<table>
<thead>
<tr>
<th>Model.</th>
<th>4</th>
<th>15</th>
<th>16*</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Wt.</td>
<td>450,000</td>
<td>380,000</td>
<td>455,</td>
<td>445,</td>
</tr>
<tr>
<td>S</td>
<td>5700</td>
<td>3725</td>
<td>4000</td>
<td>6200</td>
</tr>
<tr>
<td>Eng thrust</td>
<td>2300</td>
<td>1840</td>
<td>2060</td>
<td>2600</td>
</tr>
<tr>
<td>L/D Cruise</td>
<td>1.90</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/D cruise</td>
<td>8.31</td>
<td>7.59</td>
<td>(6.63)</td>
<td>7.35</td>
</tr>
<tr>
<td>TSFC cruise</td>
<td>1.58</td>
<td>1.58</td>
<td>1.60</td>
<td>1.58</td>
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<tr>
<td>Range Factor NMl.</td>
<td>9.50</td>
<td>9.260</td>
<td>7100</td>
<td>8000</td>
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<tr>
<td>OWE #</td>
<td>212,100</td>
<td>177,000</td>
<td>197,000</td>
<td>198,400</td>
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<tr>
<td>Reserve, #</td>
<td>44,250</td>
<td>33,000</td>
<td>36,000</td>
<td>45,200</td>
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<tr>
<td>V_{to}, KT (50°F, 1000)</td>
<td>169</td>
<td>171</td>
<td>164</td>
<td>184</td>
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<tr>
<td>2nd seq climb grad.</td>
<td>.030</td>
<td>.030</td>
<td>.051</td>
<td>.030</td>
</tr>
<tr>
<td>L/D Sec. seq</td>
<td>4.15</td>
<td>5.75</td>
<td>7.5</td>
<td>4.0</td>
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<tr>
<td>V approach, KT</td>
<td>12.7</td>
<td>13.0</td>
<td>13.1</td>
<td>13.0</td>
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<td>CL approach</td>
<td>6.9</td>
<td>1.1</td>
<td>1.12</td>
<td>.74</td>
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<tr>
<td>N3lev Level 1000 PNdO</td>
<td>133</td>
<td>131</td>
<td>132</td>
<td></td>
</tr>
</tbody>
</table>

* Improve possible on Box data.

Based on max use of Titanium: M=3 3200 NMl. 26,125
Engine B.
SCAT 4 & 16 should come down in gross Wt.

Bob Markofka:
Need better C_{max} d L/D on climbout since 2nd seq went to Gross Wt. (L/D = 5)

T-D should be about 0.3 to handle high day acceleration.
2nd Seq | .03 Hot Day 1 engine out
\[ C_D = \left[ C_{D_{\text{TEST}}} - C_{D_{\text{WIND TUNNEL}}} \right] + C_{D_{\text{FULL SCALE}}} \]

\[-C_{D_{\text{TUNNEL SPINLASE}}} + 0.05 C_{D_{\text{FULL SCALE}}} \text{ (MANUFACTURING ROUGHNESS)}\]

\[+ \Delta C_{D_{\text{LANDING + MISC}}} + \Delta C_{D_{\text{WAISE}}} \text{ (BODY CLOSURE)}\]
\[ C_{\text{Pressure}} = (C_{\text{MIN}} - C_{\text{SEP}})_{\text{TUNNEL}} + \Delta C_{\text{CANOPY}} + \Delta C_{\text{PORT CLOSURE}} - \Delta C_{\text{TUNNEL SPILLAGE}} \]
1. SCAT 4

1.1 DATA

1.1.1 Data Sources

a. TNX-801, Preliminary low speed data for performance estimation based on this report (SCAT 4-3.2).

b. SCAT 4-2.9, Low speed data recently available.

1.1.2 Configuration

The configuration being analyzed is SCAT 4-3.2. Variations in the configuration deemed necessary for control were tested on -2.9. The intent is to apply corrections to -3.2 based on the data for -2.9.

1.2 CORRECTIONS

1.2.1 Configuration Corrections

Corrections for the difference in flaps (number, size, and deflection) and wing tip droop must be applied.

1.2.2 Scale Corrections

Data from TNX-801 shows a slight improvement in $C_L$ at a fixed $\alpha$. These data will be used for scale corrections.

Minimum drag is modified using the formula:

$$C_{D_{\text{min}}}= (1.0 S \frac{\rho_{\text{air}}}{\rho_{\text{air, test}}})^{-2} C_{D_{\text{min, test}}}, \quad (*)$$

where 5% is added for fabrication roughness. A correction to $\Delta C_{D_P}$ is also made where

$$\Delta C_{D_P} = C_{D_P} - C_{D_{\text{min, max}}} = [C_{D} - \frac{\alpha^2}{\pi R}] - C_{D_{\text{min}}}. \quad \Delta C_{D_{\text{min}}}$$

First, an estimate is made of the portion of $\Delta C_{D_P}$ due to skin friction. This estimate is made by extrapolating the $\Delta C_{D_P}$ vs. $C_L$ curve for the low $C_L$ to higher $C_L$'s. This portion was corrected for Scale using

$$\Delta C_{D_P} = \Delta C_{D_P}^{\text{test}} \left( \frac{R_{\text{test}}}{R_{\text{L}}^{\text{CONFIDENTIAL}}} \right)^{\delta}$$

(*) This neglects the fact that part of $C_{D_{\text{min, max}}}$ is pressure drag.
a formula based on Holmbold's formula for profile drag.

Pitching moments are modified for scale by extending the $C_L$ for pitch-up. It is assumed that this $C_L$ will occur above $1.69 \times C_L(\text{approach})$.

1.2.3 Trim
With $S_{e_h}$ at $-12^\circ$, any remaining untrimmed pitching moment about the forward c.g. must be trimmed with the horizontal tail. This will add drag and reduce lift. These increments are determined from available data on the horizontal tail modified for the chosen tail area.

1.2.4 Thrust
The following corrections to lift and drag due to thrust inclination are made:

$$\Delta C_{L\text{Thrust}} = C_T \sin (\alpha + \xi)$$

$$\Delta C_{D\text{Thrust}} = C_T \left[ 1 - \cos (\alpha + \xi) \right]$$

where $\xi$ is the inclination of the thrust vector to the reference axis.

1.3 TAKE-OFF AND APPROACH CONDITIONS
Take-off and approach will be at $C_L$'s corresponding to geometry limited attitude with oleo's not extended unless limitations due to climb gradient or speed stability cannot otherwise be solved. On the ground, the given wing incidence will be used with data determined in ground effect. Reasonable sized airbrakes will be assumed.