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AIRLIFT DIRECT DELIVERY --

A Definition and Some Modeling Considerations

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JANUARY 1986

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BACKGROUND

The words "Direct Delivery" have appeared frequently in Congressional testimony supporting Air Force airlift augmentation programs. The phrase also appears in the Airlift Master Plan and in corporate advertising in several periodicals with nationwide circulation. Regrettably, there is no commonly accepted definition of direct delivery in JCS Publication I or other official literature. Neither have any quantitative claims appeared regarding the effectiveness and measurement of direct delivery.

PURPOSE & SCOPE

This paper will propose a working definition of "Airlift Direct Delivery" for future inclusion in the official lexicon. In addition, by providing a framework for deployment modeling, the paper will show how the advantages of the direct delivery concept can be measured. Not addressed are the additional advantages of using a long-range airlift aircraft in an intratheater role nor the specific advantages of operations into small, austere airfields.

DISCUSSION

Definition

The following working definition is proposed:

Airlift Direct Delivery - Air movement of cargo and troops from out-of-theater airfields directly to those in-theater operating bases (landing zones, extraction zones, or drop zones) located nearest to desired final destinations.

Deployment Concepts

Intuitively, direct delivery is worthwhile because it enables deploying units and their logistical support to arrive at their objective areas more quickly, while shrinking the demand for intratheater lift and reducing congestion at large, in-theater airfields. A closer look at these concepts will lead to a method of measuring them.

First, consider the deployment problem sketched in Figure 1 below.

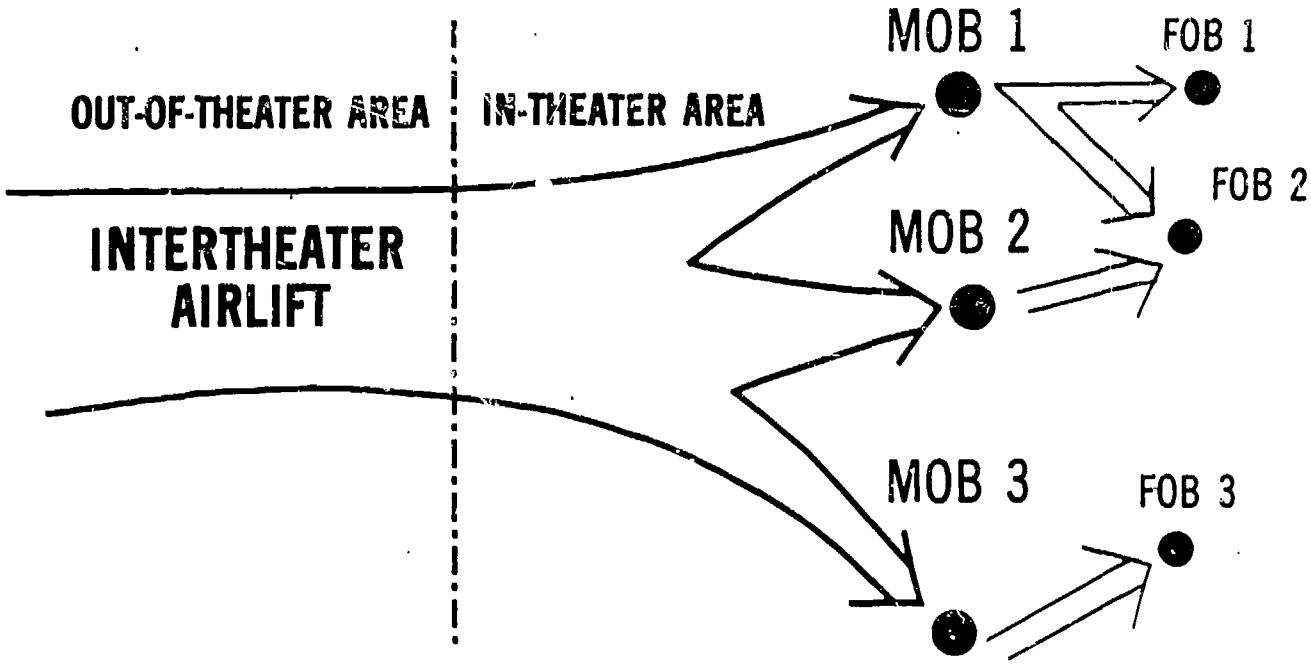

Figure 1. Traditional Airlift Deployment

Some portion of the material aboard the intertheater airlift fleet is needed at or near the forward operating bases (FOBs). But the FOBs may not be capable of accommodating all types of intertheater aircraft, due to short or narrow runways, lack of parking space, unprepared surfaces, or other restrictions. So the cargo needed at the FOBs must be offloaded at one of the main operating bases (MOBs) and then be lifted by air or surface modes to its final destinations.

If the FOBs are less restrictive or if some of the intertheater aircraft are more versatile, bypassing the MOBs may be possible, allowing direct delivery to the more austere, but favorably located, FOBs. The deployment diagram might then look like the sketch in Figure 2.

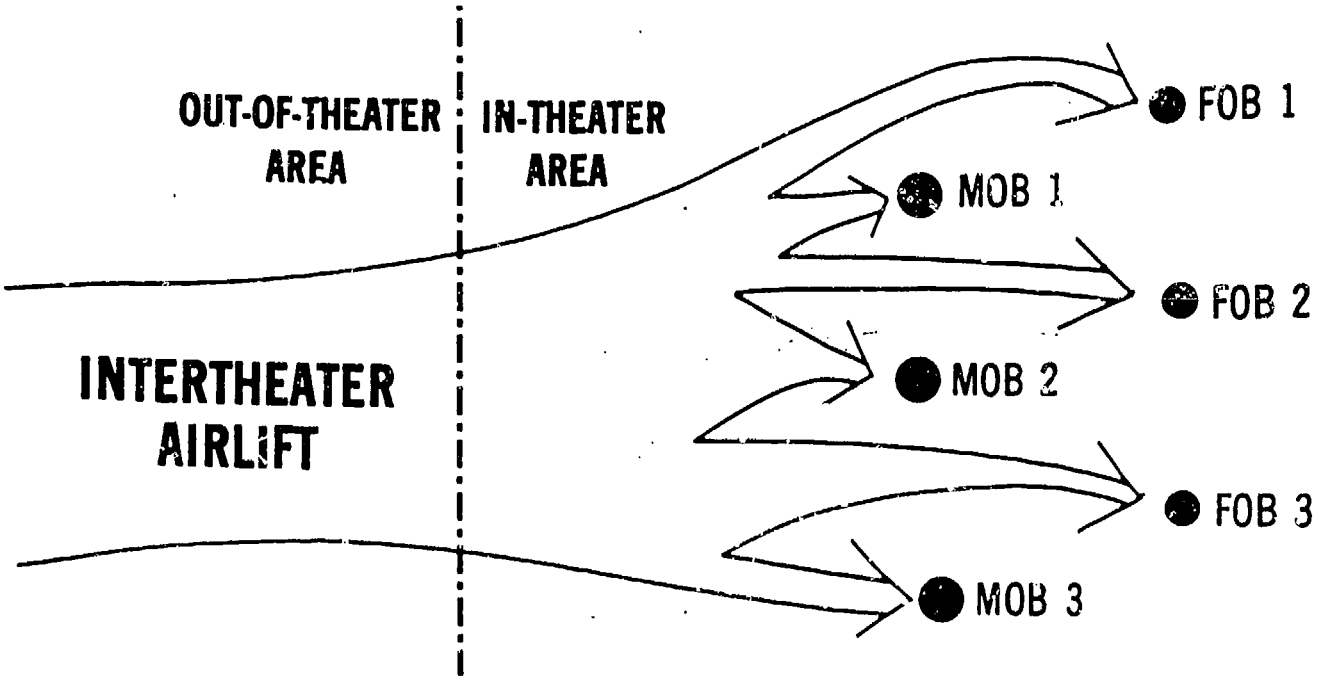

Figure 2. Airlift Deployment with Direct Delivery

Now imagine two intertheater airlift fleets. The first, a non-direct delivery fleet (NDDF), performs in the traditional manner (none of its aircraft can operate into the FOBs). The second, a direct delivery fleet (DDF), contains at least some aircraft that can operate into the FOBs. When the performances of the two fleets are compared, several differences will emerge.

- Units whose destinations are at or near the FOBs will probably arrive sooner when moving on the DDF than on the NDDF. (How much sooner will depend on the time needed at the MOBs to offload aircraft, to process the cargo, and to onload the intratheater surface vehicles or aircraft, and how much delay is incurred due to lack of readily available intratheater lift).

- Units whose destinations are at or near the MOBs will arrive at least as early via the DDF as via the NDDF. (Fewer intertheater aircraft and intratheater aircraft will compete for MOB facilities in the DDF case. MOB arrivals delayed by MOB saturations in the NDDF case would find less congestion in the DDF case).

- Demand for intratheater air and surface lift will be the same or less in the DDF case than in the NDDF case. (Whatever is delivered directly to the FOBs requires no lift from MOBs forward).

- Demand for cargo processing, loading, and warehousing at the MOBs will be the same or less in the DDF case than in the NDDF case. (This is due to fewer transshipments).

Modeling Considerations

The primary measure of effectiveness for any airlift force mix is unit closure - when deploying forces arrive at their final destinations. Unit closures will be affected by the available air network, by the size and composition of the air movement requirement, and by the characteristics of the airlift fleet. (The possible adverse effects of bad weather and enemy action can be modeled by adjusting airfield sortie capacities downward and by decreasing the number of airlift sorties or aircraft in the problem.)

A framework for modeling should include the specific data appearing in Tables 1 - 3 below. Then the performances of a DDF and a NDDF may be compared.

Table 1. Air Network Data

- List of in-theater MOBs and FOBs and last out-of-theater MOBs
- Distances from
  - -- Last offshore MOBs to in-theater MOBs
  - -- Last offshore MOBs to FOBs
  - -- In-theater MOBs to FOBs
- Daily sortie capacities of in-theater airfields (in C-130 equivalents or some other measure)
- Airfield restrictions by aircraft type

Table 2. Air Movement Requirement

- Force package list sorted by final destination
- For each package
  - -- Number of passengers
  - -- Outsize tons
  - -- Oversize tons
  - -- Bulk tons
  - -- Movement sequence

Table 3. Airlift Sortie Characteristics

- Intratheater Airlift Sorties
  - -- Average payloads/passengers
  - -- Block speeds from MOBs to FOBs
  - -- Daily aircraft utilization rates
  - -- Sortie capacities used
  - -- Number of aircraft available
- Intertheater Airlift Sorties
  - -- Daily in-theater arrivals
  - -- Average payloads/passengers
  - -- Sortie capacities used
  - -- Best possible routing

For each fleet mix, analysts should observe:

- Package and unit arrival dates at final destinations
- Intratheater lift demand (total tons, tons/day, airlift sorties, ton-miles/day, truckloads, or some other measure)
- Throughput at MOBs (daily and total airlift sorties of all types, tons and passengers transshipped)

When compared to a NDDF, a DDF should provide greater wartime effectiveness as evidenced by earlier unit closures at their final destinations. A DDF should also show the potential for lower peacetime acquisition and support costs for several reasons:

- Fewer intratheater lift vehicles will be needed because of lower lift demand (unless, of course, it could be shown that more intratheater lift would work effectively with a DDF in providing even better closure performance).
- Fewer lift vehicles means less manpower and spare parts.
- Lower throughput means less cargo loading and processing equipment and less manpower will be needed at the MOBs.

The effectiveness of other airlift fleet mixes, possessing varying degrees of Direct Delivery capability, may also be tested. Each simulated deployment should produce useful data on unit closures, intratheater lift demand, and MOB throughput.

SUMMARY

A proposed working definition for "Airlift Direct Delivery" is:

> Air movement of cargo and troops from out-of-theater airfields directly to those in-theater operating bases (landing zones, extraction zones, or drop zones) located nearest to desired final destinations.

An airlift fleet with some direct delivery capability offers two main advantages:

(1) Greater wartime effectiveness because of faster delivery both to main and to forward operating bases, and

(2) Potentially lower peacetime acquisition and support costs because less intratheater lift is needed and less cargo processing support is required for deployment.

The benefits of "Airlift Direct Delivery" are measurable if analysts examine the performance of alternative airlift fleet mixes under consistent assumptions about airlift requirements, the air network available, and airlift sortie characteristics.

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Unclassified
SECURITY CLASSIFICATION OF THIS PAGE

AD-A164 383

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: Unclassified	1b. RESTRICTIVE MARKINGS: None
2a. SECURITY CLASSIFICATION AUTHORITY: N/A	3. DISTRIBUTION/AVAILABILITY OF REPORT: Unlimited
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE: N/A	
4. PERFORMING ORGANIZATION REPORT NUMBER(S): N/A	5. MONITORING ORGANIZATION REPORT NUMBER(S): N/A
6a. NAME OF PERFORMING ORGANIZATION: Air Force Center for Studies & Analyses; 6b. OFFICE SYMBOL (If applicable): SAGM	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State and ZIP Code): Room 1D377, Pentagon, DC 20330-5420	7b. ADDRESS (City, State and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION: N/A; 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State and ZIP Code)	10. SOURCE OF FUNDING NOS. — PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT NO.
11. TITLE (Include Security Classification): Airlift Direct Delivery	
12. PERSONAL AUTHOR(S): MUEH, DAVID C.	
13a. TYPE OF REPORT: Final; 13b. TIME COVERED: FROM ____ TO ____	14. DATE OF REPORT (Yr., Mo., Day): 1986 January; 15. PAGE COUNT: 8
16. SUPPLEMENTARY NOTATION: An AFCSA White Paper proposing a definition and some modeling considerations.	

17. COSATI CODES		
FIELD	GROUP	SUB. GR.
15	07	011800

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number): Direct Delivery, Main Operating Base, Forward Operating Base

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

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20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS ☐	21. ABSTRACT SECURITY CLASSIFICATION: Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL: David C. Mueh	22b. TELEPHONE NUMBER (Include Area Code): 202-697-9245; 22c. OFFICE SYMBOL: AF/SAGM

DD FORM 1473, 83 APR — EDITION OF 1 JAN 73 IS OBSOLETE.

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE

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