Operational Liaison Meeting FBW aircraft

Taxi Procedures
Contents

- Introduction
- Safety Precautions
- Powerpush
- One-Engine Taxi (A340 Two-Engine Taxi)
- Taxi with Deflated Tires
- Taxiing the A340-500/600
- Conclusion
**Introduction**

- Taxi incidents are usually perceived to be less dangerous than incidents in flight ...

...but they may cost a lot of money!

- Safety precautions specific to Airbus aircraft
- Pushback and taxi techniques:
  - One-Engine Taxi (A340 Two Engines)
  - Powerpush
  - Taxi with Deflated Tires
**Safety Precautions**

- **Conventional vs. Towbarless Pushback**
  - Towbar embodies a “torsion and traction fuse”
  - No towbar → No “excessive effort” protection

- **Nosewheel steering** must not be pressurized during pushback.
  - Towbar shear pin breaking (conventional towing).
  - Severe damage to the nose landing gear (towbarless towing).

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In case of pushback (conventional or towbarless), the nosewheel steering selector bypass pin must be in the tow position. The ECAM NW STRG DISC memo indicates this to the flight crew.
Safety Precautions ...

- BRAKE HYD SEL FAULT / WHEEL HYD SEL VALVE
  - NWS remains available

**WHEEL HYD SEL VALVE**

Failure of the normal brake selector valve, or the steering selector valve, in the open position.
- If the normal brake selector valve is failed open, full green hydraulic pressure is present at normal servovalves’ entry.
  - Nosewheel steering remains available.
- On ground, do not tow the aircraft with the green hydraulic system pressurized.
  - Nosewheel steering remains pressurized, and so towing may either break the towbar’s shear pin, or the nose gear (if towbarless towing).
- Selecting A/SKID NWS OFF or resetting the BSCU will cause the nosewheel to go to maximum deflection.
- A/SKID NWS .............................. KEEP ON
  - As long as antiskid is operative, brake pressure is regulated by normal servovalves.

**STATUS**

- A/SKID NWS ...................... KEEP ON

**ABNORMAL & EMERGENCY**

FCOM 3.02.32

A320 family: REV 33
A330: REV 14
A340: REV 22

DO NOT TOW WITH GREEN HYD!!!
Safety Precautions ...

- ACCU PRESS...CHECK
  - SOP Preliminary Cockpit Preparation
  - Re-pressurize with electrical pump, if needed

- NO REVERSE at low speed
  - FOD
  - Hot exhaust air re-ingestion → Compressor stall

**NO REVERSE for slowing down the aircraft during taxi**

**NO REVERSE for pushback**
Safety Precautions ...

- The Flight Control check to be done prior to autobrake arming:
  - If the spoilers are left in the extended position after landing...
  - …the aircraft will suddenly brake at autobrake MAX arming!!!
  - Recommendation introduced in the SOP.

- Reduced efficiency at first brake application in wet conditions.

CAUTION

If the aircraft has been parked in wet conditions for a long period, the efficiency of the first brake application at low speed will be reduced.
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**Powerpush**

- Only for the A320 family:

  PUSHBACK WITH POWERPUSH BY THE MAIN LANDING GEAR (FCOM 3.04.80)

- PPU (Power Push Unit) remotely operated by one person.
- The flight crew steers the aircraft, according to ground indications.
- Ground personnel has wingtip-to-wingtip visibility.
**Powerpush ...**

- PPU holds the Main Landing Gear

- No forces exerted on the landing gear structure.
- The aircraft is not lifted from the ground.
- Why only the A320 family? Present PPU adapted to “diabolo” gear type.
**Powerpush - Airbus Recommends...**

- ENG 2 is started prior to pushback.
- Last actions on ground performed on the **LEFT**-hand side of the aircraft.
- Engine 2 pressurizes **YELLOW HYD**️ parking brake pressure.
- GREEN HYD (for steering) ensured via the PTU.
Powerpush - Airbus Recommends...

- The PPU is placed on the left main landing gear.
- CAPT, being in the left seat.
- ENG 2 start, on the right-hand side.
**Powerpush - Airbus Recommends...**

- Flight Crew in charge of *aircraft steering* (according to ground indications).

**CAUTION:** Do not use brakes during pushback, unless required due to an emergency.

- In case of an emergency, the PPU should be immediately removed.
- Nevertheless, the cabin evacuation is always possible with the PPU in place.
Powerpush - Airbus Recommends...

After pushback is completed:
- Ground operator disengages the PPU, and backs it away.
- PARKING BRK…ON
- ENG 1…START
**Powerpush - With Engines OFF**

- Some airports **may not allow** engine start at the gate.
- Some conditions to be met for ensuring nosewheel steering:

  - Towing lever in the normal position
  - PARK BRK...OFF
  - A/SKID & N/W STRG...ON
  - One ENG MASTER LEVER...ON
  - YELLOW ELECTRICAL PUMP...ON
Powerpush - With Engines OFF ...

- AIRBUS does not give Powerpush with Engines OFF procedure.
- YELLOW ELECTRICAL PUMP pressurizes the YELLOW and GREEN HYD.
  - Risk of weakening hydraulic power → NWS failure
- ENG MASTER LEVER…ON
  - Risk of unwanted engine start.

DO NOT MOVE FLIGHT CONTROLS OR FLAPS/SLATs DURING POWERPUSH!!!

DO NOT SET THE ENGINE MODE SELECTOR OUT OF THE NORM POSITION!!!
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One-Engine Taxi (A340 Two-Engine Taxi)

- Advantages and Drawbacks:
  - Fuel & engine life economy
  - Jet blast increase ➔ FOD risk
  - Reduced control on slippery taxiways
  - Crew must consider which engine to use
One-Engine Taxi (A340 Two-Engine Taxi) ...

- Which Engine to Use?
  - A320 Family: ENG 1
  - A330: ENG 1
  - A340: Outer engines (ENG 1 + 4)

- A320 Family:
  - ENG 1 pressurizes GREEN HYD (NWS + NORM BRAKE)
  - PTU is not needed
  - YELLOW HYD pressurized via ELEC PUMP
One-Engine Taxi (A340 Two-Engine Taxi) ...

- A330:
  - ENG 1 pressurizes GREEN + BLUE HYD
  - HYD BLUE ensures ACCU PRESS
  - ELEC PUMP are not needed

- A340:
  - ENG 1 + 4 pressurize GREEN HYD (NWS + NORM BRAKE)
  - Check ACCU PRESS normal before ENG start
  - ELEC PUMP are not needed
A340 Two-Engine Taxi

- A340 taxi on inner engines (ENG 2 + 3):
  - Operational reasons may advise taxiing on inner engines...
    
    **Example:** Narrow taxiways, where unpaved sideways may increase the FOD risk.
  
  - ENG 2 + 3 does not pressurize GREEN HYD
  - GREEN ELEC PUMP runs automatically

*CREW MUST CHECK GREEN ELEC PUMP AVAILABILITY!!!*

*DO NOT MOVE FLAPS/SLATS DURING TAXI!!!*
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**Taxi with Deflated Tires**

- **Tire deflated or severely damaged?**
  - Stop the aircraft and confirm the damage
  - Contact gear-runway → severe gear damage

- **JAR 25.511:** The aircraft must be capable of taxiing with one deflated tire (no structural damage risk).

- **Airbus:** The aircraft can taxi with up to 3 deflated tires (A340: 4 tires).
  - Affected tire monitoring is highly recommended.
  - **SPEED** and **TURN** limitations apply.

**DO NOT TAXI !!!**
New Operating Limitation to cover TAXI WITH DEFLATED TIRES

**TAXI WITH DEFLATED TIRES**

If tire damage is suspected after landing, inspection of the tires is required before taxi. If the tire is deflated but not damaged, the aircraft can be taxied at low speed with the following limitations:

1. If one tire is deflated on one or more gears (i.e. a maximum of three tires), the speed should be limited to 7 knots when turning.
2. If two tires are deflated on the same main gear, speed should be limited to 3 knots, and the nosewheel steering angle should be limited to 30 degrees.
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Taxiing the A340-500/600

- Taxi Aid Camera System (TACS) for A340-500/600 ground operations
**Conclusion**

- **Safety Precautions**
  - Steering HYD supply
  - NO REVERSE for taxi
  - Flight control check

- **Powerpush**
  - ENG OFF associated RISK:
    - Unwanted ENG START
    - NWS failure

- **One (Two) Engine Taxi**
  - A320 taxi on ENG 2: PTU reliability impact
  - A340 external / internal engines

- **Taxi with Deflated Tires**
  - Limitations
  - Contact gear-runway: DO NOT taxi!