Optical Viewports

- Large optical port on centerline (zenith)
- Small optical ports in aperture pads
  - On centerline, 18° off centerline, and side windows.
Large Port

- 43 cm clear aperture (normal incidence)
- Fused silica (Infrasil 302)
- $\frac{1}{4}$ wave @ 633 nm, 10 arcsec parallelism, 40-20 scratch-dig, bubble class 0, homogen. < 6 ppm
- Two different antireflection (AR) coatings on hand
- Fabricating new large Infrasil windows with different coating is possible, ~$60 000, 1 year
- **Might** be able to strip and recoat one set.

* The outer pane is ordinarily the cabin pressure seal. The FAA Supplemental Type Certificate (STC) requires a backup window capable of retaining cabin pressure in case outer pane breaks.
Large Ports (cont.)

- 43 cm clear aperture
- Each pane is 26.5 mm thick
- First to last surface is 70 mm
Large Port AR Coating #1

Vertical scale is 100 % reflectivity
Large Port AR Coating #2

Vertical scale is 10% reflectivity
Small Optical Ports

- Top ports, and one can replace a side window.
- Clear aperture 20 cm x 14 cm
- Oriented with long axis for-aft only
- Also double-pane
Small Optical Ports (cont.)

- **ZnSe**
  - AR coated, 4% average reflectance from 2 to 15 um
  - Quality: < 1/2 wave PV @ 633 nm

- **Infrasil 302**
  - same material spec's as large ports
  - AR coated and uncoated available
ZnSe Small Port

From 0.6 to 1 um the reflectivity varies from about 20 to 80 %
Infrasil Small Port Coatings

Uncoated Infrasil

325 – 900 nm BBAR

Large port coating #1
More Options

- Large and small wing pods
- Dome over Large optical viewport
  - The FAA may require flight testing of a dome. This would make for a MAJOR effort – several years and several million dollars.
Large Wing Pod

- New STC not required, relatively painless
- 50 cm ID, 4 m length
- Less environmental control, more motion
- Nose of the pod is ahead of the wing
  - Used for HCR with 30 cm nadir antenna
Small Wing Pods

- 15 cm ID, ~1 meter long
- Nose tip is very near the wing's leading edge
  - Might be able to look past the wing at 65° elevation
Optical Dome

- Dome (inverted canoe?) over the Large viewport
- Less than 25 cm high might be feasible
- Still requires backup pressure seal.
- This would require an extensive design and certification effort for the required STC

Details – Contact Mark Lord @ RAF: 303-497-1046, lord@ucar.edu
Platform Stabilization

- Inertial Navigation System (INS) data feed available
  - Available over ARINC 429 at (very near) real-time.
  - 25 Hz for heading, 50 Hz for pitch and roll
  - **Possibly** could borrow a separate INS to incorporate on pointing platform.
GV Electrical Power

• Cabin:
  - 115 VAC power on 20 amp breakers
  - ~ 20 kVA total

• Wing power (for pods):
  - 2 x 20 amp AC circuits, ~30 amps total
  - 28 VDC (weight-on-wheel switched), ~16 amps

Details – Contact Kurt Zrubek @ RAF: 303-497-1086, zrubek@ucar.edu