THE MARGINAL VALUE OF THE CRAF DC-10-10 COMPARED TO THE KC-10A (U)

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In support of defense airlift requirements, a proposal to modify Civil Reserve Air Fleet (CRAF) DC-10-10 aircraft was provided for HQ USAF review. In light of the modification costs, AF/SA was tasked to examine the marginal value between the proposal and the procurement of additional Air Force KC-10A tankers.

The proposed CRAF modification would strengthen the cargo floor and increase the cargo door size on certain civil air-carrier DC-10 aircraft. The aircraft would normally be used for CRAF Stage III requirements (cargo airlift during a national emergency). The KC-10A is a tanker version of the DC-10 and is being acquired by the Air Force. The KC-10 can perform an aerial refueling mission, carry significant amounts of cargo, or do both simultaneously.

The examination produced cost and operational comparisons.

- Using the same airlift requirements in two Southwest Asia scenarios, 7 to 8 DC-10s equated to five KC-10s for one possible set of closure times while 21 to 22 DC-10s equaled 15 KC-10s for another set.

- In terms of 16-year life cycle costs (LCC), the KC-10 LCC ranged 3 to 4 times higher than the DC-10 LCC if the KC-10 operations and support costs are added to the peacetime tanker training program. However, if KC-10 flying hours are substituted for KC-135 flying hours, the KC-10 LCC ranged from equal to the DC-10 LCC to two times the DC-10 LCC.

- To deploy a squadron of 24 F-15 aircraft and support personnel and equipment to Southwest Asia, seven KC-10s could support the deployment. Twenty KC-135s, six DC-10s and two C-141Bs (or one C-5A) would provide an equivalent deployment support capability.

Discussion

Comparisons of the aircraft operational characteristics and approximate acquisition costs are shown in Table 1. Both aircraft can carry certain oversize cargo, but neither aircraft can carry outsize cargo. The KC-10 is also capable of being air-refueled.

	DC-10-10	KC-10A	Difference
Maximum Takeoff Gross Weight (Lbs)	440,000	588,200	+ 34%
Fuel Capacity (Lbs)	145,851	348,255	+ 139%
Maximum Allowable Cabin Load (Lbs)	119,556	169,541	+ 42%
Approximate Acquisition Cost (FY 81 $M)	22-25	52-55	+ 108-150%

Table 1. KC-10A Compared to CRAF DC-10-10

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Figure 1 compares the range-payload of the KC-10 and DC-10. The KC-10's greater capacity in maximum allowable cabin load and fuel provide the reasons for the large difference in range-payload. Typical non-stop deployment distances from U.S. locations to NATO, Korea and Southwest Asia are indicated on the range scale. The KC-10 is capable of carrying its maximum allowable cabin load to Europe; the DC-10 allowable cabin load for a comparable distance, however, would be limited to approximately one-half of the KC-10's.

The DC-10 would require intermediate stops to airlift cargo to Korea or Southwest Asia. The KC-10 could carry approximately 25 tons of cargo to Southwest Asia without intermediate stops. Air-refueled, the KC-10 could carry its maximum allowable cabin load (85 tons) the entire distance as shown in Figure 1.

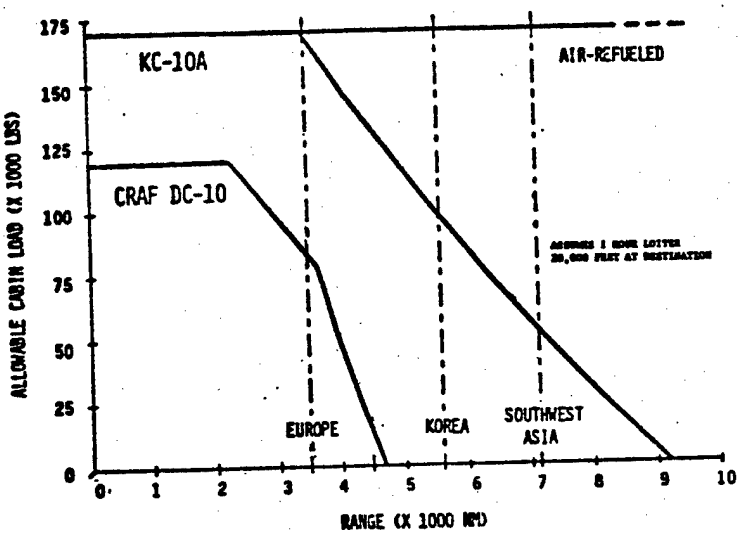

Figure 1. Payload--Range Comparison

Airlift requirements were determined for two postulated Southwest Asia scenarios. Desired closure time (days to meet the airlift requirement) was the major factor in the total number of aircraft required. KC-10s were added to a baseline airlift force of C-5s, C-141s and existing CRAF aircraft to achieve certain closure times. Replacing DC-10s for KC-10s in each scenario provided the comparison curve in Figure 2.

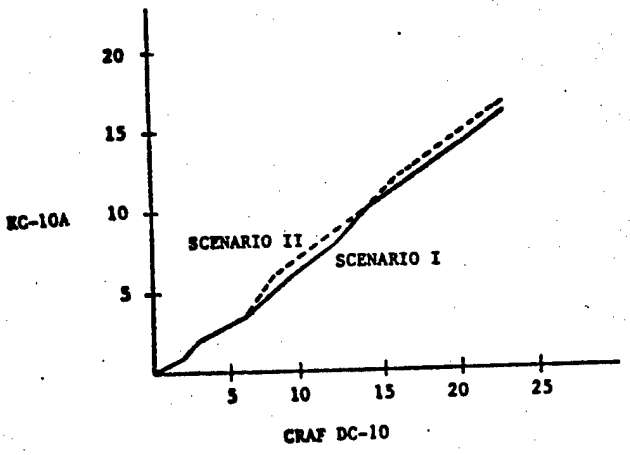

Figure 2. Number of Aircraft to Meet Equal Airlift Requirements

The economic comparision focused on 16-year life cycle costs (the length of the CRAF program proposal) and is contained in Table 2.

CONDITIONS	KC-10 FLYING HOURS ADDED TO THE EXISTING TANKER PROGRAM	KC-10 FLYING HOURS SUBSTITUTED FOR KC-135 FLYING HOURS
RATIOS	3 - 4:1	1 - 2:1

Table 2. KC-10A to CRAF DC-10-10 Life Cycle Cost Ratios

Further operational utility comparisons of the KC-10 and the CRAF DC-10 were assessed. Given a requirement for deploying a squadron of 24 F-15s from Langley AFB to Saudi Arabia (over 7000 nm), seven KC-10s are capable of deploying the fighters non-stop and airlifting 327 support personnel and 183 tons of equipment to the destination. Without KC-10s, the deployment would require twenty KC-135s for air-refueling fighters as well as six DC-10s and two C-141Bs (or one C-5A) for airlift; or if no DC-10s are available, then 12 C-141Bs (or four C-5As) would be necessary for airlift. Finally, since the KC-135 tanker force supports the single integrated operation plan (SIOP), KC-135 availaiblity at high DEFCON levels for support of non-SIOP forces may be limited.

Finally, certain factors were not analyzed that must be considered in the decision making process: (1) impact if the air-carrier terminated CRAF participation after 8 years (at his option in the 16-year contract); (2) availability of the CRAF DC-10 in times other than a national emergency; (3) impact on KC-135 aircrew training if KC-10A flying hours were substituted; (4) availability of the KC-10 to augment military airlift capability when required; and (5) residual value of the KC-10 after 16 years.