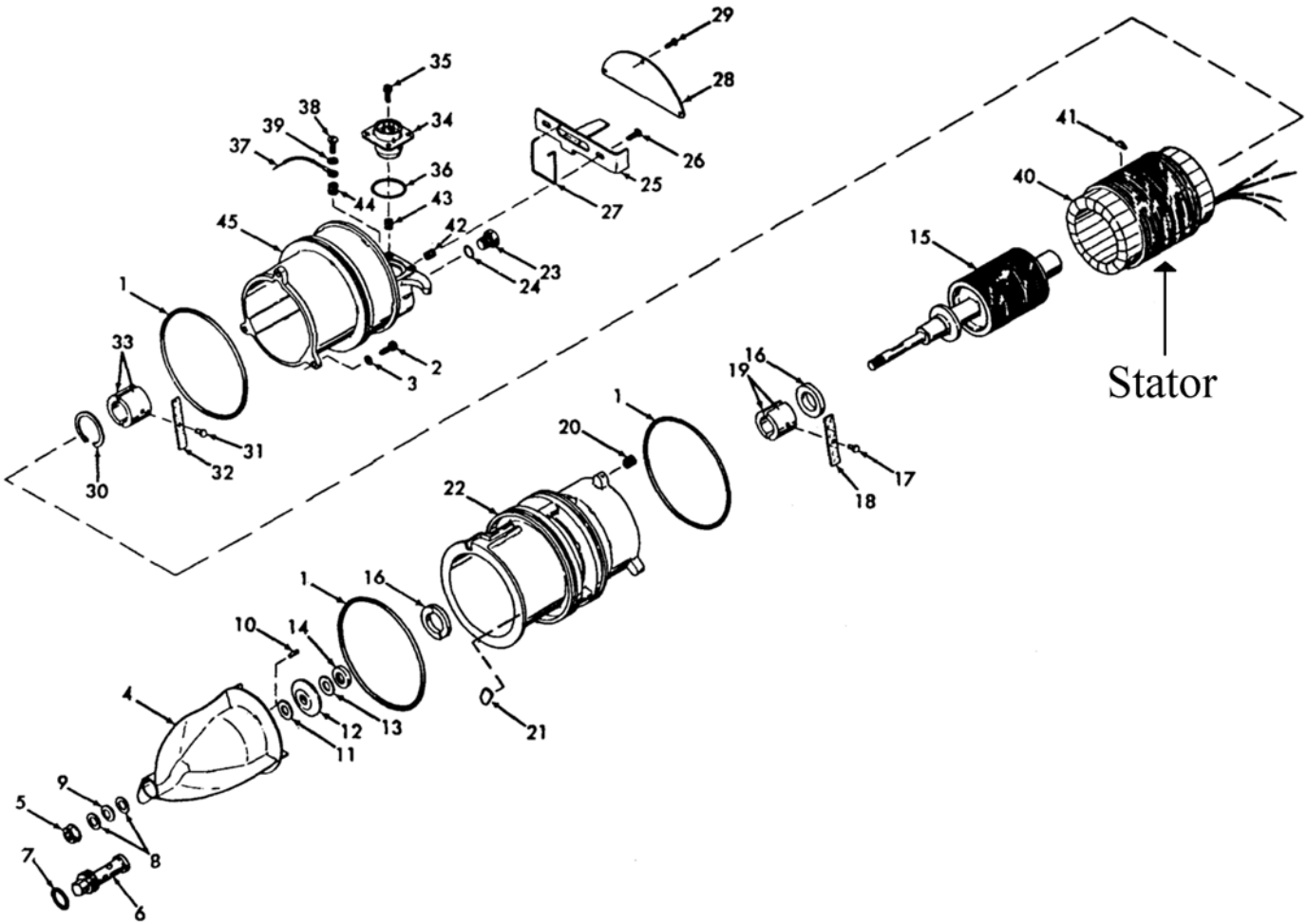


FUEL BOOSTER PUMP

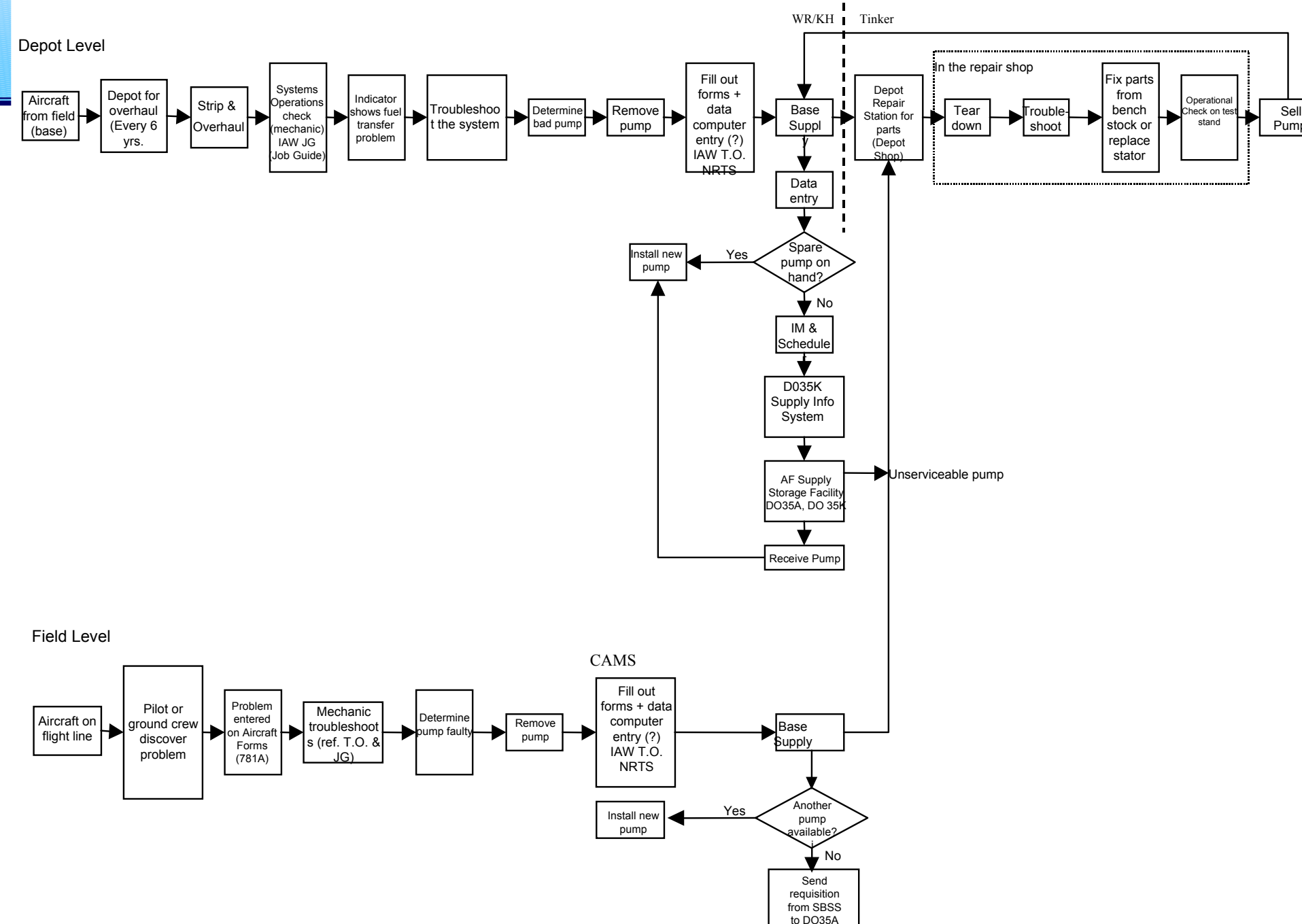


PUMP HOUSING

STATOR POSITION IN THE FUEL BOOSTER PUMP, EXPLODED VIEW



Pump Flow


WR/KH
Tinker
Depot Level
Aircraft from field (base)
Depot for overhaul (Every 6 yrs.
Strip & Overhaul
Systems Operations check (mechanic) IAW JG (Job Guide)
Indicator shows fuel transfer problem
Troubleshoot the system
Determine bad pump
Remove pump
Fill out forms + data computer entry (?) IAW T.O. NRTS
Base Supply
Depot Repair Station for parts (Depot Shop)
In the repair shop
Tear down
Trouble-shoot
Fix parts from bench stock or replace stator
Operational Check on test stand
Sell Pump
Data entry
Spare pump on hand?
Yes
Install new pump
No
IM & Schedule
D035K Supply Info System
AF Supply Storage Facility DO35A, DO 35K
Unserviceable pump
Receive Pump
Field Level
CAMS
Aircraft on flight line
Pilot or ground crew discover problem
Problem entered on Aircraft Forms (781A)
Mechanic troubleshoots (ref. T.O. & JG)
Determine pump faulty
Remove pump
Fill out forms + data computer entry (?) IAW T.O. NRTS
Base Supply
Another pump available?
Yes
Install new pump
No
Send requisition from SBSS to DO35A