The Fairchild Papers

Expeditionary Air Operations in Africa

Challenges and Solutions

Karen U. Kwiatkowski
Lt Col, USAF

The Fairchild Papers are monograph-length essays of value to the Air Force. The series is named in honor of Muir S. Fairchild, the first commander of Air University and the university's conceptual father. General Fairchild was part visionary, part keen taskmaster, and "Air Force to the core." His legacy is one of confidence about the future of the Air Force and the central role of Air University in that future.

Expeditionary Air Operations in Africa

Challenges and Solutions

KAREN U. KWIATKOWSKI
Lt Col, USAF

Fairchild Paper

Air University Press
Maxwell Air Force Base, Alabama 36112-6615

December 2001

Library of Congress Cataloging-in-Publication Data

Kwiatkowski, Karen U.
Expeditionary air operations in Africa : challenges and solutions / Karen U. Kwiatkowski.
p. cm. — ISSN 1528-2325
"Fairchild paper."
Includes bibliographical references and index.
ISBN 1-58566-100-7
1. United States. Air Force--Foreign service--Africa. 2. Aeronautics, Military--Africa.
I. Title

UG633 .K94 2001
358.4'1352'0973--dc21 2001053559

This Fairchild Paper and others in the series are available electronically at the Air University Research Web site http://research.maxwell.af.mil under "Research Papers" then "Special Collections."

Contents

Illustrations

Figure

Table

Foreword

Lt Col Karen U. Kwiatkowski's *Expeditionary Air Operations in Africa: Challenges and Solutions* details air operations challenges in Africa. She discusses how the USAF currently meets or avoids these challenges. She contends that Africa is like the "western frontier" of America's history—undeveloped, brimming with opportunity as well as danger, and that it is a place where standard assumptions often do not apply. Africa has not been, and is not today, a US geostrategic interest area. However, as the dawn of the twenty-first century breaks over a planet made both intimate and manageable by CNN and DHL Air Express, Colonel Kwiatkowski believes that the winners will be those who understand Africa and can meet the challenges of air operations on the continent first. Air operations, whether commercial or military, are critical to a continent that has a limited overland transportation infrastructure of roads, rail, and waterways. Sea and river access to most of the major population areas of Africa is possible and well used. But from a US military perspective, water transportation does not always provide the desired speed or flexibility for contingency or humanitarian response.

Africa is a continent connected overwhelmingly via airways, and the USAF will continue to use African airspace and air infrastructures. There are multiple perspectives on the numerous air and transportation challenges in Africa. The problems—whether air safety, navigation, ground transportation network and airport infrastructure immaturity, security, geography, culture, governmental mismanagement—are often presented as insurmountable. Ironically, the air transport situation is often seen as a problem that must be solved collectively by the 53 very different and very burdened states of Africa; and for this reason, unsatisfactory air operation infrastructures are accepted as a permanent handicap. A portion of Colonel Kwiatkowski's study is dedicated to illustrating how USAF air transport is *really* done in Africa on a daily basis, in hopes of shedding light on lessons the leadership of the world's most powerful air force may have missed. She recommends ways to

improve our ability to conduct expeditionary air operations on the continent.

Expeditionary Air Operations in Africa: Challenges and Solutions is an Institute for National Security Studies-sponsored research project by Colonel Kwiatkowski. Air University Press is pleased to present her essay as a Fairchild Paper.

Shirley Brooks Laseter

SHIRLEY BROOKS LASETER
Director
Air University Library/Air University Press

About the Author

Lt Col Karen U. Kwiatkowski

Lt Col Karen U. Kwiatkowski is a political-military officer assigned to the Office of the Secretary of Defense, Undersecretary for Policy, Office of African Affairs. Prior to her current assignment, she served on the Air Force Staff, Operations Directorate, at the Pentagon; the staff of the Director of the National Security Agency (NSA) at Fort Meade, Maryland; and has completed tours in Alaska, Massachusetts, Spain, and Italy. Colonel Kwiatkowski entered the Air Force in 1983 and was a recipient of a four-year ROTC scholarship. While she has served as a political-military officer for the past two assignments, her basic specialization is communications-electronics; and she has a secondary AFSC in logistics. She has an MA in government from Harvard, an MS in science management from the University of Alaska, and is currently a PhD candidate in world politics at Catholic University. Colonel Kwiatkowski has completed both Air Command and Staff College and the Naval War College seminar programs. She is married to Hap Kwiatkowski, and they have four children, Katie, Greg, Betsy, and Michael.

Preface

Africa is like the "western frontier" of America's history—undeveloped, brimming with opportunity as well as danger, and a place where standard assumptions often do not apply. Numerous air and transportation challenges exist in Africa, and the need for Air Force operations to be conducted there will remain and grow in the twenty-first century. The problems—whether air safety, navigation, ground transportation network and airport infrastructure immaturity, security, geography, culture, governmental mismanagement—are often presented as insurmountable. Of course, they are not insurmountable; USAF aircrews overcome the known problems and more every time they fly there.

The more important questions addressed in my paper are these: Is the USAF aware of the problems our aircrews face? Are we as an organization doing anything about them? Is what we are doing working? To answer these questions, I look first at known African civil aviation conditions, then examine the USAF recorded lessons learned on recent air operations on the continent. I also examine the kind of responses the Air Force as an organization is promoting to correct known deficiencies and solve problems. A survey of pilots and aircrews was conducted via the Web, gathering a wealth of data on what it is really like to conduct air operations in Africa. The results of this survey are included in their entirety at appendix A and are interesting reading. *Expeditionary Air Operations in Africa: Challenges and Solutions* makes several recommendations in two classes: the predictable organizational solutions based on traditional lessons learned—tending to be gradual and keyed on more funding—and the less traditional and more innovative recommendations that tend to be procedural and do not require extensive funding. Money needs to be spent, no doubt; but more than this, our lock-step thought process and ossified thinking about what we do—the flying business—needs to change. In the first category of recommendations, we must address the need for operational communications, air traffic control, and reachback on the continent. Air operations planning for African deployments needs to become more coordinated,

more aware, and more sophisticated. Our embassy support to air operations is critical, yet underfunded, undertrained, and undermanned. Security of airframes and people is paramount; and the dynamic impact of sustained mobility operations on aircraft, crews, runways, and airports must be understood.

In the second category, my recommendations include perhaps more simple, more focused suggestions. (1) Get the Global Positioning System and Traffic Alert/Collision Avoidance System on all airframes that fly in Africa. This has already been mandated, yet is not done, particularly for the aircraft most likely to see Africa flying time. (2) Activate defense and air attachés for improved air operations by assigning the right people in the right places and listening to their ideas and those of aircrews to improve this "saving grace" of African air operations. (3) Use commercial flight publications and practices when the USAF publications and practices are inadequate. (4) Improve airfield and security databases and information flow by listening, talking, and responding up and down the chain. (5) Share knowledge among the interested civil and military air operations community on Africa. (6) Take lessons on what works and adapt quickly. (7) Spend some USAF mental energy on creatively improving air operations and flight safety in Africa.

When we ask our aircrews to do dangerous missions, we rely on their courage, talent, and dedication. However, when a nation or a military service asks so much of its people, something is expected back. This paper should provide some of that back by recognizing and documenting the reality and crafting a way ahead for safer and more effective air operations in Africa.

Acknowledgments

This study is the result of the work of many people. I thank the Institute for National Security Studies for funding the research travel and my supervisors on the Air Staff and the Office of the Secretary of Defense for their encouragement. I thank Capt Kathy Amponin at Air Mobility Command (AMC) for her previous study on a similar subject; it sparked my curiosity and was very useful. Specific people were exceptionally helpful. Janice Missildine at the Air Mobility Warfare Center Library quickly and energetically found many things I knew existed and some items for which I had only hoped. Maj Pete Hahn and Capt Roman Isayiw were enthusiastic and inspiring, and they started me off on the right track. I am grateful for the assistance of Maria Aurora Hinayon—senior manager, Statistics and Data Processing, of the Airports Council International—who E-mailed to me her entire database of airport traffic information and was supportive of the research. Lt Col Mark J. Surina and MSgt Kenny of the Air Mobility Battlelab were very helpful, as were Maj Q Schlortt, Lt Col Joel Wheeler, Lt Col T. J. McCarthy, and SSgt Sean Horchoff at Headquarters AMC. Col Ken Menzie was instrumental in editing the final copy. Doug Rohn in Niger was a great source of help and inspiration, both in his survey and in person. I am deeply indebted to my family—Katie, Greg, Betsy, Mike, and Hap for doing their part to make sure everything else did not fall apart while I typed into the night for many months. I dedicate this paper to all the USAF men and women who fly in and out of Africa, doing what their nation has asked them, uncomplaining, quietly reliable, and courageous. I hope this research will be worthy of you and the work you do.

Chapter 1

What the World Knows about Air Operations Challenges in Africa

When thinking about air safety in Africa, what comes to mind for many Americans are the tragic accidents such as the September 1997 midair collision of a USAF C-141 and a German Tu-154 off the coast of Namibia, the deadly crash of a hijacked Ethiopian Air jet off the Comoro Islands in November 1996, or the Kenyan Airways crash out of Abidjan in February 2000. Accidents involving smaller aircraft—such as the Cape Verde Airlines charter in August 1999, the Tanzania sightseeing flight in September 1999, or the January 2000 Swiss charter crash off the coast of Libya—are worrisome. Perhaps the shootdown of the UN flight in February 1999 over Angola helps to form our image of African airspace insecurity. News reports of Guinean stowaways in wheelwells[1] or the June 1999 report of the Air Zimbabwe pilot being locked out of his cabin during flight complete the picture.[2] Or do they?

The challenges of flying in Africa are not mythological and punctuated by the spectacular but are instead well documented and often mundane. Because Africa is not a US priority for either commercial or military air traffic, focused and scientific attention of the systemic ills of air operations on the continent is largely absent. But for the USAF aircrews and passengers of more than 1,000 air arrivals and departures annually from African countries, recognizing, understanding, and acting on these systemic ills are critical.[3] In a twenty-first century that envisions increased US trade and travel to Africa and for a United States that stands ready with its world-class mobility capability to respond to humanitarian crises on the continent, understanding African air transport challenges is imperative.

The International Civil Aviation Organization (ICAO) in December 1996 reported a wide variety of air operations shortcomings in Africa gathered from several sources.[4] These improvement opportunities fall into a variety of categories, including airfield operations, air traffic control (ATC), commu-

nication, navigational and surveillance aids and services, aeronautical information systems, training or aeronautical professionalization, and procedures. Identified shortcomings the ICAO reported are summarized in table 1. These known challenges to air operations in Africa are reflected to some extent in the Federal Aviation Administration (FAA) Flight Standards Service International Aviation Safety Assessment (IASA) Program established in August 1992. FAA's IASA rates countries as "1" (meets ICAO standards) or "2" (does not meet ICAO standards). Of 95 countries rated worldwide, 10 were from Africa. Of these, Morocco, Egypt, Ethiopia, Ghana, and South Africa met ICAO standards. Five of 10 countries—Côte d'Ivoire, Gambia, Swaziland, Zimbabwe, and the Democratic Republic of the Congo (DROC)—received a "did not meet" rating. The other 43 African countries were not rated by IASA. Prior to 2000, IASA used a three-category system of "1," "2" (does not meet ICAO standards—conditional), and "3" (does not meet). These ratings were unchanged since the July 1998 IASA listing, with no conditional rating being upgraded to a "meet."[5] While direct flights between African and US airports are increasing—including to unrated Senegal—FAA IASA rating capacity has not matched this growth.

Table 1

ICAO Reported African Air Operations Observations

Category	Observation	Category	Observation
Aerodromes/ Airfield operations	insufficient control over persons, animals and vehicles due to inadequate fencing	Communication/ Navigation/ Surveillance	very high frequency (VHF) voice communications within 150 nautical miles (NM) of airport not implemented
	bird hazards		unreliable or unusable high-frequency (HF) radio
	deficient power supplies		instrument landing system (ILS) and very high frequency omni-directional radio-range (VOR) facilities listed in different stages of serviceability
	deficient fire and rescue services		lack of flight plans coordination between Flight Information Regions
	lack of personnel screening		
	unauthorized personnel accessing secure or restricted areas		

Table 1 (Continued)

Category	Observation	Category	Observation
	runway/taxiway inadequacies (rubber accretion, surface breakup, lighting unserviceable)		absence of VHF
			saturation of HF, poor or no HF reception
	inadequate apron lighting and layout		instrument landing system
			selective calling facilities not provided or inadequate
	unserviceable anomometers		
			bandboxing of VHF frequencies in busy areas—tower and en route frequency shared
	nontransmital of pilot reports		
			inadequate en route navigation facilities (inoperable or partially operative)
			NAVAIDs not provided or inoperable
			lack of precision approach aids
			noncalibrated instrument landing systems
Air Traffic Control (ATC)	nonimplementation of ATC service within 150 NM from airport	General Procedures	noncompliance with International Aviation Organization Standards and Recommended Practices
	nonimplementation of Air Traffic System (ATS) direct speed circuits (35 cases) or need for improved ATS direct speech ciruits (57 cases)		noncompliance with requirements notice to airmen (NOTAM) and all defective facilities
	inadequate traffic separation information (generally uncontrolled airspace)		lack of air traffic controller and air traffic communicator training and competency, to include language competency
	inadequate provision of air traffic control in “controlled airspace”	Aeronautical Information Service	nonexistent air in-flight publication (AIP)
			outdated AIPs
	frequent use of non-English communications, on HF and VHF, between ATC and pilots		missing aeronautical charts
			irregular NOTAMS
			inadequate or unreliable airport
			weather and wind information for approach and landing
			absence of or inaccuracies in surveys of surrounding areas.

IASA ratings, while useful, are not necessarily correlated with African countries’ share of air traffic volume. The Airports Council International (ACI) annually ranks airports around the world for passenger travel, cargo shipment, and volume (takeoffs or landings). In 1999, 833 airports were included in

the ACI survey. Six percent of the reporting airport participants are in African countries. Selected results of ACI airport rankings for African airports are summarized in table 2. For this paper, ACI surveyed African participants who are grouped by overall region (north, south, east, and west); and each region is presented in the order of highest reported passenger traffic volume to the least. Central Africa is absorbed in this group because most airflow in Africa is north-south and remains close to the relatively better radar coverage near the continental coastal nations and cities. Zimbabwe, DROC, Swaziland—all with FAA "does not meet" ratings—did not participate in the voluntary ACI survey nor did Angola, Senegal, Sudan, or Libya. Even with these absences, the data is useful in understanding air operations trends and status on the continent. While the worldwide average cargo flow increase was 14.6 percent, Africa averaged 12.1 percent growth. Worldwide average passenger traffic increased an average of 13 percent; African passenger traffic grew at a below average rate of 10.5 percent.[6] It is not surprising that growth in African air transport would lag the international average, given the economic condition and debt structure of many African states. Further examination of the ACI 1999 traffic trends for these 833 airports is more revealing. While African airports account for only 6 percent of the total participants, they represented 9.6 percent of airports reporting more than 10 percent annual growth in passenger flows, 9.2 percent of airports reporting more than 10 percent annual growth in cargo flows, and 8.6 percent of airports reporting more than 10 percent annual growth in total numbers of takeoffs and landings.[7] In the area of accelerated, double-digit percentage growth, African airports are overrepresented in all three categories collected by the ACI.

By examining the regional breakout, it is clear that for 1999 cargo travel increased at well over the international level for southern and northern Africa—while passenger travel was lower than average, and the increase in numbers of takeoffs and landings remained flat. Eastern and western Africa experienced lower than normal cargo flows, strong passenger traffic increases, and—in the case of West Africa—recorded well above the international average for takeoffs and landings. For

Table 2

Passenger and Cargo Traffic and Volume Growth for African Airports, 1999

CITY (AIRPORT)	TOTAL CARGO	% CHG	TOTAL PASSENGERS	% CHG	TOTAL MOVEMENTS	% CHG	Safe Skies	IASA Rating
			East Africa					
NAIROBI (Kenya)	126,621	7.60	2,668,217	13.50	45,624	9.90	Yes	None
ADDIS ABABA (Ethiopia)	30,135	-14.20	940,400	3.70	22,041	-5.20		1
MOMBASA (Kenya)	2,376	-25.30	889,543	9.50	19,386	-16.10	Yes	None
DAR ES SALAAM (Tanzania)	8,279	152.70	582,166	1.70	21,879	7.30		None
ENTEBBE (Uganda)	25,786	-16.10	448,528	0.50	20,872	-6.30		None
ZANZIBAR (Tanzania)	1,253	-7.50	232,902	9.80	12,907	1.60	Yes	None
KIGALI (Rwanda)	5,426	12.60	119,751	-3.10	11,426	15.30		None
ASMARA (Eritrea)	3,387	26.60	93,007	-25.80	3,070	-67.40		None
BUJUMBURA (Burundi)	3,735	-65.50	57,934	143.00	7,573	52.00		None
	Average	**7.88%**		**16.98%**		**(0.99%)**		
			North Africa					
CAIRO (Egypt)	221,327	5.90	8,302,212	16.70	86,953	9.60		1
CASABLANCA (Morocco)	45,995	5.10	3,421,445	8.20	49,321	6.10		1
TUNIS (Tunisia)	24,713	-3.10	3,373,025	-2.10	47,046	-0.30		None
ALGIERS (Algeria)	19,557	2.30	2,631,807	-2.70	34,412	6.20		None
JERBA (Tunisia)	1,214	-62.80	2,158,241	16.90	23,389	8.30		None
ASWAN (Egypt)	n/a	n/a	1,790,575	80.20	17,491	17.70		1
MARRACKECH (Morocco)	2,006	20.10	1,292,216	19.50	16,509	1.70		1
OUJDA (Morocco)	600	41.70	199,593	1.70	3,975	-1.30		1
RABAT (Morocco)	1,867	19.80	137,380	9.20	4,786	11.50		1
TAMANRASSET (Morocco)	384	0.00	111,595	-7.70	2,454	-12.60		1
TOZEUR (Tunisia)	30	32.70	105,996	-3.60	3,308	-1.50		None
OUARZAZATE (Morocco)	123	173.10	79,216	8.70	2,276	1.50		1
TABARKA (Tunisia)	3	61.10	60,372	34.50	1,030	10.50		None
SFAX (TUNISIA)	119	-13.40	57,530	-14.00	3,392	-20.30		None
GAFSA (TUNISIA)	4	n/a	4,913	n/a	252	n/a		None
	Average	**21.73%**		**11.82%**		**2.65%**		

Table 2 (Continued)

CITY (AIRPORT)	TOTAL CARGO	% CHG	TOTAL PASSENGERS	% CHG	TOTAL MOVEMENTS	% CHG	Safe Skies	IASA Rating
			Southern Africa					
JOHANNESBURG	300,886	1.20	11,339,920	4.70	154,435	1.30		1
CAPETOWN (S. Africa)	n/a	n/a	4,614,931	-9.40	83,418	12.40		1
DURBAN (S. Africa)	11,764	-32.90	2,523,899	3.70	43,926	4.40		1
NATAL (S. Africa)	8,665	29.10	1,011,027	8.10	22,854	10.30		1
ANTANANARIVO (Mozambique)	13,736	3.40	678,366	10.90	31,819	8.10		none
WINDHOEK (WDH) Namibia)	10,445	162.10	492,957	4.80	12,126	2.30		none
MAPUTO (Mozambique)	4,564	9.80	390,882	18.10	17,344	11.10		none
LUSAKA (Zambia)	14,265	11.50	341,361	0.40	23,770	-11.90		none
LILONGWE (Malawi)	4,593	-2.70	198,924	-4.00	8,881	-8.70		none
WINDHOEK (ERS) (Namibia)	n/a	n/a	107,952	-7.80	41,460	3.80		none
KIMBERLEY (S. Africa)	244	-0.30	84,165	30.70	9,552	-6.80		1
	Average	**20.13%**		**5.47%**		**2.39%**		
			West Africa					
LAGOS (Nigeria)	24,310	27.40	2,389,522	20.20	57,498	10.50		none
ABIDJAN (Côte d'Ivoire)*	23,537	18.20	1,250,968	6.50	23,628	0.80	Yes	2
LIBREVILLE (Gabon)*	15,474	-17.70	807,159	-7.30	38,766	-12.80		none
ABUJA (Nigeria)	437	21.70	687,466	20.60	20,316	29.60		none
ACCRA (Ghana)	46,758	9.50	673,661	16.40	12,036	53.10		1
DOUALA (Cameroon)*	15,631	2.20	434,744	6.90	14,821	-2.90		none
COTONOU (Benin)*	4,065	8.10	335,643	3.60	7,722	26.90		none
BANJUL (The Gambia)	3,232	-5.20	317,885	2.80	5,985	-16.00		2
CONAKRY (Guinea)	5,285	10.40	316,866	10.40	9,512	39.60		none
BRAZZAVILLE (Congo)*	10,563	-83.00	259,840	-13.90	12,460	-24.90		none
LOME (Togo)*	4,670	3.80	219,444	-1.40	3,173	6.30		none
YAOUNDE (Cameroon)*	4,371	20.50	179,345	57.70	4,608	-6.10	Yes	none
NIAMEY (Nigeria)*	911	-28.80	96,928	-9.40	4,380	-4.20		none
GAROUA (Cameroon)*	522	26.90	69,191	13.00	1,822	7.70	Yes	none
	Average	**1.00%**		**9.01%**		**7.69%**		
Overall Average Growth	**Cargo 12.1%**		**Passengers 10.5%**		**Volume 3.4%**			

*Agency for Air Navigation Safety in Africa and Madagascar members.

Source: Airports Council International World Airport Ranking, 1999, database received via E-mail from Maria Aurora Hinayon.

1999 these numbers reflect regional conflict, specifically disruptions relating to the Ethiopian–Eritrean war, ongoing unrest in the Republic of the Congo, and the regional impact of the wars in the DROC, Angola, and Sierra Leone. While this data represents a snapshot from 1999, air traffic has been increasing rapidly for most of Africa during the past several years. The removal of apartheid in South Africa fostered a large share of this increase. After 1994 multiracial elections, sanctions were lifted and the number of airlines serving the country grew from 20 to 80, with a doubling of air traffic and with a 300 percent increase in European–South African traffic.[8] The latest International Air Transport Association (IATA) *Freight Forecast* estimates that growth in international air freight traffic will average 5.5 percent per annum during 1999–2003;[9] all freight (domestic and international) traffic growth for African airports in 1999 averaged 11.85 percent.

More air traffic can signify more safety problems, even in highly developed air support infrastructures. An example of this impact is seen in air passenger death statistics. The United States, an example of a relatively well-developed air infrastructure, reported in 1996 a seven-tenths per million air passengers death rate. That year, Africa reported 15 deaths per million air passengers, a rate 21 times greater than that of the United States.[10] Other statistical trends that prompt FAA and Department of Transportation (DOT) alarm include not only the *number* of accidents but also the *types* of accidents that tend to occur in Africa. Accidents experienced by cargo planes as a result of poor runways and ground infrastructures predominate on the continent. Between 1987 and 1996, 53 such accidents occurred around the world—49 incidents, or 92 percent, occurred in Africa. For 1996 all 11 recorded cargo aircraft accidents took place in Africa. In part "this reflects the kinds of operations that they have had to carry out," such as support to refugees and deliveries of goods to hinterland airports.[11] According to the Flight Safety Foundation, Africa leads the world in "controlled flight into terrain" accidents.[12] Reporting of statistics from the Agency for Air Navigation Safety in Africa and Madagascar (ASECNA) is also alarming. ASECNA represents 15 largely west African states—including Cameroon,

Chad, DROC, Madagascar, Mauritania, Niger, and Senegal—and is managed with the significant participation of France. These seven ASECNA members had 33 of 77 near midair collisions in 1996.[13] Chad—where most north-south and east-west traffic meets—alone had 16.[14] The International Federation of Airline Pilots' Associations (IFALPA) reported that 75 percent of air traffic infrastructure in Africa is "unable to provide the services necessary for safe and expeditious operation of flights."[15]

Table 2 also indicates the countries that have received FAA IASA ratings and are participants in the DOT initiative, "Safe Skies for Africa." The FAA ratings—when correlated with regional traffic volume centers and the large list of countries not rated—show that major traffic centers are simply unknown or are known to be dangerous. FAA IASA ratings would be useful to have for those African countries that are experiencing stark increases in air traffic—specifically Nigeria, Benin, Guinea in the west, Kenya, Uganda, Burundi in the east, and Namibia in the south. The DOT Safe Skies for Africa program was implemented in 1998 to address the need for aviation safety improvement on the continent. Eight countries were invited to participate in the initiative, including Angola, Cameroon, Cape Verde, Côte d'Ivoire, Kenya, Mali, Tanzania, and Zimbabwe. The US government is in the process of sending teams to conduct surveys of the aviation needs of the countries selected and will assist them in developing work plans to improve and enhance their aviation infrastructure.[16] Safe Skies invitees—Zimbabwe, Mali, Angola, and Cape Verde—did not provide 1999 ACI air traffic data; and only two of five African FAA IASA failures, Côte d'Ivoire and Zimbabwe, are included in Safe Skies. The magnitude of the problem is clear, but the approach by US agencies toward improving aviation in Africa is noncomprehensive and uncoordinated.

Of the eight countries selected for the DOT program, five were specifically recommended by the Department of Defense (DOD) based on frequency of Air Mobility Command (AMC) sorties.[17] To get an idea of where the USAF flies in Africa, table 3 shows where AMC has flown in Africa since 1995. While theater-owned airlift is excluded from this data, the strategic mo-

bility pattern is helpful in understanding the challenges facing air expeditionary operations in Africa.

Table 3
Air Mobility Command Missions,
Selected African Countries by Volume Years

Country	# Total missions, past 5 years	1995	1996	1997	1998	1999	2000 to Aug	Safe Skies	FAA IASA	Air attaché
Egypt	2,716	368	621	558	570	393	206	No	Meets	RO
South Africa	474	18	11	25	131	66	223	No	Meets	RO
Senegal	436	27	127	91	99	61	31	No	N/R	none
Tunisia	290	20	70	62	40	57	41	Yes	N/R	RO
Kenya	199	0	39	14	35	63	48	No	N/R	OPSCO
Côte d'Ivoire	172	5	13	99	27	21	7	Yes	Fails	RO
Uganda	156	2	74	27	44	7	2	No	N/R	NRO
Mozambique	153	0	3	5	7	2	136	No	N/R	OPSCO
Ghana	143	2	7	34	32	13	55	No	Meets	none
Gabon	140	0	1	81	15	11	32	No	N/R	None
Cameroon	111	0	3	42	14	21	31	Yes	N/R	OPSCO
Djibouti	100	2	11	11	39	7	30	No	N/R	None
Sierra Leone	97	1	81	10	2	0	3	No	N/R	None
Namibia	95	3	2	39	18	24	9	No	N/R	NRO
Botswana	81	2	6	12	39	18	4	No	N/R	OPSCO
Chad	79	6	14	18	12	18	11	No	N/R	None
Zimbabwe	74	4	5	20	34	8	3	Yes	Fails	None
Tanzania	72	4	4	6	24	10	24	Yes	N/R	None
Mali	71	0	4	41	16	9	1	Yes	N/R	NRO
Rwanda	67	6	26	12	13	7	3	No	N/R	None
Congo-B	66	5	7	54	0	0	0	No	N/R	None
Ethiopia	66	6	12	20	25	1	2	No	Meets	None
Nigeria	64	1	4	4	6	14	35	No	N/R	NRO
Eritrea	62	5	12	23	18	2	2	No	N/R	OPSCO
Liberia	59	0	0	54	4	0	1	No	N/R	OPSCO
Algeria	42	4	10	9	7	6	6	No	N/R	OPSCO
Cape Verde	42	4	6	6	15	7	4	Yes	N/R	RO
Totals for higher volume locations	6,132	495	1,173	1,377	1,286	846	950			

Legend:
FAA—Federal Aviation Administration
IASA—International Aviation Safety Assessment
NRO—nonrated officer
OPSCO—senior noncommissioned operations officer
RO—rated officer

The evidence that flying in Africa can be risky is well documented. International pressure and encouragement are both present, in terms of FAA and ICAO initiatives and specific US government activities. It is fair to say that African countries are doing the best they can given their individual economic situations and the level of domestic concern that in most cases is not focused on improving air traffic safety, reliability, and satisfaction of international standards. It is also clear from the types of problems faced on the continent that regional, bilateral, and multilateral attention must be developed and coordinated to ensure limited air operations and infrastructure budgets are effective over time. Of the countries selected for the Safe Skies program, Kenya and Tanzania are contiguous—as are Mali and Côte d'Ivoire—and perhaps could share or mutually develop airspace management responsibilities. Safe Skies includes only three of 15 African ASECNA members (Cameroon, Côte d'Ivoire, and Mali) and does not include the larger countries of ASECNA. Of the countries marked by severe and persistent flight safety challenges, Chad stands out, yet is not addressed by any US program or initiative. The first century of human flight has ended with great achievements around the planet, but the twenty-first century dawns dangerously for African air operations.

Notes

1. Stephen Bates, "Dead Stowaways Left Plea for Africa," *The Guardian*, 5 August 1999, n.p., on-line, Internet, 25 January 2000, available from http://www.mg.co.za/mg/news/99aug1/5aug-stowaway.html.

2. Gaby Plattner, "Choppy Skies: A White Knuckle Flight on Air Zimbabwe," *Chicago Tribune*, 6 June 1999. This story appeared in the travel section and detailed a case where air passengers on an Air Zimbabwe flight witnessed the pilot being inadvertently locked out of his cabin. Reportedly, he gained access by using an ax to chop down the door to the cockpit. This story is disputed by Air Zimbabwe.

3. Air Mobility Command statistics. See table 3.

4. Kathy Amponin, "Flying in Africa," paper, Institute for National Security Studies, November 1999, 9–12.

5. "FAA Flight Standards Service International Aviation Safety Assessment Program (IASA)," 12 October 1999, n.p., on-line, Internet, 20 January 2000, available from http://www.faa.gov/avr/iasa/iasaxls.htm; and http://www.faa.gov/avr/iasaxls.htm, accessed September 1998. Note: This Web site accessed on 2 July 2000 indicates that the 1–3 rating scheme has been altered to "meets/does not meet."

6. Airports Council International (ACI) World Airport Ranking, 1999, calculated from database, also available from on-line, Internet, http://www.airports.org/.

7. Ibid.

8. Lara Pawson, "Africa's Deadly Skies," *African Business*, March 1997, 8–11.

9. "Muted Outlook for Air Freight," IATA Press Release PS/01/00, 12 January 2000, n.p., on-line, Internet, 25 January 2000, available from http://www.iata.org/pr/pr00janb.htm.

10. Pawson, 10.

11. Ibid.

12. James Ott, "Africa ATC Crisis Escalates," *Aviation Week and Space Technology*, 20 January 1997, 45–47.

13. James Ott, "Safety Groups Respond to African ATC Crisis," *Aviation Week and Space Technology*, 12 May 1997, 66.

14. *IATA Air Bulletin*, 30 January 1998, accessed 6 January 2000.

15. Pawson, 8–11.

16. "Safe Skies for Africa," FAA information sheet, 22 March 2000, n.p., on-line, Internet, 2 July 2000, available from http://www.intl.faa.gov/AIA-300/ssfa.html.

17. E-mail response to questions to Maj Dorotha Biernesser, March 2000, Headquarters AF/XOOA, Washington, D.C.

Chapter 2

What the USAF Knows about Air Operations in Africa

Continually increasing air traffic, poor safety statistics, persistent airfield and ATC problems, and a relatively sparse and nonsystemic international approach towards achieving regional improvement are the sad facts of African air operations. What does this mean for USAF expeditionary operations in Africa? The framework for US air operations in Africa is limited, not only by national interest and will but also by the effective ability of our air forces to operate in Africa. For example, in 1993 only 15 percent of all runways were reported to be able to support a heavy C-130, the USAF's smallest tactical transport aircraft.[1] Even among the 286 larger African airports or airfields currently reported in the May 2000 AMC Airfield Suitability and Restrictions Report (ASRR), only 84 percent of major military-surveyed airports can support C-130 operations. (African airfield data from the AMC ASRR, 11 April 2000—selected fields—sorted on country, then runway length—is found at appendix B.) The C-17, designed for better worldwide deployment, still requires a 4,000-foot-long paved runway and can land in less than 65 percent of ASRR-listed major African airfields. Col John L. Cirafici points out that third world runways tend to average 900 feet long.[2] For a variety of reasons, the bulk of the missions flown into Africa use C-130 and C-141 airframes, not the C-17. There are only 46 primary C-17 aircraft available in the USAF inventory today. Further, safety of flight, available support and fuel on the ground, and security and standards all compound the simple lack of suitable runways and defeat the advantage of the C-17's capability to provide worldwide response—at least to much of the African continent.

Recent Operations

Several recent air operations on the African continent provide some insight into what current and expected future air operations look like in Africa and some of the lessons learned. The USAF body of experience—from after action reports, interviews, and day-to-day operational procedures—can be instructive. Operation Restore Hope in Somalia (1992–93), Operation Support Hope in Rwanda (1994), Operation Assured Lift in Liberia (1996), and Joint Task Force (JTF) Eagle Vista—an operation deployed to support President William J. Clinton's 1998 visit to Africa—each provide a set of lessons learned regarding the kind of airlift intensive humanitarian style operations we can expect in Africa in the near term. Humanitarian operations Noble Response in 1998 and the more recent European Command (EUCOM) operation, JTF Atlas Response in Mozambique, provide additional information on how the USAF can better approach these kinds of operations.

Operations Provide Relief/Restore Hope, Somalia 1992–93

Operation Restore Hope involved the airlift of humanitarian aid into Mogadishu, Somalia, and represented the first major projection of forces by air mobility assets following AMC command activation in June 1992.[3] Lessons learned from the air mobility side of this operation were extensive and include issues of airfield management, flow control, and security. As seen eight years later with joint air operations in Tirane, Albania, for Operations Allied Force and Shining Hope, in a dual-use military/humanitarian airhead, support, security, and army forces often prefer to set up operations in close to the runway, taxiways, and parking ramps. In Restore Hope, Cirafici writes "As units poured into Mogadishu, many, out of necessity or convenience, established their operations on the airport proper, closing in around the runway and hard surface areas."[4] Additional operational problems (some of which recurred in Albania almost a decade later) included multiple chains of command and lack of consolidated airhead management—resulting in management shortfalls in the areas of air-

field real estate, flow control, ground security integration, and communications. Sustainment and support problems included fuel management, logistical support, and shelter availability.[5] One issue that recurred in the various forward operating locations (FOL) was poor initial condition of airfield, ramps, and runways and the impact of repeated heavy aircraft usage on these runways. Runway deterioration was a significant factor in Somalia; and this phenomenon has been observed in most other African operations where heavy lift aircraft, sustained cargo flow, and limited existent runway repair capabilities coincide. One Joint Universal Lesson Learned System (JULLS) submission for Restore Hope (1993) stated simply that all problems had been previously documented in JULLS, yet "[W]e end up paying again to achieve the same undesirable results."[6]

One Director of Mobility of Forces (DIRMOBFOR) end-of-tour report for Operation Provide Relief—the humanitarian relief operation under way from Kenya that served as a support for the insertion of troops during Operation Restore Hope—had several observations on Air Force C-130, Marine KC-130, British C-130, and German C-160 operations in Mombasa, Kenya. These included the competition for ramp and parking space and the challenges of maintaining four different C-130 models (often with further multiple configuration variations between active and Air National Guard aircraft). Credit for the success of the operation was given to the resourceful and talented people, particularly the "maintainer's creative thinking." The US Navy's logistics capability via a nearby carrier resolved some of the maintenance problems, particularly in the repair of an auxiliary power unit, as did the use of the contract carrier maintenance personnel at the Mombasa airport.[7]

Operation Support Hope, Rwanda/DROC 1994

In the summer of 1994, Support Hope represented the US military response to the massacre of 800,000 Tutsi and moderate Hutu by radical Hutu. This slaughter had ended in early May when exiled Tutsi from Uganda invaded and Paul Kagame's Rwandan Patriotic Front took over the Rwandan government. The defeated Hutu—including many former Hutu government soldiers—fled west to Zaire (now DROC) and

south to Burundi where conditions in the overcrowded camps there had deteriorated badly. The United States deployed 2,100 military personnel to the region and established a JTF headquarters at Entebbe, Uganda, with logistical operations in Goma and Bukavu, Zaire, Nairobi and Mombasa, Kenya, and Kigali, Rwanda. A 24-hour expanded air logistics site was implemented at Kigali International Airport, which served as the focal point for United Nations High Commissioner for Refugees / nongovernment organizations (NGO) coordination or activity and the hub for all relief flights in support of humanitarian relief operations. In support of the operation, the United States deployed a civil-military operations center, a USAF Tanker Airlift Liaison and Control Element (TALCE), other staff and logistical personnel, and a military police detachment for force protection of US military personnel.[8] Support Hope entailed around 700 sorties of C-141s, KC-135s, and C-5s, hauling 11,000 passengers and 23,000 tons of cargo between July and September 1994 in and around Goma, Zaire. Regionally, a total of six TALCEs were deployed to the region to support the air operation.[9]

Lessons learned and observations for air expeditionary operations extracted from after action reports include difficulties in gaining diplomatic clearances in a timely manner, difficulty in determining airfield capabilities, lack of air refueling tracks over the Mediterranean Sea for aircraft deploying to Africa, and communications frequency management shortfalls.[10] Recommendations for diplomatic clearance delays included commander in chief (CINC) awareness of the importance of advance notification of overflights and landings, efforts made to notify host nations as early as possible, and schedule stability in flight planning. Communications frequency approvals, like diplomatic clearances, require advanced planning and time—commodities often in short supply with USAF operations in Africa. The AMC ASRR lists basic information about the airfield; but it was noted that the theater command-specific information on airfields was not contained in the ASRR database, and often this information was extremely critical. Further, a simple lack of adequate air bases, both in the area and en route, was noted.[11] Billeting availability, current con-

struction projects, fueling capabilities, and aircraft parking information are information categories not always reflected in the ASRR. Consequently, this information for sometimes-obscure African airfields may or may not be available until rediscovered in the next contingency.

Fueling and air management challenges existed. It was noted that air refueling track availability could be improved by the allocation of "call up" tracks that support contingency flights to Africa from Europe. Currently, all Africa-bound missions refuel using the Greek corridor; and the maximum airflow is limited to 24 airlift missions per day through the refueling track. Other refueling choke points (on the ground) existed at Mombasa, and it was noted that "putting more assets (crews/aircraft) into an airflow won't improve throughput if there are other limiting factors."[12] It was observed that not moving ATC personnel forward initially exacerbated an already problematic airflow/air control situation. The lack of radar control in the area resulted in the need for manual terminal approach control, mobile radar capability, and possibly operational improvements such as traffic sequencing. The US Air Forces Europe (USAFE) Terminal Procedures were credited with being the most up-to-date information on the African airfields, and aircrews were encouraged to use them even though they may not have agreed with published data.[13]

The limitations of the forward-deployed communications suite was noted, both in capability and in terms of the outsized cargo airlift requirements. The absence of a forward and modern fax capability was problematic for the JTF because in Europe and the United States, the fax is every man's data transmission tool. Lack of access to the global decision support system (GDSS), an air mobility real-time Internet-based database, was noted as an impediment early on in the deployment. Beyond equipment, commercial telephone lines in Uganda were procured by members of the joint special operations task force (JSOTF), not by the Defense Information Systems Agency support staff in EUCOM (Defense Commercial Communications Office), the organization with the mission to procure leased telecommunications for the EUCOM area of responsibility (AOR), including Africa.

Other observations included deployment without sufficient sustainment, particularly a 30-day chemical supply for the water purification equipment.[14] Requirements for sustainment were not built into the deployment database; and visibility in sustainment actions needed, ongoing or planned, was limited throughout the JTF. FOL hazardous material storage was accomplished inappropriately. It was observed that deployment of personnel to the JTF used the "warm body" technique, resulting in a lack of strategic and tactical airlift expertise of the JTF staff.[15] These types of problems stem from a lack of planning and resourcing, that in turn relates to the reactive nature of most of our deployments into Africa. However, while expected, this lack of planning and resourcing is inconsistent with USAFE's *Strategic Vision* statement—which includes an entry on rapid global mobility which provides "airlift, aerial refueling, and en route infrastructure capability to respond within hours of a tasking" and an entry on agile combat support that can enable "robust, distributed military operations with time definite sustainment."[16] In discussing lessons learned in Rwanda, John E. Lange writes in *Parameters* that "The U.S. military will need far more than 'focused logistics' to be fully successful when it is selectively engaged in providing humanitarian aid. It will require stronger commitment from its leadership, stronger support in Congress, and closer cooperation with civilian agencies on both the nature and termination of its humanitarian mission."[17] The Support Hope after action report described the problems, many of which had been previously identified elsewhere. It reports simply "We don't learn or read previous 'lessons learned.' "[18]

Operation Guardian Assistance, DROC/Rwanda 1996

Operation Guardian Assistance was conducted two years later, in November and December 1996, echoing Operation Support Hope in location and purpose. The JTF was sent to assist in diffusing an expected refugee crisis in the Kivu region of eastern Zaire (DROC) and Rwanda, caused in part by the continuing low-level warfare between Rwandan Hutu, Zairian Hutu, and former Rwandan Armed Forces soldiers (who con-

trolled many of the camps remaining in the area since the 1994 genocide), and the government-backed Rwandan and Zairian Tutsi. Recent actions by both Zairian and Rwandan governments had exacerbated the situation, which to the West appeared to threaten a replay of events in 1994. The US operation never exceeded 400 people in the region, but a variety of air operations lessons learned were documented. These included a wide range of planning, personnel, deployment communications, fuels, and airfield or flight issues.[19]

Communications challenges were recorded. A need for land-mobile radios and cell phones went unsatisfied due to the diverse units and physical separation. The use of local commercial communications should have been planned and utilized. Availability of electrical power and generation capability was extremely limited. The need for a local unclassified message dissemination system and access to the Internet was identified, particularly in the lack of access to the GDSS and personnel management systems. A shortage of laptop computers and appropriate software was also noted, as was the slowness and limited throughput of the DSN switch deployed as part of the secure tactical communications suite.

Personnel deployment problems were noted. For example, some deploying personnel did not have passports; and reliance on a military identification card, as in NATO countries, was not sufficient. The operational assumption that single aircraft with two aircrews deployed forward in Africa results in a ready aircraft or crew combination was criticized, with the comment "splitting up that deployment team [of two aircraft and crews] jeopardized both missions, which could have failed from a broken aircraft or sick crewmembers."[20] The air operations center (AOC) was staffed by rated personnel but was devoid of airlift expertise. In Africa the Air Force operations are almost always airlift intensive and airlift focused; but this is not the typical orientation of the AOC manning profile, a construct designed to manage fighter or bomber sorties and deliver a deadly payload, not humanitarian aid. Load planners were also poorly represented in the JTF; and, as a result, all load planning for redeployment was performed by the TALCE. The contracting agents deployed with the advance Humanitar-

ian Assistance Survey Team (HAST) and also with the AMC TALCE were not authorized paying agents and did not have the ability to procure contract quarters, vehicles, et cetera.

Air operational issues persisted. Lack of fuel storage and mobile refuelers limited overall fuel throughput, and strategic mobility aircraft were not allowed to refuel at Entebbe but were required to come in with fuel sufficient to fly on to refuel at Mombasa or Nairobi. Because the aircraft fuel situation in the region is limited and infrastructure for fuel transportation minimal, "[a]ny operations within [Central Africa] must be looked at from a 'big picture' perspective as any heavy uplift of fuel from any one location will seriously impact numerous other locations along the fuel lines of communication (domino effect)."[21] Airfield facilities, navigational aids (NAVAID), and procedures often did not meet US standards. Coordinated airspace with host nations and diplomatic clearances were often difficult to achieve and in some cases not achieved during the operation. The lack of current and complete airfield surveys was noted, resulting in a "last minute rush to accomplish needed surveys and flight checks critical to safe operations. In addition, different planning organizations had different data, which could be a fatal flaw for any plan."[22]

Operation Assured Lift, Liberia 1997

Only a few months later, the USAF would have another opportunity to conduct a relatively small air operation in Africa. Operation Assured Lift, conducted in January and February 1997, organized the transport of the Economic Community of West African States Military Observer Group (ECOMOG) troops supporting ongoing peacekeeping operations into Liberia. Assured Lift followed a US noncombatant evacuation operation (NEO) from Monrovia that had taken place almost a year earlier in April 1996. While the NEO itself was conducted by 352d Special Operations Group helicopters,[23] Assured Lift was led by the Air Force; and the Third AF (3AF) commander was in charge of the JTF. The staging base was determined to be Abidjan, Côte d'Ivoire; and jointness was established with the participation of Special Forces French language-capable troops and combat control teams to coordinate airfield secu-

rity and provide liaison or coordination elements at three departure fields and at Roberts International Airport (IAP) in Liberia.[24] A fleet of five C-130s deployed to Abidjan to fly up to 48 missions shuttling soldiers and equipment from ECOMOG countries into Liberia. C-130s departed from Abidjan for Bamako, Mali, to pick up ECOMOG troops and equipment, fly them to Roberts, conduct an engine-running offload, and return to Abidjan with a similar pattern established for Ghanaian troops from Accra.[25] A total of 49 sorties carrying troops and equipment were flown into Liberia—29 missions from Mali and 21 from Ghana—moving a total of 1,160 passengers and 452.1 short tons of equipment.

Major challenges included less than suitable airfields, particularly Roberts IAP, and satisfying maintenance and personnel health issues in the forward locations. Rationale for choosing Abidjan as the staging location over other bases, such as Bamako, Mali, was heavily argued. The US ambassador to Mali pointed out Mali's offer to waive airport fees and to provide cheaper fuel and less congestion. Abidjan, however, was deemed more centrally located and provided the most flexibility in terms of "aircraft operations and for beddown taking care of people, quality [of] life."[26] A JTF force protection working group was formed to address issues of physical security, health and safety threats, and emergency procedures.[27] In the case of Assured Lift, some experiences and lessons learned from Operation Guardian Assistance were adopted, particularly in the communications arena.[28] A robust portable communications suite, including mobile radios, STU-III phones, a laptop computer, an ultrahigh-frequency (UHF) tactical satellite, and an international marine/maritime satellite (INMARSAT) were deployed. Because Assured Lift was conducted under a strict operating budget, the impact of various airframes on the cost of strategic airlift from CONUS for major equipment and repair parts was noted. A cost was incurred due to the USAF requirement to build up existing airfields such as Roberts IAP to support C-5 and C-17 strategic airlift operations. A C-5 aircraft was used for redeployment because a broken C-130 had to leave behind some of its expected redeployment cargo, raising the remaining strategic lift mission tonnage requirement be-

yond the load capacity of a cheaper and more efficient C-17.[29] Further, Roberts IAP was not militarily certified for C-17 operations until the C-17 verification flight was flown into Roberts IAP on or about 5 March 1997, after the JTF had conducted limited repairs on the runway. This check-flight aircraft was used on its return flight to redeploy some of the JTF personnel and equipment.

Operation Guardian Retrieval, DROC/Gabon 1997

In the spring of 1997, fighting in Rwanda and Zaire (DROC) had resulted in unstable conditions, impacting the existing refugee camps and the NGOs working in eastern Zaire. Between 21 March and 20 April 1997, 1,361 passengers and 1,365 tons of cargo were moved by Operation Guardian Retrieval in support of a possible NEO of American citizens and others from Zaire. One source described the challenges of this operation as illustrating a typical African military operation handicapped by lack of transportation infrastructure and vast distances.

> Re-supply for remote facilities can take several days to transport jet fuel one way, in extremely difficult terrain. Limited bridger support (truck-transport) and small storage tanks are commonplace . . . the Air Force planned missions through Libreville, Gabon, expecting a certain amount of fuel based on contractor stated capabilities. Their capability was nowhere near this quantity, and the airport even ran out of fuel at one point.[30]

While an Army-led operation that called for the use of the 26th Marine Expeditionary Unit (MEU), this operation was airlift intensive and involved many strategic mobility aircraft—including 28 C-5, 8 C-17, 18 C-141, and 20 KC-135 missions—with another 44 KC-135 missions flown for support. USAFE aircraft also participated. Recorded official lessons learned discussed a lack of hazardous cargo storage capability at forward locations, including Libreville, Gabon, and Brazzaville, Congo, and limited fuel and aircraft parking at staging bases. This time, a mobility planner was deployed to provide improved theater mobility expertise to the theater CINC staff.[31]

Operation Noble Response, Kenya 1998

Operation Noble Response provided humanitarian assistance airlift in Kenya in late January and February 1998 in response to a regional crisis caused by flooding. An airdrop capability was expected to be used, as some critical areas were inaccessible. This short-notice US Central Command (CENTCOM) operation augmented a World Food Programme (WFP) contract relief effort that had been ongoing since December 1997. It placed US forces in a coalition operation with two Belgian C-130s and a Nigerian-based L-382 supporting the ongoing WFP efforts. As seen in the much larger Operation Guardian Assistance, the nature of the mission and objective was not entirely clear to the aircrews prior to the execution order. Noble Response included a C-130 with two aircrews and provided 294 tons of cargo, 94 percent of which was relief aid.

The humanitarian delivery operation included both airland and airdrop delivery. The airland delivery missions flew out of Mombasa with eight 4,500-pound (lb) bundles of 110 lb bags of grain and 30,000 lbs of fuel. The C-130 would land heavy (148,000 lbs) at Wajir, Kenya, and conduct an engine-running combat offload. The combat offload basically moves the aircraft out from under the load to be delivered, stressing both the engine and brakes. The maneuver requires space on the ramp or runway to accommodate the suddenly light, rolling aircraft, which immediately reverses thrust to prevent takeoff or contact with obstructions. This operation was made difficult by the congested parking area at Wajir, the heavy weight of the aircraft and load, and high temperatures. Brake and oil overheating was a constant risk and did occur. The airdrop aspect of the mission was conducted at 650 feet above ground level—with the same eight 4,500 lb bundles and no parachute—to drop zones spread throughout eastern Kenya. WFP personnel manned the drop zones; and they would find dry land, get Global Positioning System (GPS) coordinates, mark the drop zone, and coordinate drops.

Prior to deployment, aircrews scoured data support systems and the Internet for existing flight publications; packed meals ready to eat, water, malaria tablets and stomach drugs, and deployed with a container delivery system kit and a laptop com-

puter. Jeppesens (commercial flight information publications [FLIP]) were not available for the required airfields, and the aircrews planning the mission focused on self-sufficiency before entering "an aviation wilderness."[32] Upon arrival in the area of operations, it was noted that flight planning and weather was "African style";[33] and facilities were decaying, particularly at some of the forward locations, such as Wajir Airfield. ATC was reported as reasonable around major airports and nonexistent elsewhere. A common traffic advisory frequency was used, and language difficulties were commonplace—even in Kenya, a country where English is spoken.[34] Ground services were noted as difficult to get unless the embassy interceded.

Other air operations challenges included the inability to replenish liquid oxygen and to get spare tires and a replacement altitude instrument. The heavy landings, heat, and physical strain on the aircraft of this mission were hard on the airframe; and 20 aircraft write-ups were completed upon return. E-mail proved invaluable to this operation. While a small operation—with its short notice, aid-oriented nature and aircraft utilization—Noble Response illustrated many of the air operations challenges faced by US aircrews in Africa.

Operation Eagle Vista, Multiple Locations, 1998

JTF Operation Eagle Vista was conducted to oversee US military support for President Clinton's visit to six African nations, 23 March to 2 April 1998. An 800-person task force supported air operations in Ghana, Uganda, Rwanda, South Africa, Botswana, and Senegal from 12 operational support locations across four time zones; and 2,346 passengers and 2,948 tons of cargo were moved using 93 strategic airlift, 39 theater airlift, and 105 air refueling operational missions. Theater airlift included four C-130 aircraft and 13 US Marine Corps and Army helicopters; and the JTF also tracked the intercontinental movements of C-141, C-5, and C-17 sorties. Additionally, the JTF was assigned a C-21 and a C-9 and administrative control of a MEDEVAC-configured C-141.

Like Operations Support Hope, Guardian Assistance, and Assured Lift—and as we will see in Atlas Response—Eagle

Vista did not have the luxury of a geographically, culturally, and logistically focused or local area of operations. What the military normally considers theater airlift looks a lot like strategic airlift when you compare the approximately 3,800 air miles between the US East Coast and Ramstein Air Base (AB), Germany, with the almost 6,000 air miles between Ramstein and Capetown, South Africa, and the 4,200 miles from Ramstein to Entebbe, Uganda. Additionally, this operation—while not an emergency—was time sensitive and in this way resembles most emergency response and humanitarian operations we see in Africa. Eagle Vista reflected an unusually extensive multinational coordination effort for the United States, with much less time to prepare than normally available for even bilateral exercises in the region.

Eagle Vista recorded communications, force protection, environmental, and operational coordination lessons learned. Command, control, and communications were remoted back to the Crisis Action Team Cell at Ramstein AB, where a 30-member JTF headquarters element maintained contact and provided direction and support to about 600 airmen, soldiers, sailors, and marines supporting the operation down range. The commercial INMARSAT system was critical to communications and the ability to reachback to the command cell. Self-sufficiency was desired; and all required communications, medical, and aircraft support equipment was flown into the various staging areas. This massive lift of equipment prompted a recommendation that future similar operations do not discount up front the capability of commercial air to move assets. Some presumed self-sufficiency in airlift may have been, in fact, unnecessary—or at least equally satisfiable using commercial airlift.

Medical readiness was a priority. The medical team carried 20 units of blood throughout Africa, and keeping the blood within the correct temperature range throughout the hot African climate was a real challenge. A large quantity of ice was needed at every stop; at some places this was very difficult to obtain. A small refrigerator was deployed to store this blood, but it could not be used consistently on all the aircraft because of electrical power incompatibility. Additional air-

crews were deployed for emergency response capability, but it was not enough. Because of environmentally induced illnesses, the aircrew readiness rate was lower than expected. Due to the simple geographic difficulty in getting replacement support people or on-site immunizations on short notice, food contamination response and advance immunizations for the forward deploying teams became more important.

Operating, fueling, and supporting heavy aircraft was particularly challenging. Aircraft support and navigational or landing fees from commercial airports were 30 percent higher than expected, often due to the unique aspects of these larger aircraft; and neither American Express nor Visa was always the solution. Extensive precoordination on logistics for both aircraft and people was required, with a unique set of customer relationships established for every one of the more than 10 African FOLs. Aircraft performance in Africa—regardless of the time of year, at any location where temperatures exceeded 20 degrees Celsius or field elevations are high—was a concern. Detailed study of airfield data such as runway length and field elevation was required in advance. Radar and radio coverage in some parts of Africa traversed was noted as limited and less than optimal. In addition to these challenges, diplomatic country clearance for aircraft redeployment up the east coast of Africa through Cairo and Italy was sporadically problematic.

The US Transportation Command commander sent an after action message to the vice chairman, Joint Chiefs of Staff, with information copies shared with the highest levels of the Air Force, shortly after Eagle Vista. It detailed initial "disturbing" feedback on African airspace, specifically that "Radio coverage is inadequate. . . . Radar coverage was inadequate. . . . air traffic controllers in African airspace are substandard in many cases . . . on numerous occasions air traffic controllers could not or would not speak English, the accepted ICAO language."[35] Several near misses were detailed in the message, and it concluded with a reiteration of the need for the Traffic Alert/Collision Avoidance System (TCAS) on the entire AMC fleet.

Operation Atlas Response, Mozambique/South Africa 2000

Operation Atlas Response commenced in response to torrential rains and flooding in southern Mozambique and South Africa with the deployment of a EUCOM HAST to Mozambique and South Africa on 18 February 2000. Atlas Response was chartered on 3 March to support humanitarian assistance and disaster relief in southern Africa, to include Mozambique and neighboring states as required. South Africa agreed to provide Hoedspruit military airfield as an intermediate staging base for the humanitarian relief operation. A C-5 carrying part of a TALCE arrived in Hoedspruit, South Africa, on 5 March. That same day the first two C-130 aircraft arrived with "Keen Sage" imagery capability.[36] After flying 216 missions, transporting 860 passengers, and delivering 754 tons of relief supplies, Atlas Response concluded at the end of March.[37]

The DIRMOBFOR After Action Report noted a lack of strategic mobility resources available to Atlas Response due to the presidential trip to Pakistan, India, and Bangladesh.[38] Nonmission-capable C-5s at the commercial Johannesburg Airport strained host-nation relations at one point, and longer waits than normal were required for even the highest priority parts delivery to points forward. Other observations from this humanitarian and airlift-intensive operation in southern Africa include reachback communications capability, the need to travel light yet still be self-sufficient, streamlined coordination of forward operating bases and locations, and reliability of mobility aircraft on the extremely long routes required to fly from Europe and the United States to this part of Africa. At one point, C-5 aircraft in support of Atlas Response were nonmission-capable and grounded temporarily in Cairo, Egypt, Accra, Ghana, and Nairobi, Kenya.

Diplomatic delays occurred in getting clearance into Air Force Base Hoedspruit. Interestingly, many planners had no idea where Hoedspruit was or its support capabilities at the beginning of the planning process; and in fact the South African military had proposed closing the base two years earlier, when the South African Air Force (SAAF) 1st Squadron of fighters deactivated. Due to this unit's deactivation and the

SAAF desire to keep the base open, it had leased its facilities and airspace in the interim for short training periods to the Singapore air force and was ready to quickly assume combined air operations support duties.[39] While the use of Headquarters USAFE Contingency Response Group and the Crisis Action Team Cell at Ramstein AB was invaluable, an after-action recommendation for communications included a 3AF, RAF Mildenhall, United Kingdom, request for a light and lean forward communications suite called the reduced footprint initial communications (RFIC) package.[40] The JSOTF headquarters in Biera, Mozambique, deployed with a theater-deployable communications (TDC) suite, consisting of self-contained data and voice communications using only four pallets and two generators. Atlas Response demonstrated the TDC, for the first time ever, as a primary backbone of a forward communications capability in a humanitarian operation.[41] However, the desired RFIC provides voice, Internet, and Secure IP Router Network for up to 24 users and deploys at 1,800 lbs on one-half a pallet. Beyond communications challenges, medical care for US and other military personnel in southern Africa focused on minimizing the disease threat of mosquito-borne ailments, such as malaria and dengue fever (for which there is no vaccination). Finally, manual or hand loading of equipment and relief supplies at Hoedspruit for delivery to Mozambique locations was sometimes required due to limitations in or lack of specialized ground equipment.[42]

Lessons Learned Trends and Indicators

African airlift-intensive operations in the last decade have produced a variety of air expeditionary lessons learned and recorded by the standard methods of after action reports or postoperational studies. These recorded lessons tend to be operationally or system oriented and can be encapsulated in the following categories.

Command, Control, Communications, and Coordination across Multiple Locations. The need for smaller, more capable, more networked, cheaper, and easier to use voice and data communications is repeatedly noted. The airlift-intensive major communications systems used by tactical combat com-

munications units are both deficient in desired capability and excessive in weight and bulk. Ease of leasing local communications capability is lacking and may be the logical direction to proceed, particularly in humanitarian operations where classified information or data is not at issue.

Air Operations Planning, Airfield Suitability, Coordination and Matching of Appropriate Support Equipment, Airfield and Airframe Requirements. Airfield and weather information from supporting command, AMC, and commercial sources can be inaccessible for military aircrews. It is apparently impossible to find all in one place for a quick data pull prior to a short-notice mission. Forward maintenance and logistics support capability for various airframes, poor local runways, support, fuel, and infrastructures greatly restrict flexibility to support air operation scheduling and planning for Africa. Further, limited airframe suitability of various locations in Africa is magnified by limited airframe availability in the command or in the CONUS.

Diplomatic Clearance and International Coordination and Contracting Issues in Forward Locations. Getting diplomatic clearance and coordination is compounded by short-notice response missions, the expanse of the airspace over 53 African countries, and the lack of long-term relationships between the USAF and many African air forces and governments. Further, incomplete or lacking air operations expertise in the US embassies and general instability or corruption in some African governments can make life difficult for air operations planners and aircrews.

Operational Security and Force Protection Issues. Security for airframes on the ground, appropriate health maintenance and precautions, operational safety issues, secure and appropriate storage for hazardous material, and medical care forward remain constant worries.

Dynamic Impact of Expeditionary Air Operations. Runway conditions degrade over time, as does airframe or aircraft performance under conditions of excessive heat, poor runways, foreign object damage, and impure or unreliable fuel sources. Expeditionary air operations are further challenged by less than optimal aircraft maintenance, ad hoc operations

with coalitions of other militaries, and operational demands placed by nongovernmental and civilian international organizations.

More general issues pointed out by these past operations include a growing resource crunch. At the peak of Restore Hope, 14 C-130s were dedicated to theater support. Assured Lift required five dedicated C-130s; Eagle Vista, six; and at the peak, almost all available USAFE C-130 aircraft (seven) were at one point dedicated to southern Africa.[43] The workhorse of African airlift is the C-130, and this versatile airframe is now approximately 45 years old. The next generation global mobility airframe, the C-17, has not yet seen extensive usage in the African theater. As mentioned earlier, only 181 of 286 African airports listed in the current ASRR are suitable for C-17 operations. Beyond that, the known risk to airframes flying in Africa may result in a prudent tendency to preserve these flagship aircraft for more operationally safe and secure locations.

Many aspects of air operations are captured in these after action reports, although one can see that the lessons have to be extracted from a variety of sources, most of which are not available to the average airman in a unit who is planning that next short-notice deployment to Africa. Additionally, the lessons learned miss a great deal of what the operators themselves experience because official after action reports are generally written by commanders, staff officers, and historians. But significantly, two major themes are missing. First of these is the nature of air operations—the actual flying—that is required in Africa. While mention was made in some reports of the difficulty in coordinating airspace, the lack of radio and radar coverage, and diplomatic clearances to land and traverse airspace, there is a cumulative sense that this is the odd problem. In fact, this is a systemic problem for air operations in Africa, but it is rarely captured because it is rarely a direct problem for the command and control side that tends to record the after action reports. The second theme that is not captured effectively is the adapt and overcome tactical aspects of air expeditionary operations in Africa. Again, the operators who see, creatively adapt and overcome, and succeed in the tasked operation rarely record in a way that can influence fu-

ture air operations planners and executors. In many cases, these two major categories of lessons learned are kept alive solely through the sharing of war stories.

Notes

1. This information came from several sources and numbers gained from the Defense Mapping Agency Aerospace Center for Mapping, Charting, and Production, 1993.
2. Col John L. Cirafici, *Airhead Operations—Where AMC Delivers: The Linchpin of Rapid Force Projection* (Maxwell AFB, Ala.: Air University Press, March 1995), 69.
3. Ibid., 19.
4. Ibid., 38.
5. Ibid., 57–66.
6. Col Findlay, "AMC Use of Joint Universal Lessons Learned System (JULLS)," 25 January 1993, JULLS 11558–61000.
7. Col Jon Martinson, "JTF PROVIDE RELIEF DIRMOBFOR End of Tour Report," JULLS 80429-34592, 5 December 1992.
8. "Summary - Report to Congress on US Military Activities in Rwanda, 1994 - August 1997," 15 June 1998, on-line, Internet, 3 July 2000, available from http://www.defenselink.mil/pubs/rwanda/summary.html.
9. MSgt Charles Starr, "OPERATION SUPPORT HOPE: An Air Force Humanitarian Airlift to Rwanda via Entebbe, Uganda," History Office, Headquarters 60th Air Mobility Wing, Travis AFB, Calif., September 1995, 16.
10. JULLS 11246-61510, JULLS 11236-95551, JULLS 11155-92755, and JULLS 11139-41744, n.d., n.p., on-line, Internet, 10 July 2000, available from http://www.amc.af.mil/do/dop/dop.
11. Lt Col Robert Winkler, "Lack of Adequate Air Bases," JULLS 11141-47511, 20 July 1994.
12. "Operation SUPPORT HOPE After Action Review [AAR]," chap. 2, n.d., 6, on-line, Internet, 11 July 2000, available from http://www1.eucom.smil.mil/eccs–or/library/operations/completed/operation_support_hope/osh_m_02.html.
13. Ibid., 9.
14. Ibid., 1.
15. Ibid., 2.
16. *USAFE Strategic Vision 2005*, 3d ed., Headquarters USAFE, Ramstein AB, Germany, August 2000, 31.
17. John E. Lange, "Civilian-Military Cooperation and Humanitarian Assistance: Lessons Learned from Rwanda," *Parameters*, Summer 1998, 106–22.
18. SUPPORT HOPE AAR, 3.
19. "Operation GUARDIAN ASSISTANCE After Action Review," chap. 2, *Air Operations*, n.d., 27–47, on-line, Internet, 11 July 2000, available from http://jcll.jwfc.smil.mil/Other/AARs/GUARDast.htm.
20. Ibid., 35.
21. Ibid., 39.
22. Ibid., 47; and Col Brian Binn, "Current and Consistent Airfield Survey Information," JULLS 11745-44991.

23. Dr. Robert B. Sligh, "Operation ASSURED LIFT: The First Price Tagged Operation," Headquarters Third Air Force, History Office, RAF Mildenhall, U.K., 3.
24. Ibid., 10.
25. Ibid., 7.
26. Ibid., 8.
27. Ibid., 13.
28. Ibid., 11.
29. Ibid., 20.
30. "Operation Guardian Retrieval," FAS Military Analysis Network, 27 June 1998, n.p., on-line, Internet, 5 August 2000, available from http://www.fas.org/man/dod-101/ops/guardian_retrieval.htm.
31. Lieutenant Colonel Robinson and Major Curran, Guardian Retrieval JULLS 51653-86663, 51336-17008, and 51335-65169, dated 9 May 1997.
32. Flt Lt Mick Aspinall, Australian Air Force exchange officer flying for US Air Force Central Command, After Action Briefing, "Operation NOBLE RESPONSE Flash 06 and Flash 25," slide 6, provided to author by Maj Q Schlortt, AMC/DOK, 18 July 2000.
33. Ibid., slide 19.
34. Ibid., slide 23.
35. CINCTRANS MSG 271954Z APR 98, "African Airspace Concerns."
36. EUCOM ATLAS RESPONSE Web page, n.d., n.p., on-line, Internet, 2 July 2000, available from http://www.eucom.mil/operations/Silent-Promise/index.htm.
37. Col Taco Gilbert "JTF ATLAS RESPONSE DIRMOBFOR After Action Report," Dover AFB, Del., 4 May 2000.
38. Ibid.
39. Bryan Purtell, "Teamwork Key to Flood Relief Mission Success," *ATLAS RESPONSE Cheetah,* vol. 1, issue 4, Air Force Base Hoedspruit, South Africa, 24 March 2000, 2.
40. Maj Gen Joe Wehrle, briefing, "Joint Task Force ATLAS RESPONSE—A Commander's Perspective," May 2000.
41. Chuck Roberts, "SOCEUR Element Keeps Operation Communications Flowing Smoothly," *ATLAS RESPONSE Cheetah,* vol. 1, issue 4, Air Force Base Hoedspruit, South Africa, 24 March 2000, 4.
42. Jim Perry, "37 AS Delivers the Goods," *ATLAS RESPONSE Cheetah,* vol. 1, issue 3, Air Force Base Hoedspruit, South Africa, 20 March 2000, 4.
43. Ibid.

Chapter 3

What the USAF Is Doing about Air Operations in Africa

Even with the breadth of expeditionary air operations experienced in Africa prior to 1997, it is fair to say the seminal USAF flight safety event in Africa was the midair collision of the US C-141 and the Tu-154 transport near the coast of Namibia on 13 September of that year. As for most airline and other complicated system mishaps, this tragedy was the result of many correctable factors converging chronologically.

Some Solutions for Future Improvement

A variety of preventive measures to the mishap, at multiple stages in the process, could have occurred but did not. As a result of this one accident, the USAF operational community initiated or accelerated several initiatives, including:

- Formal proposals to ICAO to assess member country's compliance with international standards.
- USAF efforts to support IFALPA and IATA initiatives in Africa.
- Benchmarking with civil carriers to share procedures and safety data.
- Continuing the installation of safety systems like TCAS.
- Assigning an Air Force representative to the FAA director for Europe, Africa, and the Middle East.
- Contributing ATC training materials via the ICAO TRAINAIR air traffic controller training program.
- Creating more opportunities for African air traffic controllers to attend USAF technical training schools.
- Utilizing security assistance funding to install ATC and safety equipment in African facilities.

- Moving towards the establishment of a regional airspace initiative (RAI) for African countries, similar to the current RAI in Eastern Europe.[1]

While the latter three of these recommendations were beyond the scope of the USAF, the seven actions within control of the USAF were all completed in 1998 and 1999.[2] The response to this accident—clearly the result of radar and flight procedures—speaks to the issues often underexamined at the conclusion of major air operations in Africa that did not experience such an event. To address the previous air operations challenges, the Air Force has evolved in several areas.

Communications and Coordination

A British travel writer observed in the 1950s that "If you want to telephone from Johannesburg to Lagos, two major capitals, the call must be routed through London."[3] Fifty years later, technology has rapidly advanced international communications; and communications satellite networks are in place over the African continent and are expanding rapidly. Yet, the best operational solution for military air-supported operations in Africa still follows a similar reachback solution. Flight communication and radar coverage over the continent is incomplete; but specific tracks tend to be flown following the outer edges of the continent, near population centers and major airports, where at least some ATC and communication capabilities exist. In major cities, local cell phone networks, Internet, and CNN access may be leveraged.

Following Atlas Response, 3AF requested funding for an RFIC.[4] While requests for such light and lean communications suites have been made before, it is in operations in Africa where the pressures on both communications capability and on reducing airlift demand for overhead converge and are synergistically compelling. This kind of capability—along with portable flight planning software (PFPS) for laptop computers and local command and control capability for Phoenix Raven teams—is being studied, developed, and fielded. Further, the Air Mobility Battlelab at Fort Dix, New Jersey, is looking into miniaturized data feed/flight planning/imagery/intelligence

media for aircrews.[5] The battlelab is part of the Air Mobility Warfare Center—founded by Gen Ronald L. Fogleman in 1995—and specializes in mobility enhancement concept to field delivery within 18 months.

Air Operations Planning

Planning is dependent on information available over time and on the processes—technical, bureaucratic, and human—that make the information available to people who need it, when they need it. Many aspects of information support airmen in Africa. The National Imagery and Mapping Agency (NIMA) produces a wide variety of airfield data, and both the theater planners and AMC produce guidance and share information on regional airfields. Integrated decision-support tools—whether for mobility management, mission planning, and beddown assessment such as the Headquarters AF/ILXX sponsored Survey Tool for Employment Planning[6]—already exist. African air operations planning tends to be done in a reactive way, whether the operation is a humanitarian response, VIP travel, or support to NEOs. The vast distances required to respond on the continent, the lack of forward bases or a significant US interest, and the ad hoc nature of most of our air operations there compound the difficulty of mission planning. However, African air operations point the way towards solutions that are outside of the box, innovative, and responsive and thus are worthy of examining for applicability to the larger Expeditionary Air Force concept.

To satisfy information needs for mobility air operations, AMC publishes and maintains the ASRR and GDSS programs. The ASRR is an on-line database of airfields around the world—maintained by AMC—that provides a suitability rating for specific military aircraft and a variety of FAA and other restrictions on air operations. GDSS is a database and set of applications that tracks a variety of past, present, and future AMC air operational information, including schedules, aircrew assignments, and shipments. Both ASRR and GDSS databases are continually updated and accessible on-line from any Internet access point. Airfield surveys are scheduled and con-

ducted by AMC units, and this information is added to the databases.

The AMC airfield suitability process begins with a request from planners to Headquarters AMC for an assessment of airfield information. After AMC surveys known information about the airfield, the purpose of the request, the potential classification of the product, and reviews existing DOD and commercial publications, an analysis of airfield suitability is either updated or created. If no preexisting airfield survey is available or suitable, the Tanker Airlift Control Center (TACC) may be tasked to schedule a physical survey of the airfield of interest. The conduct of the actual survey includes itemization of multiple characteristics of the airfield, such as the runway, taxiways, parking aprons, NAVAIDs and instrument approach capabilities, obstructions, weight bearing capabilities, maintenance capability, terrain, lighting, et cetera. This data is maintained in the ASRR and GDSS on-line databases for unclassified airfields.

The theater air mobility operations control center (AMOCC) at USAFE performs a mobility dispatch function, files flight plans, checks notices to airmen (NOTAM), and sets up weather for theater flights, including those in Africa. The EUCOM and CENTCOM air components provide the theater's specific terminal en route radar procedures system (TERPS) and also conduct airfield surveys for the AOR. In theory, data from theaters is included in the ASRR and GDSS; in practice, there are often inconsistencies in theater and AMC knowledge bases. For aircraft flying under the operational control of the theater CINC, the TACC and theater TERPS apply and overrule other guidance. Further, the theaters may waive AMC or other guidance that is deemed too restrictive, inappropriate, or impossible to use to accomplish a particular mission. Examples of such waivers exist outside the airlift community channels via accident reports, but in fact such theater waivers are a common and often necessary practice—in some cases simply reflecting incomplete information in the AMC or NIMA databases.

Of 286 African airports or runways listed in the current ASRR, the known suitability for various aircraft types and degree of restrictions paint a partial picture of air operations on the continent, as seen in table 4. These 286 runways represent

Table 4

Summary of African Airfield Restrictions

No. of Airfields	Restriction	No. of Airfields	Suitable for
205	MAJCOM Supplement required	243	C-130
150	Daylight only operations	204	C-21
143	Visual flight rules only	198	C-9
118	AMC approval required	191	C-141B
94	No DOD-published approach available	181	C-17
67	Jeppesen approaches—see GDSS	142	KC-135
54	No C-17	129	KC-10
89	No C-141B	81	C-5
38	No C-21		
19	Contact AMC/DOVS for runway width		
6	Other restrictions		
5	Contact AMC/DOVS for taxiway width		

a small percentage of total airfields and airstrips on the continent, but they constitute the body of USAF knowledge and serve as a guide. “Daylight only operations” rules are generally applied as a result of incomplete or uncertain knowledge of runway and taxiway obstructions, usually due to unrestricted access to the airport by people, vehicles, and animals or to uncertain information on construction projects in the area.[7] The existence of DOD-published approach is based on whether a particular approach has been certified by a military aircrew. Jeppesen approaches and flight publications are commercial products, and while generally available on a greater number of locations, more commonly flown approaches, and with frequent updates, the USAF does not authorize reliance on Jeppesen flight publications unless specifically stated or approved for a particular mission. Instead, the USAF tends to rely on its own databases, military historical and approved approaches, and airfield surveys conducted by military survey teams.

Past airfield surveys are recorded from as early as 1988, and the number of surveys conducted annually are reflected in figure 1. The survey dates tend to cluster in relation to planned or unplanned air operations; for example, in 1989 there were airlift supported operations in Angola, Chad, Namibia, Gambia, Ethiopia, and Liberia.[8] In 1997 the unforecasted Assured Lift and Guardian Retrieval operations occurred; but in 1999

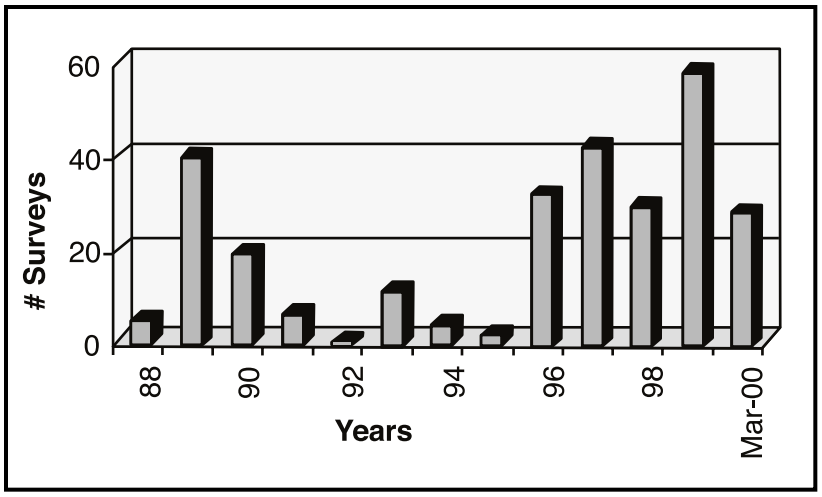

Figure 1. African Airfield Survey Dates

and 2000, the increase in airfield surveys seemed to be more planned and less reactive.

AMC, Air Combat Command, and USAFE initiatives have also moved the USAF towards streamlined and Web-based availability of ASRR and other flight planning and coordination information. FalconView software—a Windows 95/Windows NT mapping system that displays various types of maps and geographically referenced overlays—is being made available beyond the original users in the F-16 community to include aircrews and planners for African missions.[9] The software allows pilots to build their flight plans, check safety-of-flight parameters to identify military airspace, and print flight plans, maps, and imagery.[10] The NIMA Web site will soon have FalconView for distribution to all aircrews. Many types of maps are supported, but the primary ones of interest to most users are aeronautical charts, satellite images, and elevation maps.

Embassy Support and Coordination

Issues of diplomatic clearance, fees paid at airports, bureaucratic mysteries, language difficulties, logistics support, and generally all of Murphy's Laws are resolved effectively—if they are resolved at all—by the military or air attaché on the

ground in African FOLs. Diplomatic clearances and local airport support and agreements may or may not exist. In all cases, air operations are supported heavily by the defense and air attachés in the various countries. For the first time, in March 2000 EUCOM collected data from their assigned and accredited attachés on the state of a variety of categories, including air and transportation infrastructure. Attachés and country teams were requested to color code their country's capability to satisfy the objective, using "green" for satisfactory, "yellow" for sometimes meets, and "red" for a clear lack of a capability to meet the objective. These ratings are very subjective and cover only the 43 countries in EUCOM's theater, excluding those in the Pacific Command (Madagascar, Seychelles, and Mauritius) and CENTCOM area (Kenya, Ethiopia, Eritrea, Uganda, Sudan, etc.). Some of the results are summarized in table 5. The theater command expects to use this data as one of many factors in determining the kinds of regional engagement activities to be pursued. With these caveats, this data is helpful in understanding the region. From this table, it could be concluded that from the perspective of country teams on the ground, status of forces agreements (SOFA) and acquisition and cross servicing agreements (ACSA) are lacking in many of the African countries. According to EUCOM/ECJ4 (Logistics), as of March 2000 there was a completed ACSA with Tunisia and active negotiations with South Africa, Senegal, Gabon, Botswana, and Cameroon.[11] For CENTCOM, Kenya, Seychelles, and Djibouti have been determined to be eligible for ACSAs; but they have not been negotiated at this time.[12] SOFAs and ACSAs are typically standard and taken for granted for much of the rest of the EUCOM theater, but this development has not evolved similarly in Africa. The ACSAs themselves are extremely detailed and are "designed to facilitate reciprocal logistic support between the Parties to be used primarily during combined exercises, training, deployments, operations, or other cooperative efforts, and for unforeseen circumstances or exigencies in which one of the Parties may have a need of logistic support, supplies, and services."[13] They are established when both parties wish to "further the interoperability, readiness, and effectiveness of their respective

military forces through increased logistic cooperation."[14] Logistic support, supplies, and services are further defined in the ACSA template to include food, water, billeting, transportation (including airlift), petroleum, oils, lubricants, clothing, communication services, medical services, ammunition, base operations support (and construction incident to base operations support), storage services, use of facilities, training services, spare parts and components, repair and maintenance services, calibration services, and port services. Clearly, given the lessons learned described in the previous sections, ACSAs may hold part of the answer.

Attachés and country teams reported the third most frequently occurring infrastructure shortfall as security for navigational routes, communications, and port and airfield security. However, more interesting are possible disconnects in this arena of infrastructure, where issues such as language training show up as a more critical or frequently observed shortfall than current airfield surveys, airfield NAVAID status, and port and airfield capacity. While language training in nonanglophone countries is expected to be seen as a hindrance, the currency and completeness of airfield surveys, NAVAID and flight approach equipment availability and status, and airfield capacity conceivably are causing more problems for our air operations than lack of local language training.

The fourth most frequently occurring infrastructure shortfall as reported was port and airfield facilities adequacy; fifth, the geographical limitations of port linkage to interiors; and sixth, port and airfield capacity. While these ratings for African ports and airfields are subjective and undoubtedly related to past experience or lack thereof, an Army Military Traffic Management Command study acknowledges that "forward airfields are the weak link in the deployment chain."[15] The study states that the "most daunting problem discovered was that airfields in possible engagement areas were typically inadequate to handle the number of aircraft that would be required to move an Interim Brigade Combat Team." This study looked closely at the Army's deployment into Kosovo and Albania, but the issues and problems not only apply but are conceivably much worse for African areas of operation. Fur-

Table 5

Selected EUCOM Attaché and Country Team Ratings of Transportation Infrastructure for African Countries

OBJECTIVE	Does Not Meet	Sometimes Meets	% Red or Yellow	Countries Reporting as "Red"
Existing Acquisition and Cross Servicing Agreement	30	9	90%	Most don't have them
Existing Status of Forces Agreement	28	7	81%	Majority don't have them
Ability to provide security for navigational routes	11	18	67%	CAR, Chad, Eq. Guinea, Guinea–Bissau, Liberia, Mali, Mauritania, Niger, São Tomé & Príncipe, Sierra Leone, Libya
Ports/airfield security adequate U.S. logistics forces	5	22	62%	Niger, São Tomé & Príncipe, Libya, Liberia, DROC
Comms, power, water can support U.S. force extended presence	9	14	53%	CAR, Chad, DROC, Eq. Guinea, Liberia, Libya, Niger, Nigeria, São Tomé & Príncipe, Sierra Leone
Ports/airfield facilities and equipment adequate for U.S. logistics forces	2	19	48%	Niger, São Tomé & Príncipe
Host-nation English language training	9	11	46%	Algeria, CAR, Chad, DROC, Eq. Guinea, Libya, Niger, São Tomé & Príncipe, Cape Verde
Port/airfield linkage to interior LOCs	7	12	44%	São Tomé & Príncipe, Libya, Eq. Guinea, DROC, Congo, CAR, Chad
Prior exercises/events conducted with US forces	7	12	44%	Burundi, DROC, Libya, Niger, Nigeria, The Gambia, Togo
Ports/airfield capacity adequate for US forces	3	14	39%	Cameroon, Equatorial Guinea, Liberia
Proximity to ISBs and/or FOBs	2	15	39%	Burundi, DROC
Existing port/airfield survey	2	13	34%	Libya, Liberia
Existence of navigation routes and aids	1	9	23%	Libya
Established history of navigational route use by United States	1	6	16%	Libya
Ports/airfields accessible to United States	1	4	11%	Libya
United States allowed to use navigation routes	1	3	9%	Libya

Source: EUCOM summary results collected at the annual Regional Engagement Planning Conference for Africa, held at Garmisch, Germany, in March 2000. The captured data for Objective Question Sets 7 and 9 E-mailed to author by EUCOM/ECJ5-OR, May 2000.

ther, it is clear that this issue of airfield and port adequacy and capacity was a recurring problem in all of the African operations discussed in the previous chapter.

There are only 20 air attaché billets in African countries. Five are rated officer billets, six are nonrated officer billets, and eight are senior enlisted operations NCOs. Six billets are either currently unfilled or occupied temporarily by an Army representative. While five more were funded last year, these

new billets were not for rated officers; and a lack of operational airmindedness in our permanent FOLs in African capital cities is noticeable. A small survey was conducted among random attachés in African states. The results of that survey are provided at appendix C and include comments and suggestions on how to get more air operations experience in country and how to leverage what is currently available. The suggestions received via this survey both raise additional concerns and shed light on possible solutions. Several of the suggestions related to sharing knowledge—of air operations and aircrew needs at forward locations, developing air operations responsiveness on the ground by assigning enough air operations-oriented people to the embassies, sending survey teams to get the real data set, and working to develop training and liaison programs with local African air forces.

Operational Security and Force Protection Issues

AMC implemented the Phoenix Raven program to review airfield security conditions in advance and deploy the appropriate force protection for aircrews and aircraft with AMC aircraft. Ravens are two- to four-person teams specially trained in antiterrorism, protocol, and negotiation measures who provide security for AMC aircraft and people when traveling to "hot spots" around the world.[16] The concept of operations includes direction to "deter, detect, and counter threats to AMC personnel and aircraft by performing close-in aircraft security, accomplishing airfield assessments to document existing security measures and vulnerabilities."[17] Instituted in 1997, it received the 1999 DOD's Most Outstanding Antiterrorism Innovation or Action in the Command award. The cross-functional teams are "specifically trained to protect aircraft and crew members in hostile environments."[18] Phoenix Raven teams conduct site surveys and utilize information on security from intelligence and police functional sources. Deployment locations requiring an associated Phoenix Raven security team are determined by the AMC Threat Working Group, and a list of locations is updated frequently. The list as of 11 July 2000 contained 54 locations, 24 of which were in Africa; and African

locations in the past have constituted a significant percentage of airfields of concern.[19]

Incidentally, a commercial combination of both airfield operations and operational security surveys is available, oriented to commercial and government entities. Companies such as Air Security International (ASI), Incorporated, and Global Crisis Control International (GCCI), Incorporated, offer airfield operations and security services to companies and government or nongovernmental agencies needing such services. GCCI's comprehensive airfield security and assessment program can overview geographical considerations, location of flight NAVAIDs, local weather and wind conditions, airspace, proximity to urban areas, facility characteristics and warehousing capability, ATC frequencies, air traffic history, documentation requirements for entry or exit, and location of resupply and refueling areas. Charts and maps are included in the deliverable, and country political assessments reports are optionally available.[20] Other optional services include aerial and satellite imagery and evacuation and medical services. ASI offers a similar set of services, including an overview of existing threats to facilities, corporations, or personnel; customer's specific vulnerability to those threats; potential risks to flight operations; and the quality of the services under the responsibility of destination airport authorities.[21] These companies often hire experienced former Air Force personnel to conduct these surveys.

Other force protection proposals to date include a program to outfit some C-17, C-130, and other transport and tanker aircraft with lasers capable of jamming infrared (IR) guided (heat-seeking) shoulder-fired missiles.[22] Laydown armor for mobility aircraft is also used in some missions and some locations. The Air Mobility Battlelab is working a variety of security-related initiatives that, while not designed specifically for the African theater, will enhance air operations in Africa. Portable intrusion detection sensors, under development at a Hanscom AFB, Massachusetts, systems program office, offer a variety of less than lethal force options; and directed-energy defenses are being monitored by the battlelab. The battlelab is designing night vision lighting for the C-130 cockpit, specifically for

mobility aircrew wearing night vision goggles that would be disabled by normal aircraft cockpit lighting. It is a standard feature in special operations C-130s and would be useful in C-130s on African runways undergoing night operations in high-risk or unsafe environments. Other innovations designed—and soon to be fielded—by the Air Mobility Battlelab include a bubble hatch for the C-17 and other airframes to improve threat awareness. The bubble hatch was validated for C-141s in the fall 1997 Red Flag exercise, with users finding an 85 percent increase in awareness of threats. Even safety features currently being designed and ultimately fielded—such as remote airfield taxiway illumination and gravel protection devices for C-130s—would be of great value to our operators who fly into Africa.

Expensive security enhancements and modifications, such as TCAS and laser detection, will tend to be placed on higher value and newer airframes first, which incidentally are those least likely to see extensive flying time throughout the African continent for infrastructure and security reasons. A 1995 paper on operational support airlift readiness contained a variety of recommendations for operational security and force protection, focusing on C-20 and C-21 aircraft. These included training aircrews in combat airspace management techniques, combat communications, and establishing complete visual flight rules operational familiarity. The study also recommended these aircraft be equipped with inertial navigation systems and modern integrated GPS capability and be included in the AMC Airlift Defensive Systems program.[23] These recommendations are likely to be both confirmed by pilots who fly aircraft of all types during African peacetime and loudly lamented today, as they were in 1995.

Dynamic Impact of Expeditionary Air Operations

The issues of runway degradation, repair, and resupply in forward African locations strain on the medical and personnel support over time; and dealing with local agencies, NGOs, and coalition partners are issues that have not been addressed cohesively. USAF Red Horse engineering units (e.g., the US Army Corps of Engineers Transatlantic Programs Center with offices

in Egypt and Kenya) and commercial firms (i.e., Brown and Root, Incorporated) have been used successfully to deal with infrastructure challenges over time. The burden on the already strained strategic airlift system is seen in emergency operations—as in Assured Lift—where the runway repair equipment combined with the needed aircraft parts pushed the mobility airframe up to a C-5 level vice the cheaper C-17, or ideally, C-130. It is also seen in standard channel flights, where one attaché remarked, "We have been trying to get a C-130 engine here for three months. AF cannot do it because the channel flights are full of rations . . . Oreos seem to have priority over an engine."

A serious problem for sustained air operations in Africa is fuel cost, availability, and resupply. A recent paper comparing the cost of refueling options for sustained African air operations found that fuel costs for African operations—when accounting for the cost of delivery, of aircraft flying heavy with extra gas, of utilization of limited Mediterranean refueling tracks, and ground delivery costs—is four times higher than the normal purchase price of gas.[24] Various means of fuel management for African operations include simple air refueling and ad hoc local purchases, a EUCOM initiative to purchase and store fuel in three strategically located intermediate staging bases (ISB), a EUCOM initiative to contract for guaranteed deliveries of fuel from ISB locations, and use of the offshore petroleum distribution system (OPDS). OPDS has both traditional pipeline laydown distribution, as well as a modified usage as seen in Mogadishu, Somalia, 1993–94, where fuel trucks on the pier filled from the OPDS ship in port and drove to the airfields. The study used Operation Support Hope as the sample deployment and found that all options for fuel for that size operation would cost about $2 million except for the guaranteed purchase contract, which is not currently possible based on local capabilities.[25] Even Nairobi, Kenya—with a unique continental storage capacity of over 2.42 million gallons—is handicapped by distribution and imbalance of supply and demand, as seen and recorded in Guardian Assistance and other operations.[26] Recommendations include formalizing or legitimizing the tailored in-port OPDS offload to trucks and

pursuing EUCOM initiatives for ISB fuel storage and contracting agreements. Interestingly, the USAF is not the only one challenged to get the air operations gas they need. The US Navy and Marine Corps are considering hiring private companies to provide midair refueling for contingency operations.[27] Omega Air, Incorporated, has developed the first commercial aerial refueling aircraft—refitting a Boeing 707 with a drogue gas delivery system—specifically with the Navy and Marine Corps in mind (whose aerial refueling capable aircraft all use the drogue system instead of the USAF preferred boom delivery system). Omega indicated that the commercial refueler would be cheaper to fly than the KC-135, with its estimated 2001 flying hour cost of $10,761, and that "the idea is so new that it may ruffle some feathers in the aerial refueling world."[28]

Medical and personnel support over time can be problematic, particularly with the force protection concerns that accompany all US operations. These concerns—whether medical, safety, or simple bureaucracy driven—tend to isolate the Americans in a humanitarian operation in "American bases." In humanitarian environments, personal contact with international partners and local militaries and cooperation with commercial and nongovernmental agencies and the community at large will solve problems and smooth over operational bumps. If the US forces cannot make that achievement, the burden falls to the good offices of the embassy staff. A competent, present, and engaged US embassy—particularly the military attaché office and country team—can go far to compensate and overcome US operating practices that may cause problems in places that run on "Africa time." An engaged and supportive CINC or his representatives can also do wonders in building relationships that make things flow instead of stopping them in their tracks.

In relation to the long-term impact on US expeditionary operations, the current practice is to establish an exit strategy quickly and hold to it. Aircraft write-ups are fixed upon return, and the USAF is satisfied. This exit strategy idea has been around for a long time, and it is becoming the commander's mantra in every war and nonwar engagement. Unfortunately, in Africa where problems and crises are long lived and inter-

national and local agencies spend decades dealing with long-standing problems, US commanders' emphasis on exit strategy is often insulting and offensive to others involved in the emergency or humanitarian operations. The after action briefing on Atlas Response made it very clear that the success of the operation was the early decision on an exit strategy and the adherence to that plan. For the military, it is the right thing to do. For long-term political benefit, and possibly for CINC engagement objectives, the exit strategy should be designed with some follow-on engagement planning that can build on solutions to problems. It could be that it is not the military—and certainly not the Air Force's—responsibility to develop a postexit strategy engagement plan (even one that is wholly internal to the Air Force via sharing lessons learned, contacting programmatic and requirement offices for status on initiatives, and sharing new solutions from the field). However, the alternative is what we have been doing—recreating the wheel in terms of relationship, skills, awareness, and putting our people at unnecessary risk.

Regional Airspace and Control Initiatives

The DOT Safe Skies for Africa program has made limited progress in improving flying safety. Originally funded with $1.2 million in 1998, it expects to quadruple the number of African countries that meet the ICAO standards within three years, to improve airport security at between eight and 12 airports in Africa, and to improve regional navigation services.[29] DOT Secretary Rodney E. Slater stated in 1998 that only five of 53 African countries meet ICAO standards for safety and security: Egypt, Ethiopia, Ghana, Morocco, and South Africa.[30] This statistic remains true today; but by September 1999, two surveys had been completed (Kenya and Côte d'Ivoire) with others planned.[31] Secretary Slater also mentioned that a US Federal Transit Administration safety training program is currently under way in South Africa and that he had intentions to duplicate the program in other African countries.[32] At the "Aviation in the 21st Century—Beyond Open Skies Ministerial," Secretary Slater moderated a panel on African aviation, in which key points were made about African aviation. These

points included the large number of "politically conceived airlines dependent on state subsidy"; inadequate intra-African air services; high costs of fuel; maintenance abroad; insurance premiums; inadequate human resources, especially technically skilled personnel; inadequate infrastructure, both airports and NAVAIDs; and safety and security shortcomings (many of which are being corrected).[33] Cooperation, privatization, and partnerships from abroad were named as the main solutions to these systemic and regional issues.

The FAA and ICAO continue to work with regional and international flight safety organizations, such as ASECNA and IFALPA, to raise awareness and ideally gain solutions to flight safety for air operations in Africa. In 1997, ICAO endorsed all 128 recommendations of the Africa–Indian Ocean Regional Air Navigation Meeting held in May of that year.[34] Subregional organizations, such as ASECNA, Common Market for Eastern and Southern Africa (COMESA), IATA, and IFALPA also have various initiatives for regional airspace and air control initiatives. IATA is sponsoring installation of a network of very small aperture terminals for satellite communications (SATCOM) in Africa.[35] In 1997, all 14 members of the South African Development Community agreed to replace landline communications between control towers with a SATCOM system and conduct a feasibility study to install a single ATC station for the upper airspace covering the entire area by 2005.[36] After the C-141 midair collision in Namibia, a recommendation to develop a DOD-sponsored RAI for Africa was produced. The RAI currently in place in Eastern Europe is sponsored by the Partnership for Peace, includes a bilateral investment, and can lead to upgrades in radars among other things.[37] It is designed for Central and Eastern Europe and uses monies appropriated for that region to develop and encourage civilian and military cooperation in managing a country's airspace under a single manager.[38] Even though the C-141 report contained this recommendation, in Africa there is often no military control of airspace and no military assets capable of adding to the civilian air picture. From the USAF perspective, "the conditions which made RAI an appropriate bilateral offer of assistance in Central and Eastern Europe, in the main, do not exist in

Africa."[39] As of now, this particular concept for Africa is dead in the water.

The Air National Guard State Partnership Program (SPP) is on a similar track. State partnership programs participate in bilateral training, exercises, fellowship style internships, and civic leader visits. While the National Guard SPP is a direct outgrowth of EUCOM's Joint Contact Team Program and of the 30 US states, Puerto Rico, and District of Columbia partnered—none are linked with African countries.[40] Overall, DOT, Department of State, DOD, and even the FAA currently have little that resembles a cohesive program to begin to interface with the existing—albeit weak—regional aerospace organizations in Africa.

A bright spot in the area of regional airspace management could be the Safe African Skies Group (SASG). This group came into being after the announcement of the Safe Skies for Africa program and consists of investment companies, Lockheed Martin Air Traffic Management Division, Africa experts and analyses firms, with a goal of implementing a state-of-the-art satellite-based communications, navigation, and surveillance air traffic management system for Africa.[41] By late 1999, SASG established a partnership with the 21 member states of the COMESA to implement an air traffic management system for the region. COMESA includes countries from Egypt to Zimbabwe and could address both upper airspace (above 24,500 feet) and, ultimately, lower airspace control and integration for the north–south air routes along the eastern half of Africa. The SASG–COMESA partnership is seen as a way that the private sector "working with African governments, can undertake major infrastructure projects without huge public sector subsidies."[42] This private-public sector cooperation towards improved air traffic management may ultimately benefit USAF air operations in the region.

Humanitarian Tactics

The nature of airlift operations in Africa tends to be either exercise support, humanitarian delivery, or evacuation. These kinds of missions into less than optimal airspace management, airfield condition, or security environment result in a

kind of quasi-wartime mentality. During Gen John P. Jumper's final year as USAFE commander, he demonstrated a new Humanitarian Expeditionary Force (HEF) concept "similar in scope to the [1994] Rwanda operation."[43] He indicated the HEF would include "specialized force protection units, engineers to repair or make airfields, medical personnel, airlift" and would be prepared to work with NGOs and international organizations in delivering humanitarian and medical aid, as well as accompanying attack forces such as the A-10 or AC-130U.

The kinds of tactical ideas that would enhance the operations we do in Africa include a relook at the techniques like the low-altitude parachute extraction system (LAPES), a method of delivering heavy items on poor or no runways. This airlift technique was previously utilized by the Army for field delivery of a currently discontinued tank. Since 1995 the Army has not funded LAPES training for Air Force aircrews. While LAPES as a technique carries a risk to aircrews and cargo, it may be an option to consider in Africa-style missions. LAPES, in a low ground-to-air threat environment, could be a useful technique for low-cost and flexible delivery of runway repair equipment and/or humanitarian aid, particularly where runways are unsuitable or absent. Another innovation currently being worked partially as a result of African aircrew experience is the low-cost combat offload (LCCO). Under development by the Air Mobility Battlelab, the LCCO is an inexpensive, all-wood pallet designed to be left behind instead of unloaded and returned to the waiting aircraft—delaying takeoff, clogging congested airfields, and contributing to the types of problems experienced in African and other humanitarian operations. The currently used aluminum and wood 463L pallets are often left behind in the interests of time, safety, and maximum on ground restrictions. With the 463L pallets and required netting costing around $1,000 each, the LCCO (at around $60 each) is an innovative, safer, and cheaper alternative.[44]

A flyaway laptop-based PFPS is available where all types of regional data can be uploaded to compact disc and/or laptop, and this resource would be available to pilots flying long missions or missions subject to in-flight modification. For African

missions, often VIP oriented and/or short notice, such a capability would be helpful to otherwise isolated aircrews forced to plan and replan in midair. Further, attempts to capture lessons learned—often from challenging airlift operations in Africa—and include them in the Air Force Tactics, Techniques and Procedures (AFTTP) 3-1, "C/HC-130," vol. 25, and "C-5/C-17/C-141," vol. 35, was initiated in 1999 with only the AFTTP volumes to include lessons learned thus far.[45]

Past experience has led the Air Force to move in certain directions; and for African-specific challenges, it is not expected that solutions will be well funded. Solutions for African air operations challenges will need to be procedural, process, collaborative, and on the cheap. Much is being done, much more can be done, and a lot of it without additional spending. Before the summary of recommendations is presented, it will be illuminating to hear what experienced pilots have to say about flying in Africa.

Notes

1. Headquarters AF/XOO-CA document, "U-154/C-141 Mishap African Air Traffic Control Recommendations Course of Action," 15 January 1998 (FOUO).
2. Maj Dorotha Biernesser, Headquarters AF/XOO-CA, E-mail, 20 January 2000.
3. John Gunther, *Inside Africa* (New York: Harper and Brothers, 1953), 8.
4. Maj Gen Joseph Wehrle, briefing, subject: "Joint Task Force Atlas Response . . . A Commander's Perspective," May 2000.
5. Lt Col Mark J. Surina, interviewed by author at the Air Mobility Battlelab, 25 July 2000; the Air Mobility Battlelab brochure, 25 July 2000 n.p.; and E-mail from Colonel Surina, 15 August 2000.
6. Lt Col Tony Dronkers, "Integrated Decision Support Tools to Tailor Support Forces," bullet background paper, Headquarters AF/ILXX, 9 September 1999.
7. Lt Col Joel Wheeler and Lt Col T. J. McCarthy, Headquarters AMC/DOVS, interviewed by author, 18 July 2000.
8. Alan Vick et al., *Preparing the US Air Force for Military Operations Other Than War* (Santa Monica, Calif.: RAND, Project Air Force, 1997), 137–40.
9. FalconView information sheet, n.d., n.p., on-line, Internet, 3 July 2000, available from http://www.falconview.org.
10. DOD News Release No. 285-97, "AIR RESERVE SOFTWARE PROGRAM WINS WORLDWIDE RECOGNITION," 3 June 1997, n.p., on-line, Internet, 3 July 2000, available from http://www.defenselink.mil/news/Jun1997/b060397_bt285-97.html.
11. E-mail from Maj Ed Davis, USEUCOM/J4-ML, 23 March 2000.

12. E-mail from Maj Nancy Jean–Louis, CENTCOM/J-5, and Lt Col Daniel McCabe, CENTCOM/J-4, 13 September 2000.

13. E-mail from Maj Ed Davis, USEUCOM-J4-ML, data extracted from ACSA Template Form, 23 March 2000.

14. Ibid.

15. "Army Study: Poor Forward Airfields Jeopardize Deployment Goals," *Inside the Army*, 21 August 2000, 1, on-line, Internet, 21 August 2000, available from https://ca.dtic.mil/cgi-bin/ebird?doc_url+/Aug2000/e20000821armystudy.htm.

16. Karen Petitt, "Phoenix Raven, Antiterrorism Programs Earn DOD Awards," *Air Force News*, 7 September 1999, n.p., on-line, Internet, 3 July 2000, available from http://www.af.mil/news/Sep1999/n19990907_991640.html.

17. AMCI 31-104, Phoenix Raven Program, n.p., n.d., on-line, Internet, 25 August 2000, available from http://amc.scott.af.mil/pubs/amci/31series/31-104.pdf.

18. Edwina Walton and John Price Jr., "Wing Team Saddles up for First AMC Rodeo," *MacDill AFB On-line*, 19 June 1998, n.p., on-line, Internet, 3 July 2000, available from http://www.macdill.af.mil/Staffagn/pa/news/tbolt/June19/Rodeo.htm.

19. "Phoenix Raven Required Locations," 11 July 2000, n.p., on-line, Internet, 11 July 2000, available from http://web.amcin.scott.af.smil.mil/TWG/backup/raven.asp (FOUO).

20. Global Crisis Control International, Inc., ASAP Web site, n.d., n.p., on-line, Internet, June 2000, available from http://crisis-control.com.

21. Air Security International, Inc., Web site, n.d., n.p., on-line, Internet, 23 July 2000, available from http://www.airsecurity.com/surveys.htm.

22. Brian Bender, "Transports to Get Missile Jammers," *Jane's Defence Weekly*, 16 February 2000, n.p., on-line, Internet, 17 February 2000, available from http://ebird.dtic.mil/Feb2000/s20000216transports.htm.

23. David Dyche, *Making Operational Support Airlift Ready for War* (Maxwell AFB, Ala.: Air University Press, 1995), 213–25.

24. Steven Dye, "Improving African Fuel Availability in Support of Humanitarian Relief Operations," AFIT/GMO/LAC/99E-3, June 1999, 14.

25. Ibid., 46.

26. Ibid., 44.

27. Christian Lowe, "Navy, Marine Corps Consider Privatizing Some Aerial Refueling," *Defense Week*, 21 August 2000, 1.

28. Ibid.

29. US DOT News Release, "Safe Skies Initiative Is Improving US–Africa Air Service, Slater Tells Committee," 30 July 1998, n.p., on-line, Internet, 3 July 2000, available from http://www.dot.gov/affairs/1998/dot14498.htm.

30. "Slater to Push African Safety," *Aviation Week and Space Technology*, 6 July 1998, 47.

31. Rodney E. Slater, "Closing Remarks at the US–Africa Transportation Ministerial," 29 September 1999, n.p., on-line, Internet, 23 July 2000, available from http://www.dot.gov/affairs/1999/92999sp.htm.

32. Rodney E. Slater, "US–Africa Ministerial Panel on Economic Partnership," 16 March 1999, n.p., on-line, Internet, 23 July 2000, available from http://www.dot.gov/affairs/1999/31699sp.htm.

33. Comments by Côte d'Ivoire Transportation Minister Adama Nibi Coulibaly, "Aviation in the 21st Century—Beyond Open Skies Ministerial," Chicago, Ill., 6–8 December 1999, n.p., on-line, Internet, 23 March 2000, available from http://www.faa.gov/dotconf/body.html.

34. "ICAO Endorses Major Recommendations for Improving Safety of African Airspace," ICAO press release, 5 December 1997, n.p., on-line, Internet, 6 January 2000, available from http://www.Icao.org/icao/en/nr/pio9723.htm.

35. "TU-154/C-141 Mishap African Air Traffic Control Recommendations, Course of Action," Point Paper, Headquarters AF/XOO-CA (Washington, D.C.: Pentagon, 15 January 1998), 1.

36. *IATA Air Bulletin,* 30 January 1998, accessed 6 January 2000.

37. Point Paper, 4.

38. Dorotha Biernesser, Headquarters AF/XOO-CA, E-mail dated 15 August 2000.

39. Ibid.

40. "National Guard State Partnership Program," Information Paper, International Affairs Directorate of the National Guard Bureau, Washington, D.C., 3 January 2000.

41. Jack Edlow and Erastus J. O. Mwencha, "Improving Air Traffic Management in Africa," *Perspectives on Africa,* Winter 1999/2000, 46–53.

42. Ibid., 48.

43. Greg Caires, "Jumper: USAFE to Conduct Humanitarian 'AEF' Next Year," *Defense Daily,* 22 July 1998, 3.

44. MSgt Thomas Kenney, AMWC Battlelab, interviewed by author, Fort Dix, N.J., 25 July 2000.

45. Maj Q Schlortt, AMC/DOK, Scott AFB, Ill., interviewed by author, 18 July 2000.

Chapter 4

What Aircrews Know about Air Expeditionary Operations in Africa

The previous chapters overview some of the conditions affecting air expeditionary operations in Africa, discuss operational level lessons learned, and share some solutions currently being pursued for future improvement. To meet these challenges practically today, our pilots, aircrews, and planners adapt to the air operations situation and do their best to overcome the challenges. Beyond the traditional sources of data discussed above, we also have the experience of the numerous active and Guard pilots of USAF aircraft who fly routinely into Africa supporting routine channel flights, VIP transport missions, and special assignment airlift missions. These pilots and aircrews support multinational exercises—such as the French-sponsored Gabon '98 and Gabon 2000 in West Africa, the Blue Crane/Hungwe series peacekeeping exercises in southern Africa, and Golden Spear series in the Horn—African Crisis Response Initiative training, small-scale humanitarian delivery, and search and rescue or evacuation missions. As part of research for this paper, a detailed questionnaire was made available via the Internet and provided to randomly selected pilots with experience flying in Africa. While the Web-based questionnaire automatically produced anonymous responses, many of the pilots and aircrews participating provided their E-mail addresses and were available for later clarification and further elaboration of particular points. The questionnaire with all summarized responses (see appendix A) basically asked pilots to validate African air operations concerns already identified by the FAA and ICAO and to comment on the African air operations situation as they saw it.

The pilots or aircrews completing the survey were about evenly split between C-130 and C-20/21 pilots and larger airframes (C-5, C-141). The types of missions flown tended to be humanitarian response, contingency, exercises, and VIP transport. Pilots were asked to rate the ICAO-documented

shortfalls listed in table 1 between a "1" to "5," with "1" meaning the shortfall was rarely observed, and "5" meaning the shortfall was almost always observed. The categories included aerodrome conditions (12 questions), air traffic control (six questions), aeronautical information services (seven questions), communications/navigation (12 questions), and general procedures (three questions). This part of the questionnaire effectively fine-tuned the ICAO study of African aeronautical challenges based on USAF real-world experience. The data provided in table 6 reflects only those categories of challenges that received an average rating of 2.75 or higher by either strategic mobility (representing heavier airframes) or by tactical airlift. Inclusion of a problem area in table 6 indicates it occurs predictably in Africa—problem areas are shown in priority order in the tactical airlift category.

The condition, capacity, and capability of African airports and airfields, as documented elsewhere, is a problem for USAF pilots flying in Africa. The heavier aircraft tend to fly into larger airports, and the aerodrome-related complaints center on runway and taxiway inadequacies and insufficient security screening of personnel. For tactical airlifters, the complaints shared concerns of lack of control of airfields, apron lighting and suitability (as well as general runway inadequacies), and deficient fire and rescue services. Given the nature of most missions to Africa—requiring offload of supplies, aid, and equipment—deficiencies in the aerodrome category are serious mission impacters. A pilot-reported security challenge affecting at least one African airport is described as follows:

> In spite of the presence of several armed guards, security is, in my opinion, severely lacking. There are numerous methods to gain access to a particular airfield, some due to graft and corruption. . . . Customs is another area of concern. During one deployment (single aircraft), our aircraft had numerous maintenance problems requiring aircraft parts from European bases. These parts came in via FedEx or another civilian carrier. Due to the "work schedule" of the customs officials, it was next to impossible to gain access to these parts which severely impacted the success of the mission. Bribery was finally used as a last ditch method to get the parts.

Another example reported from a 1995 experience in Sierra Leone illustrates some of the infrastructure problems.

Table 6

Summary of Pilot Ratings on ICAO-Observed African Flight Concerns

Category	Average Rating: Strategic Mobility	Average Rating: Tactical Airlift
Aerodromes (1= rarely observed, 5= almost always observed)		
• Insufficient control over persons, animals, and vehicles due to inadequate fencing	3.25	3.61
• Lack of personnel screening for security purposes	3.33	3.26
• Inadequate apron lighting and layout	3.08	3.26
• Runway/taxiway environment inadequacies (surface breakup, lighting)	3.42	3.16
• Unauthorized personnel accessing secure or restricted areas	2.58	3.13
• Deficient fire and rescue services	2.67	2.82
• Unserviceable ground equipment	2.50	2.76
Air Traffic Control: (1= rarely observed, 5= almost always observed)		
• Inadequate traffic separation information (generally uncontrolled airspace)	2.79	3.32
• Inadequate provision of air traffic control in "controlled airspace"	2.96	3.03
• Nonimplementation of ATC service within 150 NM from airport	2.67	2.92
• Nonimplementation of air traffic system direct speed circuits	2.50	2.82
• Inadequate use of existing ATC radar	2.67	2.74
• Frequent use of non-English communications between ATC and pilot	2.92	2.58
Aeronautical Information Service: (1= rarely observed, 5= almost always observed)		
• Irregular NOTAMs, lack of NOTAM service	3.08	3.45
• Forecasting/weather support deficient	2.67	3.22
• Absence of or inaccuracies in surveys of surrounding areas	2.92	2.87
• Nonexistent aeronautical information publications	2.50	2.82
• Missing aeronautical charts	2.38	2.79
• Inadequate or unreliable airport weather and wind information for approach and landing	3.09	2.05
Communications/Navigation (1= rarely observed, 5= almost always observed)		
• Saturation of HF, poor or no HF reception	3.79	3.50
• Lack of precision approach aids	2.92	3.37
• Lack of flight plans coordination between FIRs	2.92	3.16
• Inadequate en route navigation facilities (inoperative or partially operative)	2.75	3.05
• Unreliable or unusable HF radio	3.33	2.92
• ILS and VOR facilities listed in different stages of serviceability	2.21	2.76
General Procedures (1= rarely observed, 5= almost always observed)		
• Lack of air traffic controller and air traffic communicator training and competency, to include language competency	2.83	3.18

We arrived at [Sierra Leone] at night with no approach lighting, but determined the moonlight (and a VOR approach) were sufficient to make a safe landing. [We] landed uneventfully, and taxied to the small ramp which was filled with little light being provided by the 2–3 AF "lightalls" on the ramp. A provisional WX/flight plan team was in place via SATCOM. We quickly updated the WX/FP and unloaded our cargo (ramp ops were hazardous at best). After cleared for takeoff and lining up on the [runway], airfield lighting was lost. . . . completely. However, communication with the tower remained. We asked tower if this happened much. He responded "occasionally." After a few minutes, the lights re-

> turned, we were cleared for takeoff only, and told that our en route clearance would be received from Karthoum on HF. We were unable to reach Karthoum for one hour after takeoff and proceeded on the route according to VFR rules while opposite direction IFR traffic passed above us.

Beyond runway and aerodrome infrastructure, communications is arguably the single biggest air safety problem in the continent according to Cathy Bill of the Airline Pilots Association of South Africa. Beyond what has already been discussed, examples in the commercial or private world include flight plans never reaching the proper ATC authorities due to ineffective communication between pilots and the ground and between control towers, lack of radio coverage, and poorly trained controllers.[1] According to an IATA bulletin, the majority of incidents over Africa relate to a loss of communication with air traffic controllers.[2] As mentioned earlier, in 1996 there were 77 *recorded and reported* near misses in Africa due to lack of air control.[3]

Communication concerns figure prominently for USAF pilots. Whereas the USAF has gradually phased out HF radio communications in the cockpit, as one pilot said, "HF radio is Africa Comm." Following is an anecdote shared by one pilot that illustrates both this necessity and the disconnect between USAF policy and reality:

> The sole HF radio on the aircraft failed en route to South Africa. The FAA says HF is required, but AF says it is not a requirement (which is why there was no backup HF installed). USAF regulations precluded *local* repair which was readily available, and a situation that hearkens the late Joseph Heller—the crew cannot get it fixed, and they cannot get out of South Africa without HF. The solution was found by waiting until a team of US-funded contractors came down and did the repairs on the radio.[4]

Unfortunately, even if the HF is working, one pilot described the HF traffic situation as hideous! It was not uncommon to have four or even five airspace controllers screaming your call sign—whether you were in their flight information region or not.

An interesting operational procedure that is not generally taught to Air Force pilots is the African use of 126.9 MHz for pilot self-control. This in-flight broadcast procedure, developed decades ago, is used by individual pilots to broadcast traffic information, with all other information communicated

on the interpilot frequency 126.95 MHz.[5] While commercial carriers and pilots in Africa have long used this VHF location broadcast system, our pilots "only caught on a few years ago"—namely after November 1997. Pilots comment on weather support and procedures in the absence of military weather and no legitimate alternatives technically allowed from cell phone networks or national or local commercial teletype services. Other USAF pilot concerns included command and control with dispatchers, and the comparison of Air Force approaches to how commercial carriers such as Lufthansa and Air France remain in real-time communication with their dispatchers throughout their African flights. The failure of Iridium, Incorporated, was bemoaned by some, as Iridium provided reliable communications, worked where local cell phones did not, and was often used by USAF aircrews in Africa.

Another aspect of the survey also asked pilots to rate between a "1" and a "5" other challenges to flying in Africa. In this case, the following prioritization (shown in descending order for tactical airlift pilots) was established (see table 7).

For tactical airlift aircraft in Africa, the top observed challenges are the availability of commercial flight publications (CFP); medical, food, and water support issues; and airframe security. The next cluster of concerns is related to maintenance forward and reachback for communications. A lack of Web or Internet access (from which data and information could be instantly available—making up for lack of current or complete FLIP, weather data, Web-accessible ASRRs, and other guidance) is more of a problem for strategic mobility and likely more of a problem for longer missions. For strategic mobility aircrews, the top four issues were Internet access; medical, food, and water support issues; maintenance of the aircraft; and gaining country diplomatic clearances. A recurring theme in pilots' comments was to move to Jeppesens, adopt commercial procedures, and let the system learn. Expertise for planning missions in Africa was seen in many cases to be lacking at the combatant command air planning staffs and underemphasized. Comments ranged from "weather support in Africa is poor—USAFE OWS [Operational Weather Squadron] cannot fully support our missions into Africa and has a diffi-

Table 7

Challenges to Flying, Strategic Mobility, and Tactical Airlift

Challenges to Flying	(1= rarely observed, 5= almost always observed)	
	Strategic Mobility	Tactical Airlfit
Medical, food, and water support issues for aircrew and passengers	2.96	3.00
Availability of Jeppesen products or FLIPs	2.04	2.95
Availability of maintenance or generation equipment	2.63	2.87
Availability of airframe security support (Raven Team or commercial)	2.42	2.68
Reachback to AMOCC or other air force control and support center	2.25	2.61
Communications gear maintenance support	1.29	2.50
Network (Web) access*	3.25	2.43
Unexpected charges from officials	2.29	2.24
Availability of country clearances	2.63	2.18
Availability of appropriate fuel limited at airport	2.33	2.00
Availability of runway space to support your mission	2.29	1.82
Availability of ramp width, length, or weight bearing capability to support your mission	2.25	1.63

*Note: This challenge was the number one concern for strategic mobility.

cult time getting the crews good accurate weather forecasts" to "planning and coordination for these missions is rarely done well [by CENTAF]. Dip clearances are inadequate, aircraft are over-grossed, etc."

Another part of the questionnaire asked pilots to rate their theater command support and AMC-level support in a variety of areas. The average results are presented in table 8, this time with a "1" rating meaning not supportive and a "5" rating indicating great satisfaction with the support currently provided. Not surprisingly, the tactical or theater airlifters felt less satisfied with the support they have received. Many comments were provided in these two categories, and a variety of suggestions were made. Key themes included schedule pressures and variations (particularly among VIP flights) that prevented complete preparation for African flights, particularly as many of the materials to plan the flights were outdated, unavailable, or incomplete. Lack of diplomatic clearance for these types of flights as well as contingency or humanitarian flights (basically any flight that is not planned with months of lead time), lack of Jeppesen FLIPs, lack of TERPS approaches, and in-

Table 8

Operator Satisfaction with AMC and Theater Support

Category of Support	Theater		AMC	
	Stratlift	Tactical	Stratlift	Tactical
Scheduling	2.79	3.05	3.13	2.92
Flight Planning	2.33	2.65	2.79	2.71
Execution stage (real-time support)	2.54	2.89	3.00	2.79
Response to concerns identified/process improvement cycle	2.54	2.53	3.50	2.53
Adequate threat briefing/intelligence preparation	3.04	2.45	3.25	3.24
Terminal En route Radar Procedure Systems (TERPS) criteria/standards	2.50	2.79	3.00	2.68
Airfield Suitability Reports	Not rated		3.46	2.79
Summary of Airfield Restrictions	Not rated		3.00	2.61
Airfield Surveys	Not rated		2.83	2.63

consistencies in AMC and theater TERPS evaluations and standards were cited as problems. Lack of TCAS and general communications was also a concern for these pilots. The bottom line seemed to be that crews often must develop African flight plans on their own, on short notice, assuming late or absent diplomatic clearance, with missing or incomplete information and publications, and fly at a risk that would be unacceptable in other theaters and perhaps for other airframes. "Invariably (95 percent of missions) only one approach is TERPSed—usually not the one in use. This forces the crews into an unsafe dilemma—divert (again, available TERPS approaches/dip clc/WX/etc.), or fly a non-TERPSed approach (normally the one every other commercial flight is flying) and 'hack' the mission. This begs the question, why can an airliner with 400 pax fly a Jeppesen approach, but the United States DOD cannot?"

In interviews with C-20 and C-21 pilots at Ramstein, a variety of concerns were discussed, many of which are repeated or confirmed by the survey comments.[6] General validity and reliability of information about procedures, airports, and airfields was questioned. Inconsistencies between FLIPs, Jeppesens, and AMC and theater records were frequently encountered. Aircrews need 1:50,000 charts for planning, but they are not always available. The TERPS system was thought to be undermanned and unable to keep up with requirements. TERPS was noted as not being standardized across the Air Force and hav-

ing no intercommand TERPS interpretation, which effectively means that "AMC TERPS do not equal USAFE TERPS." One pilot wrote that two of the top three problems are TERPS, and "We need more approaches and departures out of these fields with current and reliable information. The fact remains that we will be tasked to fly into these fields. And in many cases we are forced to make dangerous decisions because we don't have the TERPS info we need to get in and out of these fields."

Often, disconnects between granting of foreign clearance and the available airports at desired destinations meant clearance was granted into inappropriate or impossible airports, and/or the suitable airport based on capabilities was not granted a diplomatic clearance. Pilots pointed out that intelligence threat estimates are different than operations threat estimates and that "intel-safe is not ops-safe!" The issue of cash required for fuel fees, landing fees, security, and communications services was repeatedly mentioned. Form 1801s, used to file international flight plans, are not universal; and some countries and airports have their own unique form (and fees).

Practical recommendations to improve support to aircrews flying African missions recognized clearly the relative priority of African missions over other EUCOM or CENTCOM traditional core focus areas. Recommendations specifically addressed rigid processes and arbitrary rules, asked for not necessarily more help but better use of the help and expertise that already existed, and included a request for simple awareness and understanding among higher up organizations of what African flying entails. One pilot suggested, "Task folks with theater planning specifically to Africa and not as an 'arm' from east cell. There are plenty of folks willing to help us in Africa but they lack information and resources to do this." Another pointed out "it is easy to place a statement on the top of every AFI that states 'Compliance with this instruction is mandatory,' to actually comply with the written regulations in many locations is indeed impossible. *For a crew to comply with these regulations fully, the mission would not happen the way the leadership expects it to occur*" (emphasis added). Again indicating a process and rules problem, one pilot commented that AMC is "much more operationally flexible than USAFE which

crippled itself unnecessarily. USAFE [between 1994 and1997] would require daylight VMC [visual meteorological conditions] ops throughout Africa because adequate NOTAMs and maps were not available to perform proper TERPS reviews. AMC [since 1997] has the same info constraints, but uses innovative solutions like adding a couple hundred feet to the Jeppesen minimums" (emphasis added).

Pilots were also asked to rate NIMA. In general, NIMA support was rated highly in terms of charts, approach and departure plates, and IFR supplements. The lowest average scores given in NIMA categories related to availability of other flight publications, in-flight guides, response to concerns, and the NIMA process improvement cycle. This category generated a variety of comments that provide insight into a key issue for flying in Africa, namely that the government system does not produce or deliver enough or appropriate flight publications for African destinations and that commercial products are more current and available (although often illegally or in violation of government policy at some level). One pilot noted that "the African Approach book is hardly worth publishing—one approach to places we rarely go is no help." Another observed "that NIMA is never as good as Jeppesen because the 'publishing cycle kills it.' "[7]

Pilots and aircrews were also asked how they handle air operations challenges in real time. Forty-eight responses registered on this survey question, and the breakout is as follows: 69 percent rely heavily on the local defense or air attaché to resolve problems, 60 percent call back to home station, 50 percent call back to AMC, 48 percent rely on themselves and plan for self-sufficiency ahead of time, 23 percent refuse or modify missions, 19 percent avoid known problem airports, and 10 percent utilize commercial airline service capabilities or products. Seventeen percent do something else when faced with problems, suggesting self-sufficiency with suggestions to bring it with you as part of the deployment, Federal Express for aircraft parts to small locations, and work with host-nation military forces, particularly Air Force contacts. One noted, "Since communication by telephone or HF can be difficult at best, self-sufficiency is a necessity."

What pilots know about air operations in Africa is extensive, but their collective perception remains ad hoc and not well incorporated into the Air Force body of knowledge. Many pages of comments from the 62 pilots and aircrew members who were contacted and chose to complete a survey are included at appendix A, and these are worthwhile reading. The extensive nature of these comments, and in many cases their tone of urgency, contrasts significantly from the official collection of lessons learned and after action reports that "we do not read" anyway. It is possible that the business practices of more nontraditional learning organizations can be found to apply to the USAF. For USAF African air operations, improved management of our existing knowledge is clearly indicated.

Notes

1. *IATA Air Bulletin,* 30 January1998, accessed 6 January 2000.
2. Ibid.
3. James Ott, "Safety Groups Respond to African ATC Crisis," *Aviation Week and Space Technology,* 12 May 1997, 65.
4. Maj Pete Hahn, Ramstein AB, Germany, interviewed by author, 2 December 1999.
5. James Ott, "African ATC Crisis Escalates," *Aviation Week and Space Technology,* 20 January 1997, 45.
6. Following paragraphs refer to author interviews with a number of pilots at Ramstein AB, Germany, conducted on 2 December 1999.
7. Author interview, 3 December 1999.

Chapter 5

Summary

Africa faces tough problems: among them the unavoidable issues of a vast and varied geography, long-standing poverty in both financial and visionary arenas, and the high cost of construction and implementation of modern air control and operations infrastructures and technologies. Open war, simmering conflict, and uncertain government dominate much of the continent. Due to a widespread lack of transparency, user fees paid by commercial air carriers and the international community specifically to improve air infrastructure, estimated at $6 million per month, are utilized for purposes other than those intended.[1] Money thrown at the problem will not solve it anytime soon, and the USAF has little money for that purpose in any case. What can be done, and how should we move forward for safety and effectiveness, frugality, and real impact?

Solutions

This paper presented the ongoing recommendations and activities on the Air Force plate to incrementally improve air operations safety and effectiveness in Africa. The application of Phoenix Raven teams in some of the tougher air operations neighborhoods, GPS installation, and TCAS installation on various airframes address some security concerns; and the proposal of missile and small arms fire defense systems on airlifters and tankers indicates this concern is expanding. The increase in the number of air attachés in Africa and the progress the Air Force is making in the major categories discussed in chapters 3 and 4 are good signs. However, the recommendations received from pilots themselves would indicate that these solutions are either too macroscopic or too microscopic and may reflect a certain blissful obliviousness to African air operations and economic realities. The solutions put forth by pilots who cannot wait for regional technologies and bureaucratic

protocols are actually quite refreshing, and they are summarized in the following seven categories.

GPS and the TCAS

Get GPS and TCAS on all airframes that fly in Africa, where they really make a difference. This is simple and obvious; it costs money; but as recognized in 1997 off the coast of Namibia, it costs far more to avoid the issue than to address it. One pilot summed it up, "Interestingly enough, following the C-141 midair collision over Africa a call went out for all aircraft to get TCAS, this as yet has not happened. Until the USAF is ready to spend the $$ to support safer operations, addressing this issue is a waste of time."

Activate Defense and Air Attachés

For improved air operations, activate defense and air attachés now. In the aircrew survey, aircrews indicate that they rely overwhelmingly on defense and air attachés to make everything work. Yet, airminded, air operations-oriented attachés are hard to come by in Africa. Of 20 air attaché billets in Africa, only 16 are currently filled, and only six are rated officers—all but five of these in North Africa. To resolve this expertise and availability concern, increased training and awareness on air operations, air safety and security initiatives, improved means of sharing information and ensuring adequate transfer of lessons learned from one attaché to the next, and improved Internet connectivity in embassies would do wonders for the ability of embassies to enhance their already critical support to our flyers. Hiring retired, civilian, or foreign national air operations expertise should be considered. Embassies are the ideal focal point to, as one pilot recommended, actively "work with host national ATC to improve their training/competency/capability." Air transportation and air-based response are the primary means of military deployment on the continent and will remain so for the foreseeable future. It follows that attachés' collective perception on the problems facing them and their countries should reflect more of the air operational agenda and should embrace both military, US

government, and civilian initiatives on air safety and security. One pilot confirmed, "The embassy support was phenomenal. They were our saving grace." The pressures on our attachés will only increase; and they need the tools, training, and presence to satisfy the needs of air expeditionary forces.

Adopt the Use of CFPs, Products, and Practices for Africa

Jeppesens and lack of availability or authorization to use them for flight planning and operations is a policy concern, a bureaucratic barrier. As one pilot stated, "The single most significant thing the AF can do to help is to fund and maintain Jeppesen approach publications for all squadrons who are routinely tasked with accomplishing missions in Africa." Another said, "NIMA products also need to be updated and brought into alliance with Jeppesen-like coverage. Airline service to many of the fields we operate to or from exists and has for years, and we limit ourselves if we can't count on having complete and accurate flight publications." It would be wise to simply wake up and see how commercial entities and our European allies fly in Africa. Our defense of our policy is safety and reliability for our aircrews, yet clearly from comments and from other evidence—including lessons learned from past operations—this defense is increasingly naïve and ludicrous.

Improve the Airfield and Security Databases and Information Flow

This relates to commercial product availability, but touches on the more complicated and bureaucratic issue of theater and AMC processes and upgrading of data in all databases (intelligence, airfields, approaches, security, commercial practices and weather, local logistics, diplomatic clearances, coalition and NGO air operations presence, and procedures). A pilot says, "Good theater briefs are essential—customs, security, medical issues. Solid insight into logistical support available—ramp space, fuel, food, maintenance, transport, C^2 [command and control] connectivity to coordinate mission needs is critical." The PFPS properly populated with good in-

formation and an ability to reach back for updates is a starting point. Attention to customer complaints regarding the TERPS process and product is warranted. One suggestion was to create and activate a "crack group of individuals that can handle short notice requests for TERPS support of approaches and departures at African airfields and a command and control that can get CFPs and reliable weather to aircrews." Further, recommendations for advance teams (of military or contractors) to determine and set up communications, NAVAIDs, and a combat TERPS and weather team were made.

Share Information among the Africa-Interested Community on Air Operations

A Web site for all information, lessons learned, and electronic access to what is needed—for pilots and aircrews, planners, schedulers, and attachés or embassies—would be very useful. PFPS as a user end item is part of this; other parts are content and real information sharing and knowledge management. There are places from which this kind of initiative can spring—USAFE, the USAF representative to the FAA Euro–African region (a position created after the C-141 midair collision in Namibia), and EUCOM and CENTCOM planning and operational communities.

Take Lessons on What Works

Commercial carriers throughout Africa and NASA flight operations out of Banjul, Gambia, and Morocco use proven procedures, techniques, and support infrastructures. Evacuations routinely occur as necessary without the assistance of the USAF—or even the US military—by utilizing commercial air and sea carriers and overland routes. Specific examples of excellent commercial evacuation plans include those sponsored by major and often multinational corporations and other nations who have alien workers in African locations. The UN—and particularly the WFP—airlift tons of aid annually into often very remote parts of Africa. The capability of the UN to leverage airlift is extremely high and relatively effective.[2] This is done via competitive contracts to commercial and often local

air freight carriers. Additionally, NGOs—particularly aid and religious organizations—utilize contract or organizationally owned or leased air freight capability to reach their customers. Beyond this commercial airlift and passenger lift capability, African militaries using their own or leased assets can respond internally and externally to humanitarian as well as military requirements using the same means—owned or leased aircraft. Unfortunately, this has been more often seen of late in the Ethiopian, Eritrean, or DROC funded use of Ukrainian and/or Russian fighter aircraft or helicopters than in humanitarian response cases. Certainly the example of ECOMOG—with integration of both indigenous Nigerian airlift and lift contributed by other nations—is a workable example of how the need for airlift and air operations will be met in the future. Leasing of aircraft is just one area where not doing the air operation directly makes sense or looking into a commercial source of refueling capability should be considered. Another is prepositioning both fuel, communications, NAVAIDs, and maintenance equipment, or sharing such equipment with African allies via excess defense articles and contractual agreements.

Improve our Ability to Do Africa Operations

Spend some mental energy on figuring out how to creatively improve our ability to do African operations—emergency response and humanitarian airlift and delivery. This improved ability could include increased funding and manning for the remarkably prolific Air Mobility Battlelab and following the lead of unit and individual innovators at USAFE, AMC, and throughout the Air Force.[3] It could also include ways of capturing and learning from lessons learned instead of learning them over every time. Corporate knowledge must be captured and used. There are many good ideas out there; what is needed is some freedom to act on and develop these ideas. One pilot commented, “Don’t put fighter guys in charge.” If one looks more deeply into that comment, it is clear that it could be saying we need more teaming approaches, less forcing to make it fit, and more systemic solutions. It could be saying we need more awareness of our particular challenges in Africa and more vision. It is a rare fighter pilot who has flown his

fighter aircraft south of the Mediterranean without a meticulously choreographed and unchanging flight plan. Fighter pilots do tend to show up as commanders of humanitarian, exercise, or contingency operations in Africa. There could be a disconnect; and if so, it is one more challenge the USAF must examine and overcome.

Recommendations

In 1973 the USAF conducted a famine relief operation in Chad and Mali called Operation Authentic Assistance. The historical report of this operation is both interesting and enlightening. "Supplementary maintenance and servicing was purchased from Esso Corporation, Air Afrique, and the French Air Force contingent . . . [proving] very helpful to the American . . . personnel . . . unaccustomed to the heat, sand, and dust."[4] Maj Howie Seaboldt, the Chad mission commander, reported that "all of the airfields in Chad had two potential hazards in common. . . . Uncontrolled people and livestock transiting the runway . . . [and] lowered visibility when a thunderstorm would create a sudden dust or sand storm."[5] Offloading of humanitarian supplies was conducted by hand, with one offload in Mali winning the prize for speed with "30,000 pounds of grain off my craft in 13 minutes, a sack at a time."[6] Operation Authentic Assistance suffered engine failures due to heat, sand, and dust, and then observed that "spare part supply from USAFE was poor" but compensated for by the "esprit and resourcefulness of the maintenance personnel and the cooperation of the Malian air force and local air line operators."[7] Multiple instances were observed where safety was compromised or sacrificed in order to conduct the mission. One of the pilots who flew the operation stated, "I think we took too many chances, but at the time it seemed like the right thing to do."[8] While it occurred 27 years ago, Authentic Assistance would have fit in alarmingly well with the current operations reviewed in this paper.

Air operations in Africa face unique challenges, and the USAF is learning to cope with these challenges in various ways—officially via investment programs for improved information flow and planning capability and unofficially via the

gradual growth of a body of knowledge and experience with flight operations on the continent. Challenges relating to incomplete infrastructure on the continent and overcrowding in African skies are beyond the technical and operational capabilities of most local and national governments or the USAF. These challenges will remain with us for some time. However, the requirement for USAF expeditionary and emergency response will remain and could increase as African states struggle to mature and stabilize as democracies and as the natural resources and people of the continent become more and more globally integrated.

US air operations will continue to take place in Africa's increasingly congested skies because Africa's importance as a strategic location, as a humanitarian flashpoint, as a twenty-first century world market, and as a neighbor in a networked world is inexorably growing. While the USAF today can continue to rely on pilots and aircrews who will make Africa air operations happen "because it seems like the right thing to do," we need to actively listen and then learn how to make these air operations both effective and safe. We owe it to the people we might hope to help in Africa, who simply depend on us to do it right. We owe it to the US taxpayers who pay us to get it right. And we owe it to the aircrews, military support personnel and passengers, and their families who—in spite of their quiet heroism and sometimes bravado—trust the USAF to get it right.

Notes

1. Lara Pawson, "Africa's Deadly Skies," *African Business*, March 1997, 11.
2. Gregory Giletti, "The United Nations' Capacity for Strategic Airlift," n.d., received via fax 28 January 1998 from United Nations headquarters, New York.
3. E-mail, 10 January 2000, from Lt Col Mark J. Surina, stating that since the completion of this essay, the Air Mobility Battlelab has become the Air Force's seventh battlelab.
4. Capt Timothy Fuhrman, "Humanitarian Airlift: USAF Response to Natural Calamity, 1960–1974," Research Report (Maxwell AFB, Ala.: Air Command and Staff College, May 1981), 37.
5. Ibid.
6. Ibid.
7. Ibid., 38.
8. Ibid., 39.

Appendix A

Questionnaire Responses from Pilots/Aircrews

Pilot and Operator Questionnaire on Infrastructure and Process Challenges to Expeditionary Air Operations in Africa

The objective of this questionnaire is to better understand and evaluate the numerous air and transportation challenges of African air operations, from an operator and planner perspective, to determine possible future directions for EAF planning in Africa. These problems may relate to air safety, navigation, ground transportation network and airport infrastructure immaturity, security, geography, culture, or governmental mismanagement.

This questionnaire is in support of an Institute for National Security Studies (INSS) sponsored research project by Major Karen U. Kwiatkowski, Africa Branch, Headquarters United States Air Force Regional Plans and Issues Division, Washington, D.C. The final report will be written no later than 1 August 2000.

I am seeking your help because of your ability to share experiences, anecdotes, perspective, insight and suggestions regarding the conduct of military air operations in Africa. Your anonymity will be protected and your responses will not be attributed to you, if you desire. This questionnaire contains 14 questions, most of which include a simple rating scheme, and should take twenty to thirty minutes. I greatly appreciate your assistance and comments.

NOTE: I encourage you to E-mail this questionnaire to any associates, peers, friends, uncles, and fathers who may be able to share perspective and experience on flying in Africa, including commercial pilots who formerly flew for the USAF and may fly today over African airspace. The Air Force community that can shed light on this issue is not exceptionally large—I

need to hear from everyone I can! I can be reached at (703) 695-1539, DSN prefix is 22X. Web site location for this questionnaire is http://www.xo.hq.af.mil/xop/xopx/aircrew1.shtml.

Name:

Email Address:

Mail Address (optional):

Phone (optional):

Fax (optional):

Would like a copy of the completed study mailed to the above address? Yes/No

1. What aircraft have you flown in Africa (either as pilot, navigator, or aircrew)? *(Responses)*

C-20 *(6)* C-5 *(24)* KC-10 *(3)* Fighter (please describe) *(None)*

C-21 *(8)* KC-135 *(5)* C-141 *(8)* ISR, C3I or C2 platform *(None)*

C-47 *(1)* C-7 *(None)* C-119 *(None)* C-12 *(1)*

C-130 *(22)* C-17 *(0)*

Other (please describe):

- C9 *(4)*
- AMC airlift ground support from a TALCE perspective *(1)*

2. On a scale of 1 (low) to 10 (high) how do you rate your level of experience as an pilot, navigator, or aircrew member? *8*

3. In what timeframe was most of your Africa flying experience gained?

Before 1965 *(None)*
Between 1965-1980 *(2)*
Between 1980-1994 *(18)*
Between 1994 to present *(34)*

4. How would you characterize the missions you have been involved in:

Category	Strategic Mobility	Tactical Airlift
Routine channel and supply flights for embassy support	3	7
Non-routine transports of material (non-emergency)	5	5
Non-routine transport of VIPs (including EAGLE VISTA)	11	12
Support to exercises in the region (Gabon 1998, 2000, Blue Hungwe/Crane, etc.)	6	12
Humanitarian response missions	20	21
Contingency Ops	9	13
NEOs	4	4
Other (please list) • Space Shuttle Transoceanic Abort Landing site support (The Gambia and Morocco) • Tactical training flights • Medevac • Phoenix Banner - Presidential Support	3	5

5. In what parts of Africa is the bulk of your experience (check more than one if appropriate)?

North Africa *(15)*
West Africa *(25)*
East Africa *(33)*
Central Africa *(14)*
Southern Africa *(19)*

6. ICAO, IFALPA and other organizations have identified many hazards to flying and challenges to air operations in Africa. In the categories below, please mark or provide a prevalence rating of 1 to 5 for each inadequacy listed. A rating of 1 would indicate this deficiency is rarely observed in your experience, and a rating of 5 would indicate this deficiency has been almost always encountered or observed in your personal experience.

Category	Average Rating (1-5)	
	Strategic Mobility	Tactical Airlift
Aerodromes (1= rarely observed, 5= almost always observed)		
• Insufficient control over persons, animals and vehicles due to inadequate fencing	3.25	3.61
• Bird hazards	1.92	2.37
• Deficient power supplies	2.13	2.50
• Deficient fire and rescue services	2.67	2.82

Category	Average Rating (1-5)	
	Strategic Mobility	Tactical Airlift
Aerodromes (1= rarely observed, 5= almost always observed)		
• Lack of personnel screening for security purposes	3.33	3.26
• Unauthorized personnel accessing secure or restricted areas	2.58	3.13
• Runway/taxiway environment inadequacies (rubber accretion, surface breakup, lighting unserviceable)	3.42	3.16
• Inadequate apron lighting and layout	3.08	3.26
• Unserviceable ground equipment	2.50	2.76
• Non-transmittal of Pilot Reports	2.25	1.82
• Contaminated or inadequate fuel	1.79	2.00
• Excessive fees as compared to other theaters	2.42	2.13
Air Traffic Control: (1= rarely observed, 5= almost always observed)		
• Non-implementation of ATC service within 150 NM from airport	2.67	2.92
• Non-implementation of air traffic system direct speed circuits or need for improved direct speech circuits	2.50	2.82
• Inadequate traffic separation information (generally uncontrolled airspace)	2.79	3.32
• Inadequate provision of air traffic control in “controlled airspace”	2.96	3.03
• Frequent use of non-English communications, on HF, UHF and VHF,between ATC and pilot	2.92	2.58
• Inadequate use of existing ATC radar	2.67	2.74
Aeronautical Information Service: (1= rarely observed, 5= almost always observed)		
• Non-existent aeronautical information publications	2.50	2.82
• Outdated aeronautical information publications	2.38	2.58
• Missing aeronautical charts	2.38	2.79
• Irregular NOTAMs, lack of NOTAM service	3.08	3.45
• Inadequate or unreliable airport weather and wind information for approach and landing	3.09	2.05
• Absence of or inaccuracies in surveys of surrounding areas	2.92	2.87
• Forecasting/weather support deficient	2.67	3.22
Communications/Navigation (1= rarely observed, 5= almost always observed)		
• VHF voice communications within 150 NM of airport not implemented	1.96	2.29
• Unreliable or unusable HF radio	3.33	2.92
• ILS and VOR facilities listed in different stages of serviceability	2.21	2.76
• Lack of flight plans coordination between FIRs	2.92	3.16
• Absence of VHF	2.38	2.13
• Saturation of HF, poor or no HF reception	3.79	3.50
• Selective calling (SELCAL) facilities not provided or inadequate	2.29	1.89
• Bandboxing of VHF freqs in busy areas – tower and enroute frequencies shared	1.54	2.24
• Inadequate en-route navigation facilities (inoperative or partially operative)	2.75	3.05
• NAVAIDs not provided or inoperative	2.50	2.08
• Lack of precision approach aids	2.92	3.37
• Non-calibrated Instrument Landing Systems	1.79	1.87

Category	Average Rating (1-5)	
	Strategic Mobility	Tactical Airlift
General Procedures (1= rarely observed, 5= almost always observed)		
• Noncompliance with ICAO Standards and Recommended Practices (SARPs)	1.63	2.16
• Noncompliance with requirements to NOTAM and all defective facilities	2.08	2.16
• Lack of Air Traffic controller and air traffic communicator training and competency, to include language competency	2.83	3.18

7. Other challenges to flying in Africa relate to issues of fuel, logistics support, fees, and security. Please indicate using the 1 through 5 scale, the severity of problems faced in the following areas (1 meaning problems are unusual and rare, 5 meaning you expect problems in this area every time).

Challenges to Flying	(1= rarely observed, 5= almost always observed)	
	Strategic Mobility	Tactical Airlift
Availability of appropriate fuel limited at airport	2.33	2.00
Availability of runway space to support your mission	2.29	1.82
Availability of ramp width, length or weight bearing capability to support your mission	2.25	1.63
Availability of maintenance or generation equipment	2.63	2.87
Availability of airframe security support (Raven Team or commercial)	2.42	2.68
Unexpected charges from officials	2.29	2.24
Availability of Jeppesen products or FLIPS	2.04	2.95
Availability of country clearances	2.63	2.18
Comm gear maintenance support	1.29	2.50
Medical, food and water support issues for aircrew and passengers	2.96	3.00
Reachback to AMOCC or other air force control and support center	2.25	2.61
Network (web) access	3.25	2.43

8. Theater Command Support: How well does your theater command and your air component support your specific needs to fly safely and effectively in Africa? This time, 1 is “does not support noticeably” and 5 is “supports in a responsive, reliable and innovative manner.”

FAIRCHILD PAPER

Support Category	**(1= not supportive 5= consistently supportive**	
	Strategic Mobility	Tactical Airlift
Scheduling	2.79	3.05
Flight Planning	2.33	2.65
Execution stage (real-time support)	2.54	2.89
Response to concerns identified/process improvement cycle	2.54	2.53
Adequate threat briefing/intelligence preparation	3.04	2.45
Terminal En route Radar Procedure Systems (TERPS) criteria/standards	2.50	2.79

If you gave an extreme score, can you elaborate?

- HF radio traffic is hideous! It was not uncommon to have 4 or even 5 airspace controllers screaming your call sign—whether you were in their FIR or not.
- Schedules fluctuate continuously due to users. No flight planning support is provided except for diplomatic routing which are often in error (wrong airway names, poor routing).
- TERPS approval for IMC approaches is a continual and significant detriment to safety of flight in AFRICA. Invariably (95% of missions) only one approach is TERPSed—usually not the one in use. This forces the crews into an unsafe dilemma—divert (again, available TERPS approaches/dip clc/wx/etc), or fly a non-TERPSed approach (normally the one every other commercial flight is flying) and "hack" the mission. This begs the question, why can an airliner with 400 pax fly a Jeppesen approach, but the UNITED STATES DOD can't? This is the single biggest stressor for crews flying into AFRICA. (The problem is exactly the same in EASTERN EUROPE.) We are guilty of not supplying our crews with adequate resources to complete difficult missions—namely IFR (DOD or Jeppesen) approaches (or at least, improved TERPS action). Diplomatic clearance is another area where we receive lack of support. For Op ATLAS RESPONSE, we launched 7 C130s without diplomatic clearance for coun-

tries surrounding the Red Sea—advising them only to "remain in International Waters." This is a vague and certainly an ATC hassle (bordering on unsafe for lack of ATC separation) and completely unnecessary for our crews. (Get correct DIP CLC or delay the mission!) Launching our crews with vague notions about how to transit African airspace fails to address the problem and force the issue. (Our crews are highly skilled and creative which is why the mission succeeded—not because we provided them with the correct resources or procedures.) TCAS can be a lifesaver—should be REQUIRED equipment on USAF aircraft in AFRICA—no exceptions. (This would exclude most of the C130 fleet.) I have two personal examples of TCAS preventing mid airs. (or at least near mid-airs)

- Filing at certain location in Eastern & Southern Africa can be difficult with language and cultural barriers.
- AMOCC at Ramstein AB normally flight plans missions throughout Europe, but when a mission is fragged to Africa, the mission planning is placed on the crew. Eurocontrol does not process flight plans beyond entry into North Africa. Subsequent legs must be individually filed with each facility. There is no centralized control of air traffic in most of Africa.
- Did not get the TERPS support needed prior to missions. Required USAFE DO waiver at 0000Z for support.
- Aircraft Commander is responsible for 100% of the planning in Africa for 76 AS missions.
- All flight planning done by crew in USAFE for Africa. Limited TERPs Support.
- In the DV airlift business, the leadership just expects the crew to make the mission happen. Basically, once the basic itinerary is cut, the crew is on their own. They rely on their own experiences, those of other crew members in the unit and the embassy personnel at each location. Most of the time the missions are executed safely, however this does not always mean they are conducted IAW

all of the governing directives. The explanation for this is simple, while it is easy to place a statement on the top of every AFI that states "Compliance with this instruction is mandatory," to actually comply with the written regulations in many locations is indeed impossible. For a crew to comply with these regulations fully, the mission would not happen the way the leadership expects it to occur.

- TERPsed approaches in Africa require so much lead time for support that in most OSA (DV support) cases the approaches can't be done in time. Recently had a mission to Africa carrying an ambassador to Tanzania, Zimbabwe, Namibia, and Angola. In most cases. Only one airfield had a TERPsed approach.
- Additionally, weather support in Africa is poor—USAFE OWS can not fully support our missions into Africa and has a difficult time getting the crews good accurate weather forecasts.
- C-130 NEO of Sierra Leone, inadequate "Treat briefing/intelligence preparation." ATC was completely unprepared for us to fly TAA/Ds. Spent extreme amounts of time explaining to ATC what a TAA/D was. If TAA/Ds are required then ATC should be notified so we don't spend time on the radio discussing it.
- CENTAF routinely controls C-130 traffic in and out of west [east?] Africa. Planning and coordination for these missions is rarely done well. Dip clearances are inadequate, aircraft are over-grossed, etc.
- TERPS is a worldwide deficiency.
- We always had a great ops package in place to include Wx, Tactics, Intel and Mx. (Guard)
- Flying strat airlift missions in Africa is always challenging. The biggest problems however are beyond the control of AMC or the TACC. Their support is adequate in most instances. We have very little contact with EUCOM during scheduled missions.

- Most C-130 contingency missions receive little or no support from HHQ. The nature of the mission is such that local commanders (for single ship ops its normally the aircraft commander) are given significant latitude in planning and executing missions.
- In most cases, the flying I have done in Africa, was on contingency (Provide Relief) or Embassy directed (coalition exercises with a particular African nation) and was therefore supported by a fairly large AMC support network. Most of the operations were deployments and supported accordingly. The majority of problems arose due to the national pride most of the individual nations have in their "ability to support" visiting aircrews. What I mean is that the host nation base ops personal would bend over backwards to provide us with weather information, flight plan processing, fuel/airport services, but due to their own situations (poor, lack of first world technology, etc.) they were unable to support us in a way that we have grown accustomed to. The effort was there, just not the capability. I have a major problem with security in those areas. In spite of the presence of severely armed guards, security is, in my opinion, severely lacking. There are numerous methods to gain access to a particular airfield, some due to graft and corruption. This is a way of life for those people and something that is not easily remedied, just something to be aware of. Customs is another area of concern. During one deployment (single aircraft), our aircraft had numerous maintenance problems requiring aircraft parts from European bases. These parts came in via FedEx or another civilian carrier. Due to the "work schedule" of the customs officials, it was next to impossible to gain access to these parts which severely impacted the success of the mission. Bribery was finally used as a last ditch method to get the parts. Just another issue that is not easily remedied. Flying in Africa is definitely challenging, but not something that cannot be overcome. Additional attention to detail is required and a greater awareness of what is going on around you, both on the ground and in the air, is required. Radio communication, airport services, lodg-

ing are all! things that must be looked at strongly for any mission entering the AOR. If there are any questions, please feel free to contact me via E-mail due to the upcoming PCS.

- Here we used USAFE C2 agencies mostly when supporting African missions to Egypt, Somalia, Kenya, or Rwanda.
- Very little theater command support available throughout Africa.
- Majority of my answers are based on flying in Angola in 1992 and Morocco and the areas of Egypt and the Sinai. Focus on TERPs and all the above questions has enhanced greatly since 1993. As a TALCE CC, we provided the best support we could in the more recent past, but better support could always be provided for a price.
- In 1995 while in a crew stage at Rota NAS, I was tasked by TACC to fly supplies to Sierra Leone in support of the embassy evac. While flight planning I learned the airfield was day only (ASR). However, I called the ASR POC at AMC who told me the restriction was due to poor electrical service; further that he had spoke with an Embassy official and the problem had been fixed. I flew to S.L. with little or no contact with Khartoum on HF during portions of the flight. We arrived at S.L. at night with no approach lighting, but determined the moonlight (and a VOR approach) were sufficient to make a safe landing. Landed uneventfully, and taxied to the small ramp which was filled with little light being provided by the 2-3 AF "lightalls" on the ramp. A provisional wx/flightplan team was in place via satcom. We quickly updated the wx/fp and unloaded our cargo (ramp ops were hazardous at best). After cleared for takeoff and lining up on the rwy, airfield lighting was ! lost . . . completely. However, communication with the tower remained . . . we asked tower if this happened much: he responded "occasionally." After a few minutes the lights returned we were cleared for takeoff only and told that our enroute clearance would be re-

ceived from Karthoum on HF. We were unable to reach Karthoum for 1 hour after takeoff and proceeded on the route according to VFR rules while opposite direction IFR traffic passed above us. Although this is only one incident, it illustrates some of the common problems we have in Africa.

- Africa missions are rarely dropped with enough time for adequate mission planning. Along with this, there are not any approaches or departures for most locations requiring TERPSed Jeppesen approaches. TERPS can not get these done on time and crews must depart on the mission without all the tools needed and try and receive the information while crew resting. Users consistently change itinerary keeping execution out of the loop. Keeping contact with execution is impossible in many parts of Africa without a satellite phone. Actual and real time threat and Intel support is weak. We receive a briefing before we depart yet no updates on the road are given. VIP aircraft are routinely sent to locations that are listed as “no go” and high threat with no capabilities for threat avoidance or defensive countermeasures. Defensive locations.
- TACC support was adequate at best, however TERPS support was not good when I was in AMC.USAFE/AMOCC support during execution of the mission in Africa is nonexistent. They cannot file flight plans, nor is USAFE TERPS much help when in Africa. The USAFE Threat Working Group that provides threat/intel briefings to the crews is lacking and inconsistent. Once I was told not to crewrest in Dakar (where tourists stay), but it was OK to stay in Kigali (where we heard gunfire outside the hotel all night!
- AMC runs missions at whatever hours they are required. It would be easier and safer to operate in some parts of Africa during normal daylight hours only. AMC handling of TERPS issues is pretty good. Much more operationally flexible than USAFE which crippled itself unnecessarily. USAFE (94-97) would require daylight VMC ops throughout Africa because adequate NOTAMs and maps weren’t

available to perform proper TERPS reviews. AMC (97-) has the same info constraints but uses innovative solutions like adding a couple hundred feet to the Jeppesen minimums.

9. AMC Support: How well do AMC products, programs, services and policies support your specific needs to fly safely and effectively in Africa? This time, 1 is "does not support noticeably" and 5 is "supports in a responsive, reliable and innovative manner."

Support Category	**(1= not supportive 5= consistently supportive**	
	Strategic Mobility	Tactical Airlift
Scheduling	3.13	2.92
Flight Planning	2.79	2.71
Execution stage (real time support)	3.00	2.79
Airfield Suitability Reports	3.50	2.53
Summary of Airfield Restrictions	3.25	3.24
Airfield Surveys	3.00	2.68
Adequate threat briefing/intelligence preparation	3.46	2.79
Terminal Enroute Radar Procedure Systems (TERPS) criteria/standards	3.00	2.61
Response to concerns identified/process improvement cycle	2.83	2.63

If you gave an extreme score, can you elaborate?

- Lodwar LZ in northern Kenya was described as in "poor" condition by the surveying TALCE team, yet nothing was done before the exercise to fix the problems. We had to raise a stink with the Army and get them to fix it before we would land there, which caused delays and changes in the exercise flow.
- ACFP program has several "blocked airways" into Africa unnecessarily complicating flight planning and increasing the workload.
- TERPS again—The answer we get from TERPS is "get in line—we have millions ahead of you—you have one approach, why would you want one to the opposite runway—or why would you need more than one departure TERPSed?" Let us fly Jeppesens.

- AMOCC controls USAFE missions into Africa, we do use the above noted AMC products which are beneficial to crew mission planning.
- Have never used AMC (TACC) for Africa. All has been with USAFE
- 76 AS is in USAFE. Generally, they handle our Command and Control.
- Airfield Restrictions and suitability reports are sometimes not up-to-date.
- I am in USAFE and have had no AMC support during my trips to Africa. However, it is interesting to note the almost conflicting guidance that the ASRR provides when compared to USAFE policy (i.e., night ops, diverse departure assessments etc.).
- Airfields not covered in the ASSR. USAFE AMOCC was supportive but could not get the office (24 AOS) in charge of TERPs issues to complete TERPs surveys in a timely manner.
- Same as above.
- Again, AMC always provided more than adequate service, but was limited due to the "end of the food chain" location. On deployments, an AMC C&C facility was always there to provide required support. But they were also affected by the "end of the food chain" situation.
- Don't really deal with AMC. There generally seems to be a lack of info dealing with African airfields, routes, and navaids. Not our/AMCs fault.
- AMC far more responsive to aircrew requests than theater command.
- In Angola in 92, we had almost no survey data or airfield support in Angola other than at our home base of Luanda. We flew VFR only into many fields in the country and would do a low pass to clear people and animals off the runway and then land on the second pass. As the Nav deputy mission commander, I was tasked to design

letdowns and ARA procedures to support our operations, but none of this was terpsed or really blessed other than based on experience. Things have changed and improved based on my TALCE experience, but there are so many airfields on the continent that we don't and never will have sufficient enough data for all of them. DOD needs a national level airfield survey office that performs airfield and site surveys for all airfields anticipated of being used by US aircraft, world wide. All the services and many of the commands within the services do some level of this, but there is not one consolidation point that I know of. AMC with its ASSR report is one of the best sources of information, but to have all the fields surveyed and kept current that we really need, you would need 100s of survey teams to do them all. We do a good job with the capabilities we have, but the program could be improved.

- During multiple missions to Ghana, the Ivory Coast and South Africa, the crew would get alerted without flight plans, weather, or dip clearances. The situation was so bad we would have to transmit via the l-band system to acquire the needed info. During the most recent flood relief to Mozambique, no one had any water deployed with them. Basically we were given an alert time and not much more. The embassy support was phenomenal. They were our saving grace.
- Same as above. C-5 does not chop to theater control. On my last Africa trip, Mozambique flood relief, it was like trying to perform airlift without phones (little to no comm with C2 was available). You can't do this mission without phones. We didn't have flight plans, Notams, air refueling info to join with tankers, or mission orders for the day.

10. NIMA Support. How well do NIMA products, programs, services and policies support your specific needs to fly safely and effectively in Africa? This time, 1 is "does not support noticeably" and 5 is "supports in a responsive, reliable and innovative manner."

Support Category	(1= not supportive 5= consistently supportive	
	Strategic Mobility	Tactical Airlift
Approach/Departure Plates	2.54	2.74
En route charts	3.04	3.16
General planning/area planning publications	2.79	3.24
IFR Supplements	2.83	3.11
In-flight guides	2.67	2.63
Other FLIPs	2.17	1.42
Timeliness, currency, and accuracy	3.00	2.97
Availability of Jeppesen products (may speak to unit policy)	2.88	2.97
Response to concerns identified/process improvement cycle	2.61	2.63

If you gave an extreme score, can you elaborate?

- Very few airfields have DOD FLIP published. Enroute charts coverage is incomplete. Several airways over the ocean west of Morocco are not depicted (we need to use Jeppesen products for coverage). Jeppesen products are readily available but seldom approved for use due to USAFE TERPS issues and policy. Other FLIP: Foreign clearance guide is frequently outdated.
- FLIP pubs are OK—but SPARSE—particularly in airfield info and number of approaches (the AFRICAN Approach book is hardly worth publishing—one approach to places we rarely go is no help).
- We need more approaches and SIDs approved and better airfield surveys.
- This is simple, the NIMA products we receive are not as updated as they should be. In addition, frequently in Africa pilots are using MAJCOM approved TERPS products, because the DOD FLIP does not have the procedures required or they are incomplete. This lends new meaning to the term “paperless Air Force.” To see examples of this just view the ASRR under the Jepps approaches and/or view the USAFE TERPS Web page. In my experience, I have used both Jepps en route charts as well as DOD, be-

cause the DOD charts are missing some of the changes that are incorporated in Jepps.

- We don't work directly with NIMA.
- NIMA approach/departure plates simply don't exist for many areas that may have Jeppesen products available. Flight planning processes are delayed significantly when these very necessary pieces of information are not available or hard to get through normal sources.
- No JOGs available for most of our routing. We flew low levels on "other" charts. When asked, NIMA gave us the standard, "we don't have them and it will take to long for us to get them."
- We had airline guys with Jeps. Our charts had coverage holes in them. Just big white areas. That was 8 years ago. (Guard)
- Jeppesen products were copied illegally (copyright) and distributed to the crews.
- With regard to Jeppesen products, our unit maintained (and funded) its own volumes of Jeppesen products because DOD publications did not cover most of the airfields we traveled to in Africa as well as South America, FSU and SEA.
- NIMA products are generally good. Jeppesen and other products (ASRR, etc.) are good for major airports, but rarely cover the airfields most C-130 operations must transit. In many cases, you go with a satellite shot or nothing at all and make the best of it.
- NIMA products are generally good, but info out of the African countries is hard to acquire sometimes and they cant help but be behind.
- Very few DoD approach/departure plates in numerous locations in Africa.
- There are hardly any DOD plates for Africa. Jeppesen are available but the are not TERPSed and approved in a timely manner.

- Products are fine if you only go to major airports. If a contingency kicks off you often go to some hole in the wall or mil base and have no DOD products. Accuracy varies.

11. How do you usually resolve issues and flight challenges when preparing for or executing missions in Africa? (Check all that apply.)

	Strategic Mobility	Tactical Airlift
Call back to home station	12	17
Call back to AMC or theater 24-hour support center	11	13
Rely on the Defense or Air Attaché in country	12	21
Rely on commercial airline services	1	4
Avoid known problem airports	4	5
Refuse or modify missions	1	10
Attempt to be self-sufficient in areas of security, health, maps, communications, logistics, maintenance, extra equipment, etc.	12	11
Other (please elaborate) • Bring it with you as part of the deployment Rarely had problem "teaming" with all agencies supported by the mission(s)—conference calls work. • Fed Ex for aircraft parts to small locations • Work with host-nation military forces, particularly air force contacts • Since communication by telephone or HF can be difficult at best, self-sufficiency is a necessity		

12. How many of the following programs are you familiar with?

Phoenix Raven *(48)*

Safe Skies for Africa *(7)*

Falconview *(50)*

TCAS *(55)*

Proposal to install anti-ground to air radar on selected transport aircraft *(6)*

Contingency Response Group *(34)*

13. What recommendations do you have for Air Force planners to improve the safety, reliability and effectiveness of air operations in Africa?

- Continue to work with host national ATC to improve their training/competency/capability.
- Need reliable communications (cell phone, satellite phone or other). Publish more Approaches in FLIP. Encourage installation of ATC radar in the region.
- TCAS required. Dip CLCs are mandatory. TERPS support or address the issue of Jeppesen approaches
- The CRG is worth their weight in GOLD!!! Outstanding support and coordination efforts during Operation Atlas Response.
- Specialized qualification for aircrews operating in Africa, with focus on unicom position reporting and flying Jeppesen procedures.
- Issue TERPS for multiple runways for both arrival AND departures, not just arrivals. Insure crews are versed in HF procedures transiting Africa (FIH).
- The greatest challenge we have is getting Jeppesen Approaches and SIDs approved in a timely manner. Many times we go down with only the fields approved we are going to land at. If there was enough lead time, we may have one alternate approved. When we go into a place, We get one approach to each runway (i.e., an approach to Runway 09 and an approach to Runway 27) and one SID from each runway. Controllers don't understand you can only accept one approach and one SID and may make you fly something else. Anything else falls on the aircraft commander to sort out. Approve more approaches for DOD use would help this. This is also true in Eastern Europe former Soviet Union and many other third world countries. The second greatest problem is getting Diplomatic landing clearance and visas. These take time which is not always a luxury we have.
- Avoid uncontrolled air space.
- Senior Leadership needs to realize that there are unique problems to flying in Africa and that more attention and time to plan is needed for missions in Africa.

- This at present is impossible. All Air Force aircraft must be equipped with modern technology such as GPS and TCAS. Interestingly enough following the C-141 midair collision over Africa a call went out for all aircraft to get TCAS, this as yet has not happened. Until the USAF is ready to spend the $$ to support safer operations addressing this issue is a waste of time. Cheap improvements do not help, we need the whole deal, we either commit to safer operations and do what is required or we don't and stop giving it lip service. If you can do anything, provide crews plenty of lead time to prepare for these trips. I have seen crews sent to Africa with less than 24 hour notice, this is less than the 48 hours required to begin the malaria medicine. I also do not understand why the visa issue is so painful, if the unit is responsible for these then they need time to comply with the FCG.
- Every airfield the USAF flies to needs to have at least one TERPsed approach to each runway and a method of departing the airfield safely (radar, diverse dept, or SID). Also we need some sort of capability to get accurate weather forecasts.
- Concentrate on infrastructure within the entire continent. Specifically, we encountered difficulty in servicing aircraft oxygen supplies that would have stranded the aircraft had we not taken extreme measures to fix the problem. Prepositioning maintenance and support equipment or having these services available and more widespread is essential. NIMA products also need to be updated and brought into alliance with Jeppesen-like coverage. Airline service to many of the fields we operate to/from exists and has for years and we limit ourselves if we can't count on having complete and accurate flight publications.
- Good coordination with other humanitarian relief agencies in order to deconflict airspace. Provide or upgrade current in-country navigation aids.
- Don't plan NEOs without supplying JOG's!

- Tell NIMA to publish wildlife areas better so planners know exact areas to climb over.
- We had to implement our own enroute Air Traffic Control between Kenya and Somalia. We had a plan using altitudes and airspeeds but some of the other nations didn't abide by the plan. We then had to use whatever we had onboard (i.e., RADAR, TCAS, eyeballs). Don't make a plan which relies on a piece of equipment that is not universal (GPS, TCAS).
- I've always had good background info. Keep getting info from the embassy and reliable sources so that if a contingency pops up you have current info. (Guard)
- The single most significant thing the AF can do to help is to fund and maintain Jeppesen approach publications for all squadrons who are routinely tasked with accomplishing missions in Africa.
- If we want to continue to operate over there, and do it safely, then we should take over the whole operation and install an ATC structure. If not we should invest in the ATC structure or abandon missions there.
- We need people who are familiar with the area (politics, terrain, environmental conditions, populace, airfields, air structure, etc., to be called in at the beginning if a contingency operation is planned for this AOR. Africa, to a greater extent than ANY other AOR, is one that planners must have been to and operated in previously before allowing them to be involved in contingency planning. Its the old you've had to have been there or you cant go. Too many variables and unique situations that must be conquered by planners in the AOR to let in "newbies" who need to get their feet wet.
- Get AF planners who are familiar with the conditions on the ground there. It should be a requirement that planners have in-theater experience before sending a mass gaggle into a contingency.

- Just be aware of the limitations aircrews have when in Africa and provide a certain amount of trust to the aircrews. We should not have our hands held throughout a particular mission. In my time flying the Herc, I have gained a lot of respect for Herc crews. They WILL get the mission done, and for the extreme most part, it is done safely and efficiently. AMC needs to continue to let us do our job and provide the trust we both want and need.
- Use of technology today to show aircraft commanders "pictures" or airfield diagrams of locations to be transited. Cross-tell between pilots/crews flying into the AOR affected. Good theater briefs are essential—customs, security, medical issues. Solid insight into logistical support available—ramp space, fuel, food, maintenance, transport C2 connectivity to coordinate mission needs is critical—reachback to TACC and/or JTF AME is critical.
- Diplomatic/Intelligence support of operations in the planning/contingency phase to allow full-range forward-deployable support packages to enter before/with military air mobility ops. When someone (user/DAO for VIP; TACC/AMOCC planners for contingency/humanitarian) hasn't done the full-blown planning before an aircraft/crew arrives (attempts to arrive)—then the mission goes poorly. When this think-tank process has occurred—then the missions go smoothly.
- TCAS requirement. Stress the training of current procedures. Require Raven teams. Require bottled water and MREs to be brought with. Ensure POC who has handled all landing fee issues is awaiting arrival of aircraft.
- Stabilize the continent politically, fiscally, and up their education level.
- Have a clear mission FIRST, then provide the operators with the resources (country clearances, airfield surveys, etc.) so they can accomplish that mission.
- Forward locate contingency supplies at a secure location within Africa. These supplies should include Mobile Mi-

crowave Landing Systems (MMLS) or other highly mobile precision approach systems, along with base perimeter defense supplies. First aircraft into contingency location could transport security force team to quickly break out supplies and defend build up location. USAF ATC personnel could quickly set up the precision approach system and the contingency op would be safely on its way.

- As mentioned earlier, create a DOD level office that works with NIMA to conduct surveys of all airfields that may be used by C-130 or larger aircraft. Publish the data and keep it up to date.
- Absolutely all aircraft that fly into areas other than our usual European NATO countries should have TCAS as a minimum. The system is almost 20 years old and it seems irresponsible of our military not to supply it.
- Although contingencies sometimes give little time for planning, work to establish lines of communication early. Task folks with theater planning specifically to Africa and not as an "arm" from east cell. There are plenty of folks willing to help us in Africa but they lack information and resources to do this.
- Survey, Implement, and Certify use of portable navaids in contingency/exercise locations. Implement dispersion of approach plates to planners/aircrew via WWW.
- More approaches in the DOD Flip and more TERPS support. Also TCAS is almost a must in Africa. It makes things more challenging without it. TERPS and proper threat assessments are the biggest issues.
- I have three recommendations: 1. TERPS2. TERPS3. Better weather support. We need more approaches and departures out of these fields with current and reliable information. The fact remains that we will be tasked to fly into these fields. And in many cases we are forced to make dangerous decisions because we don't have the TERPS info we need to get in and out of these fields. The weather info I have received in Africa is generally either wrong or

understated which has led me into several dangerous situations because of low ceilings where none were reported or T-storms that were more prolific than forecast.

- Keep operations simple, minimize need for air refueling and stick to major airports.
  - An air refueling mission is hard enough to pull off with adequate information, but very difficult if you can't get to a working phone/fax/or E-mail.
  - Enhance communication abilities. Issue worldwide cell phones or satellite phones to crews transiting Africa. This would solve many problems.
  - Operate during normal daylight working hours. This makes it easier to get aircrew and transportation support; see terrain; and to avoid weather and terrain hazards.
  - En route support agencies really help out and make the mission possible.
  - Stay out of Africa where possible. Too many diseases, too hot, too dangerous.
  - Somehow get the controllers to talk to not only the aircraft, but also to each other!
  - TCAS, Dual VHF radios for C-130s.

14. The idea of expeditionary air ops is not new to airlifters. Do you have any comments or suggestions to help improve how we do these expeditionary operations in Africa?

- Attack the above problems en-masse. Build web-site for AFRICA continuity—lessons learned, etc.
- Developing liaisons with flight plan filing and tower/ground operations are crucial at busy international airports that might not be used to airlift operations; to include taxiing, up- and downloading procedures, etc.
- Send in advance teams which can TERP potential airfields to include all data that may be beneficial to crews. I recommend producing an extensive "in-flight" guide for each

airfields to include any additional information not found in FLIP or GP. Lufthansa and Britannia airlines fly regular routes throughout Africa. Use their expertise (and perhaps briefers) to make flying safer in Africa.

- Does it really matter? We were not asked to provide input on the whole expeditionary ops issue in the first place. Flying operations in Africa requires time to prepare and experienced personnel to fill in the gaps. Since the AEF concept is based on short notice deployment and a great deal of experience is departing the Air Force, we are primed for a major mishap in Africa.
- We need a crack group of individuals that can handle short notice requests for TERPs support of approaches and departures at African airfields and a command and control that can get CFPs and reliable weather to aircrews. Also, reliable communication systems are a must. Iridium phones were good but are now bankrupt—regional cell phones can not be relied upon.
- Always bring a contracting officer and finance officer when deploying to Africa. Put them on the ADVON, keep them happy. They will make or break your deployment.
- Take more people than you think you need. There is always plenty of work to do and never enough bodies. I've worked a lot of 12 hour shifts as a planner or Tactics guy and it decreases performance over time. (Guard)
- Other alternatives [include] no night VFR authorized without a waiver. Took us a while to get a waiver for night VFR [and] Review prior mission reports.
- How does the AEF help airlifters? The concept only applies to the fighter/bomber/etc types who know their rotation. It does not apply to airlifters since we are the ones who continually have to lift them into
- The theater. As far as the AEF concept goes, it is severely one sided. Its no wonder we cant keep trained pilots. I wish we could match our Ops Tempo with actual force structure. How is it that we have taken a 30-40% reduc-

tion of forces yet, the Ops Tempo has increased 300-400%? Solve that problem and the ensuing expectations, and you will solve the retention problem.

- Plan to take everything!! Transport, tents, medical, security, fuel, portable TACANs, etc. Do not try to do it with multiple aircraft on a long term mission with a shoestring budget. You'll lose crews, aircraft and material
- See above. [Do] not rely on any host nation support - the offer is unreliable and the material of questionable serviceability.
- None. AEF is just another name for the scheduled deployments we used to do. All squadrons required to support AEF operations are well versed in flying and know what has to be done to execute an African mission. Again, provide the trust and whatever support can be provided.
- Follow model of C-130s when they deploy—they have done it for years. Unit integrity—to foster teaming, to take advantage of "certifying" the UTCs and team to support the AEF is smart Wings, Squadrons, units like deploying as a team—want to take their maintenance, support elements with them
- Get no-kidding experienced aircrew involved in the above-mentioned think-tank process. The AMC AMWC at Fort Dix (McGuire) has some of these experienced people and they need more and the budget to continue the science of air mobility ops. Then their corporate knowledge must be published in users guides and then trained toward TALCE/Stage Mgrs./AMEs, and to DAOs when no AMC/Theater C2 forward presence is not used.
- Don't put fighter guys in charge. Most NAFs and MAJCOMS where the AEF CC will come from is a fighter dude. Need more heavy guys/gals on the staff so they can have the local "expertise" on hand to do things wisely.
- A band-aid on an amputation is not enough. Relief efforts in Africa are a waste of resources if not part of a larger plan to help build up the infrastructure in those coun-

tries. And I don't believe that such rebuilding is the responsibility of the U.S. military. I've deployed to Kenya twice for Somalia relief efforts (3 months total) and to South Africa once supporting Mozambique relief efforts (1 month). The Somalia effort was (in my eyes) more successful because there was a more clearly defined objective. As for the Mozambique effort, to the line flyer it seemed to be unfocused and more of an effort to prove that we could deploy - whether we had a mission or not.

- See comments above [regarding prepositioning]. First aircraft in should be carrying base defense assets, followed by ATC assets. Then the actual operation (movement of humanitarian supplies, NEO, etc.) could begin in earnest.
- In every AEF package/unit move, include a LOG Planner UTC in the tasking for each deploying unit, or incorporate Log Planners into the Aviation UTCs and other support UTCs so that the arrival, beddown and retrograde/redeployments go smooth.
- My missions into Northern Africa were fairly good, not many complaints. However I did not have the fortune of flying into sub-Saharan Africa, only Tunisia and Morocco. Good luck.
- TCAS More training to enhance familiarity with flying in Africa. Schedule missions to Take-off/Land during daytime.
- The simplest (small) things have the biggest impact in stage operations. During stage operations issues such as fleet service, water, accurate load information, passenger manifests, etc. For the crews themselves, timely transportation to and from the aircraft is always a nightmare. Having to wait as much as 2 hours (at the acft) at the end of the duty day for transport to quarters does not help either. Crews having to sleep on the aircraft (as crew rest) is unacceptable.
- Develop "primary" vs "alternate" operating locations in Africa which would cover most contingency locations. This could be done now. As these relationships could take

time to mature, sufficient lead time is a must. Airfield surveys could be completed as well as TERPs data. Proposed contracts or gentlemen's agreements for things such as food, water, transportation and lodging could be obtained. This would be far better than swamping the embassy personnel with 5 aircrews and 3 aircraft at the last minute. Immediate response to some situations is critical. However, lack of organization impedes progress as much as non-reaction.

- As a C-5 pilot during ops into Somalia and Kenya/Rwanda, I experienced difficulty with enroute controllers frequently, but it did not bother me a whole lot. The phase that was of greatest concern to me was the last 150 miles into an airport, after the descent was started, while still under the control of local controllers. It was always a comforting feeling to be under control of a US military controller for the final phase of the approach (inside of 30 miles). If US controllers were not established at more austere locations, that was the time I felt the greatest danger (specifically if weather was a factor).
- Small advance teams (these could be contractors) used to set up communication/navigation equipment would help dramatically instead of relying on the host nation approaches.
- Send TERPS and a Combat Weather Team to the region where the EAF operations are to be conducted.
- It might be advisable to assign only the most experienced planners to Africa missions, and add an extra level of planning scrutiny. Too often I have seen Africa missions planned very poorly with impossible plans - thereby requiring extraordinary efforts from the crews.
- Since the installation of GPS equipment I have noticed that most other GPS airplanes pass exactly overhead or underneath. Precision equipment has reduced the margin of error in flight ops. In Africa where there is little radar control this could have deadly consequences. We should

get TCAS soon or consider offsetting from course centerlines.

- Noteworthy experiences:
  - In Ghana the airport ran out of fuel for three days and could not support C-5 operations. Local national ground crews were incapable of marshalling our airplanes onto tight ramps but would not allow USAF personnel to do it. These locals later ran a stair truck into one of the airplanes parked on the ramp. By the end of the mission the ramp pavement was badly damaged.
  - On a return trip from South Africa (a pretty advanced African country) our flight plan was never transmitted to other Oceanic control centers. We air refueled over the ocean and were not able to gain radio contact again for several hours. None of the areas we transited cared about our flight plan until we arrived unannounced into New York Oceanic airspace at which time we became a traffic conflict and almost got violated.

Appendix B

African Airfields Listed in the Airfield Suitability and Restrictions Report*

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
ALGERIA	TAMANRASSET	11,811	148	82		4,518	175	340	620	580	840	Aug-93		A	ACDEFSTGL
ALGERIA	AIN OUSSERA	11,500	150	72		2,132	175	330	550	570	840	Nov-95	70	A	ACDEFHRSGL
ALGERIA	HOUARI BOUMEDIENE	11,483	197	75		82	175	342	593	585	840	Jan-00		M	ACDEPGLPQT
ALGERIA	NOUMERATE	10,171	197	107		1,512	175	491	593	585	840	Mar-96		A	ACDEPTGL
ALGERIA	TINDOUF	9,850	131	72		1,453	175	330	550	455	840	Aug-93		A	CDRS1256
ALGERIA	EL MELLAH	9,843	148	55		16	175	253	406	426	840	Feb-96		A	ACDEPTGL
ALGERIA	OUARGLA	9,843	148	87		492	175	345	620	580	840	Jan-94		A	ACDEFHJRSGL
ALGERIA	BECHAR	9,808	139	58		2,661	175	266	XXX	450	XXX	Mar-96		A	ACDRS256GL
ALGERIA	TAFARAOUI	8,989	148	75		367	175	340	575	580	840	Aug-93		A	ACDEFJRSGL
ALGERIA	REGGANE	8,215	98	67		955	175	305	510	530	840	Jan-94		A	ACDRS256GL
ALGERIA	LAGHOUAT	9,355	148	72		2,510	175	330	593	580	840	Feb-96		A	ACDEFRSGL79
ANGOLA	LUANDA/4 DE FEVEREIRO	12,139	148	105		243	175	479	593	585	840	Mar-00			ABCDEFGLPQRTZ
ANGOLA	MENONGUE	11,483	147	46		4,469	165	210	330	350	730	Jun-96		A	ACDGLRSZ
ANGOLA	SAURIMO	11,155	148	53		3,583	140	180	270	270	610	Jan-94		A	ACDFJRSGLZ
ANGOLA	CUITO CUANAVALE	9,100	98	38		4,101	140	175	XXX	280	XXX	Jun-96		A	CDRS1256Z
ANGOLA	HUAMBO	8,727	148	105		5,587	175	345	593	585	840	Jul-96		A	ACDEFGLRSZ

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
ANGOLA	CABINDA	8,202	98	78		66	175	345	XXX	585	XXX	Jun-96		A	CDRS256Z
ANGOLA	LUENA	8,200	100	39		4,360	142	XXX	XXX	XXX	XXX	Jan-89		A	CRS1256Z
ANGOLA	NEGAGE	7,874	98	53		4,105	175	XXX	XXX	410	XXX	Jun-96		A	CDRS1256Z
ANGOLA	MALANJE	7,383	98	49		3,868	175	XXX	XXX	375	XXX	Jun-96		A	CDRS1256Z
ANGOLA	WAKO KUNGO	6,632	100	35		4,323	128	160	XXX	XXX	XXX	Mar-93		A	CRS1256Z
ANGOLA	BENGUELA	5,315	100	46		118	165	XXX	XXX	350	XXX	Jun-96		A	CDRS1256Z
BENIN	COTONOU	7,874	148	70	53FBXT	16	175	321	507	532	840	Jan-97		F	ABCDEFGLPZ
BOTSWANA	THEBEPHATSHWA	9,850	148	61	44RB	3,750	XXX	XXX	XXX	XXX	XXX	Aug-99	99	MF	ACDFGHILQRS25
BOTSWANA	SIR SERETSE KHAMA INTL	9,843	148	78	75RBWT	3,299	175	359	593	585	840	Mar-97	97	ML	ABCDEFGLPQTZ
BOTSWANA	FRANCISTOWN	7,218	98	40		3,283	145	184	XXX	297	XXX	Jan-98		AMF	ACDGLPQRT256
BOTSWANA	KASANE	6,562	98	30	15FAWT	3,289	116	135	XXX	239	XXX	Feb-98		MF	ACDGLRS256
BURKINA	BOBO DIOULASSO	10,826	148	73	57FBXT	1,509	175	337	560	XXX	840	Jan-88		A	ACT56GLZ
BURKINA	OUAGADOUGOU	9,843	148	75	59FBXT	1,037	175	345	554	579	840	Sep-97	97		ABCDEFGLQTZ
BURUNDI	BUJUMBURA INTL	11,811	148	63	80FAXU	2,582	175	345	593	585	840	Nov-96	70		ABCDEFGLPZ
CAMEROON	GAROUA	11,155	148	76	71FCXT	794	175	346	593	579	840	Nov-99	99	M	ABCDEFGLPQTZ
CAMEROON	YAOUNDE/NSIMALEN	11,155	148	76	071FCW	2,278	175	346	593	579	840	Feb-00	99	M	ABCDEFGLPQTZ
CAMEROON	DOUALA	9,350	148	66	59FCXU	34	175	303	554	503	840	Feb-00	89		ABCDEFGLPQTZ
CAMEROON	BAMENDA	8,202	148	46		4,065	164	212	328	XXX	728	Jan-90		A	ACRS256GLZ
CAMEROON	YAOUNDE	6,562	148	42	26FBYU	2,464	145	194	XXX	320	611	Nov-99	99		ABCDFGLOQRSZ5

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
CAPE VERDE	AMILCAR CABRAL INTL	10,728	148	87	58FAWT	177	175	397	546	585	840	Oct-97	97	M	ABCDEFGLPQTZ
CHAD	ABECHE	9,186	100	24		1,788	90	XXX	XXX	XXX	XXX	Jan-89		A	CRS1256Z
CHAD	NDJAMENA	9,186	131	69	63FCXU	968	175	317	XXX	528	840	Oct-97	97		ABCDGJLPRZ568
CHAD	FADA NORTH	8,530	150	39		1,600	141	XXX	XXX	XXX	XXX	Jan-90		A	RS12345679Z
CHAD	FAYA LARGEAU	7,546	164	39		771	141	XXX	XXX	XXX	XXX	Jan-90		A	CRS1256Z
CHAD	TOKOU	6,598	128	14		1,600	56	XXX	XXX	XXX	XXX	Jan-91		A	123456Z
CHAD	GOURO	6,299	180	30		1,315	110	XXX	XXX	XXX	XXX	Jan-91		A	CRS1256Z
CHAD	FADA WEST	6,038	197	29		1,800	108	XXX	XXX	XXX	XXX	Jan-91		A	CRS125679Z
CHAD	BARDAI ZOUGRA	5,906	190	20		3,524	77	XXX	XXX	XXX	XXX	Jan-90		A	CRS1256Z
CHAD	ZOUAR	4,757	180	20		2,654	77	XXX	XXX	XXX	XXX	Jan-90		A	123456Z
CHAD	ABADA	4,600	100	20		2,250	77	XXX	XXX	XXX	XXX	Jan-90		A	CRS1256Z
CHAD	OUADI DOUM	4,500	90	71		1,310	175	325	542	XXX	840	Jan-90		A	123456Z
CHAD	YEBI BOU	3,985	197	3		4,500	XXX	XXX	XXX	XXX	XXX	Jan-91		A	12345679Z
CHAD	FADA	3,609	164	14		1,788	56	XXX	XXX	XXX	XXX	Jan-90		A	12345679Z
CHAD	KORO TORO	3,281	98	14		797	56	XXX	XXX	XXX	XXX	Jan-90		A	12345679Z
COMORES IS	MORONI-HAHAIA	9,514	148	53		89	175	244	389	408	840	Nov-96		A	ABCDEFGLTZ
CONGO	BRASZAVILLE-MAYA MAYA	10,827	148	75	59FBXU	1,047	175	345	554	579	840	Aug-98	97		ABCDEFGLPQTZ
CONGO	POINTE NOIRE	6,562	115	350	20FBXT	56	121	XXX	XXX	272	XXX	Feb-97			CDRST125679Z
D.R. CONGO	KINSHASA/N DJILI INTL	15,279	197	73		1,027	175	335	559	530	840	Aug-98	91		ABCDEFGLPRT8Z

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
D.R. CONGO	KISANGANI	11,483	148	63		1,417	175	220	345	365	765	Nov-96			ACDEFGHLPSTZ
D.R. CONGO	LUBUMBASHI INTL	10,527	164	55		4,295	140	176	265	285	605	Nov-96	70		ABCDEFGKLPTZ
D.R. CONGO	GOMA INTL	9,843	148	63		5,088	140	175	260	280	595	Nov-96			ABCDEFGJLPRSTZ
D.R. CONGO	KAMINA BASE	8,703	148	39		3,543	175	345	593	585	840	Nov-96	90		ABCDEFGJLRSZ
D.R. CONGO	KITONA BASE	7,874	147	72		394	175	220	345	330	765	Nov-96	70	A	ACDGLRS256Z
D.R. CONGO	KANANGA	7,218	148	60		2,139	175	255	405	425	840	Nov-96			ACDEFGJLRSZ
D.R. CONGO	KISANGANI-VILLE	7,218	98	39		1,289	90	110	XXX	160	XXX	Nov-96			ACDGILRS256Z
D.R. CONGO	BUKAVU/KAVUMU	6,562	148	40		5,643	117	185	XXX	300	XXX	Nov-96			ACDFGHILORS25Z
D.R. CONGO	MBUJI MAYI	6,558	146	36		2,221	130	165	245	265	560	Nov-96			ACDGJLRST56Z
DJIBOUTI	DJIBOUTI-AMBOULI	10,335	148	75	70FCWU	49	175	342	593	572	840	Oct-97	97		ABCDEFGLPQTZ
EGYPT	HURGHADA	13,124	148	75	70FCWU	52	175	342	593	572	840	Apr-99			ACDEFGL
EGYPT	CAIRO INTL	13,120	197	135	100FAWT	382	175	620	593	585	840	Dec-99	84	M	ABCDEFGLPQZ
EGYPT	BENI SUEF	11,565	197	49	32FBWT	108	171	225	343	367	710	Jun-98	98		ABCDEFGLQRSZ
EGYPT	ASWAN	11,155	148	76	60FBWU	662	175	349	562	585	840	Jul-98			ACDEFGLT
EGYPT	BORG EL ARAB	11,155	148	72	55FBWU	177	175	329	523	547	840	Aug-99	97	L	ABCDEFGLQT
EGYPT	WADI AL JANDALI	11,000	130	92		800	175	422	XXX	585	XXX	May-99		F	ACDGLQRS256
EGYPT	SHARM EL SHEIKH INTL	10,108	148	81	65FBWU	143	175	369	593	585	840	Jan-00	90	M	ABCDEFGLPQ
EGYPT	JIYANKLIS NEW	10,000	145	97	67FA	49	175	444	593	585	840	May-99	99		ABCDEFGJLQS
EGYPT	WADI ABU RISH	9,920	131	59		1,092	175	270	440	XXX	840	Jan-90	86	A	ACQRS256GL

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
EGYPT	ABU SIMBEL	9,843	148	85	70FBWU	616	175	389	593	585	840	Jan-00	96		ABCDEFGLPQRT
EGYPT	FAID	9,843	131	59		70	142	XXX	XXX	XXX	XXX	Jan-89		A	ACIRS256GL
EGYPT	LUXOR	9,843	148	75	70FCWU	294	175	342	593	572	840	Aug-98	87		ABCDEFGLPT
EGYPT	MERSA MATRUH	9,843	148	58	40FBWU	94	175	265	406	430	833	May-99			ACDEFGLQRS
EGYPT	TABA	9,843	148	85	70FBWU	2,470	175	389	593	585	840	May-99	82		ABCDEFGLQS
EGYPT	AS BANAS	9,840	130	59		100	175	XXX	XXX	XXX	XXX	Jan-89		A	CRS1256
EGYPT	EL KHARGA	9,839	148	50	40FCXU	190	175	231	406	383	720	Jan-00		M	ACDEFGLQRST
EGYPT	CAIRO WEST	9,730	196	70	48FAWT	528	175	321	468	540	840	Jan-98	97		ABCDEFGLRS8
EGYPT	INSHAS	8,340	130	70		115	175	321	XXX	506	XXX	Jun-98	98		ACDGLRS256Z
EGYPT	EL ARISH	8,200	148	53	35FBWU	151	175	241	XXX	391	745	Nov-96			ACDFGLPRST5
EGYPT	EL GORA	7,874	98	66	48FBWU	328	175	301	468	493	840	Mar-00	89	F	ACDGLQRS256
EGYPT	ALEXANDRIA	7,218	148	52	48FDXU	4	175	240	468	364	659	May-99			ACDEFGLQ
EGYPT	CAIRO ALMAZA	6,660	164	59		303	175	271	XXX	XXX	840	Jan-89		A	ACRS56GL
EGYPT	RAS GHARIB	6,560	100	39		6	142	XXX	XXX	XXX	XXX	Jan-90		A	CRS1256
EGYPT	RAS JIMSAH NEW	6,480	164	39		20	142	180	XXX	XXX	612	Jan-90		A	CRS1256
EGYPT	DUKHAYLAN	6,000	147	59		5	175	270	XXX	XXX	840	Jan-89		A	ACRS256GL
EGYPT	PORT SAID	4,921	148	20		6	77	XXX	XXX	XXX	XXX	Jan-89		A	CRS1256
EQ GUINEA	MALABO	9,646	151	94		72	175	431	593	585	840	Sep-97	97	MA	ABCDEFGLQRTZ
EQ GUINEA	BATA	6,562	148	54		36	175	248	XXX	416	840	May-97			ACDFGLQRS5

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
ERITREA	ASSAB	11,480	148	68	60RCWU	46	175	313	593	585	840	Jan-00		A	ACDEFGLRS
ERITREA	ASMARA	9,843	148	58	40FBXT	7,618	175	265	406	430	833	Feb-99	94	M	ABCDEFGLQ
ERITREA	MASSAWA	6,444	180	20		33	142	XXX	XXX	XXX	XXX	Feb-99		A	QRS12345679
ETHIOPIA	BOLE INTL	12,131	148	61	65FDXT	7,625	175	277	593	443	806	Sep-97	97	M	ABCDEFGLPQTZ
ETHIOPIA	HARAR MEDA	10,170	147	52		6,165	XXX	XXX	XXX	XXX	XXX	Mar-97	97		LQRS1234567Z
ETHIOPIA	ABA TENNA DEJAZMATCH YALM	8,858	148	46	30RBWU	3,827	143	212	360	356	720	Mar-97	97		ABCDEFGLQRSTZ
ETHIOPIA	ABA SEGUD	6,551	165	16	07FBW	5,500	XXX	XXX	XXX	XXX	XXX	Mar-99	99		LQRS1234567
ETHIOPIA	AXUM	6,325	70	14		7,000	55	XXX	XXX	XXX	XXX	Dec-98		AMF	CRS124567
ETHIOPIA	GONDAR	4,690	115	14		6,453	56	XXX	XXX	XXX	XXX	Jan-91		A	123456Z
ETHIOPIA	BAHAR DAR	4,658	105	10		6,020	43	XXX	XXX	XXX	XXX	Jan-91		A	123456Z
GABON	FRANCEVILLE	10,105	148	75	59FBXT	1,447	175	345	554	579	840	Mar-97		A	ACDEFGLRS
GABON	LIBREVILLE	9,843	148	66	59FCXT	39	175	303	554	503	840	Aug-98	97		ABCDEFGLPQTZ
GABON	LAMBARENE	7,555	148	39		82	138	XXX	XXX	301	XXX	Jan-00		F	CDQRS125679
GAMBIA	BANJUL INTL	11,811	148	80		95	175	367	593	585	840	Aug-99	94		ABCDEFGLPQTZ
GHANA	KOTOKA INTL	9,800	197	89	60FAXT	205	175	407	562	585	840	Sep-97	97		ABCDEFGLPZ
GHANA	TAMALE	7,999	148	28	15FBZU	553	99	129	XXX	XXX	409	Nov-99			ACFGHLQRTZ45
GUINEA-BIS	BISSAU-OSWALDO VIEIRA	10,499	148	37		129	135	170	252	271	579	Sep-97	97		ABCDEFGLPQSTZ
IVORY CO	YAMOUSSOUKRO	9,843	148	37		696	135	170	252	271	579	Feb-99	99	A	CFGLPQT12452
IVORY CO	FELIX HOUPHOUET-BOIGNY	8,858	164	81	53 FAX	20	175	370	507	585	840	Feb-99	98		ABCDEFGLPQZ

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
KENYA	JOMO KENYATTA INTL	13,507	148	112	80FAWU	5,327	175	513	593	585	840	Aug-99	99	M	ABCDEFGLPQ
KENYA	LAIKIPIA AB	13,100	100	50		6,144	175	230	XXX	382	XXX	Apr-98	98	MF	ACDGLQRS256Z
KENYA	EL DORET INTL	11,000	148	89	60FAWT	6,838	175	407	562	585	840	Mar-98	98	MLF	ABCDEFGLPRSTZ
KENYA	MOI INTL	10,991	148	73	67FC	200	175	332	593	553	840	Mar-99	99		ABCDEFGLQZ
KENYA	WAJIR	9,193	104	39		770	141	180	XXX	288	XXX	Feb-97	92		CGLQRS256Z
KENYA	NAIROBI/EASTLEIGH	7,988	147	53	35FBXU	5,380	175	241	367	391	757	Mar-00	87	M	ABCDEFGHLQRSZ
KENYA	MALINDI	4,600	100	60	35FAWU	80	175	XXX	XXX	421	XXX	Jul-99			CDILQTZ12567
KENYA	EL WAK	3,281	85	5		1,550	XXX	XXX	XXX	XXX	XXX	Feb-97	92		12345679Z
KENYA	LODWAR	3,260	60	19	08FCYU	1,715	47	XXX	XXX	XXX	XXX	Jun-98	98		QRS12345679Z
LIBERIA	MONROVIA-ROBERTS INTL	11,000	150	37		31	135	170	252	271	579	Mar-97	97		ABCDEFGLPRSTZ8
LIBERIA	MONROVIA-SPRIGGS PAYNE	5,997	98	31		25	114	XXX	XXX	220	XXX	Feb-97	97		CDQRS125679Z
LIBYA	AOZOU	12,467	131	39		1,995	141	180	270	XXX	612	Jan-91		A	ACRS56GL
LIBYA	BENINA	11,731	148	90		433	175	411	593	585	840	Jan-00			ACDEFGLQT
LIBYA	OKBA IBN NAFA	10,500	148	77		253	175	353	593	585	840	Jan-00		A	ACDEFGLRS
MADAGASCAR	ANTANANARIVO-IVATO	10,171	148	75	59FBXT	4,196	175	345	554	579	840	Sep-97	97	AM	ABCDEFGLQTZ
MADAGASCAR	ANTANANARIVO-ARIVONIMAMO	8,345	148	72		4,757	175	330	550	580	840	Feb-96	70	A	ACDEFHRSGLZ
MADAGASCAR	ANTSIRANANA-ANDRAKAKA	8,202	148	63		200	175	290	475	495	840	Feb-96		A	ACDEFHRSGLZ
MADAGASCAR	MAHAJANGA-AMBAROVY	7,218	148	71		85	175	325	542	XXX	840	Jan-88		A	ACTS6GLZ
MADAGASCAR	NOSY-BE-FASCENE	7,185	148	45		33	162	211	320	XXX	712	Jan-89		A	ACRS56GLZ

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
MAHE I	SEYCHELLES INTL	9,825	150	77	72RBWU	10	175	352	593	585	840	Jan-98	83	M	ABCDEFGLQZ
MALAWI	LILONGWE INTL	11,614	148	94	80FBWT	4,035	175	428	620	580	840	May-97			ABCDEFGLPQ
MALAWI	CHILEKA INTL	7,628	98	77	50FAWT	2,555	175	354	XXX	558	XXX	Jan-00		M	ACDGLQTZ256
MALI	BAMAKO-SENOU	8,858	148		59FBXT	1,247	175	345	554	579	840	Jan-97	70	MF	ABCDEFGLPQRTZ
MALI	GAO	8,202	148	39		869	142	179	XXX	XXX	XXX	Jan-90	85	A	CRS1256Z
MALI	MOPTI/BARBE	8,202	131	37	20FAWT	906	140	XXX	XXX	285	XXX	Jun-98	98		CDRS125679Z
MAURITANIA	ATAR	9,843	98	36		758	124	164	XXX	282	XXX	Jan-00		F	ACDGLQRSZ256
MAURITANIA	NOUAKCHOTT	9,843	148	81	53FA	7	175	370	XXX	585	XXX	Sep-99	70		ACDEFGLPTZ
MAURITANIA	NOUADHIBOU	7,956	148	66	48FBXT	16	175	301	468	493	840	Jan-00			ACDEFGLQTZ
MAURITIUS	SIR SEEGOOSAGUR RAMGOOLAM	8,498	151	71	80FDXT	186	175	325	543	XXX	840	Jan-89	70	A	ACEK6GLZ
MOROCCO	BEN GUERIR	13,000	150	72		1,430	175	330	550	570	840	Mar-97	96		ABCDEFGLQRSZ
MOROCCO	MOHAMED V	12,205	148	71	65FCWT	656	175	324	593	541	840	Mar-00			ABCDEFGLPQT
MOROCCO	IBN BATOUTA	11,483	148	65	47FBWT	62	175	297	460	485	840	Jun-99		M	ACDEFGLQRST
MOROCCO	SALE	11,483	148	76	60 FBW	276	175	349	562	585	840	May-97	97		ABCDEFGLPQZ
MOROCCO	SIDI SLIMANE	11,300	197	75		179	175	344	577	585	840	May-97	97		ABCDEFGLRS8Z
MOROCCO	ER RACHIDIA	10,499	148	72	45FAWT	3,428	175	328	445	513	840	Mar-99	85	M	ABCDEFGHLPQT
MOROCCO	FES-SAISS	10,499	148	70	53FBWT	1,900	175	321	507	532	840	Sep-99		M	ACDEFGLPQT
MOROCCO	MENARA	10,171	148	73	56FBWT	1,535	175	333	530	555	840	May-97	97	M	ABCDEFGLPQTZ
MOROCCO	ANGADS	9,843	148	58	40FBWU	1,535	175	267	432	XXX	840	Jan-89		A	ACT56GL

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
MOROCCO	OUARZAZATE	9,842	148	70	46FBWT	3,783	175	293	453	477	840	Mar-99	84		ABCDEFGHLT
MOROCCO	INEZGANE	9,547	164	71	54FBWU	88	175	326	543	XXX	840	Mar-98		A	123456
MOROCCO	BASSATINE	9,252	164	71		1,890	175	325	543	XXX	840	Jan-90	85	A	ABCDEFHMQRSGL
MOROCCO	KENITRA	7,995	150	71		16	175	326	542	514	840	Jun-98	80	F	ABCDEFGLQRS
MOROCCO	SANIA RAMEL	7,546	148	39		10	142	180	269	260	615	Jul-99		MF	ACDEFGLQRS
MOROCCO	CHERIF AL IDRISSI	7,087	148	50	40FCXT	89	175	231	XXX	383	720	May-99		M	ACDFGHJLRST5
MOROCCO	ANFA	6,904	148	38		203	133	172	XXX	295	531	Jan-00			ACDFGHLOQT5
MOROCCO	IFRANE	6,890	115	39		5,459	145	XXX	XXX	XXX	XXX	Jan-89		A	CRS156
MOROCCO	SIDI IFNI	6,562	148	39		190	142	XXX	XXX	XXX	XXX	Jan-89		A	123456
MOROCCO	TAN TAN	6,562	98	39		653	142	XXX	XXX	XXX	XXX	Jan-89		A	CRS1256
MOZAMBIQUE	MAPUTO	12,008	148	66	40FAXU	131	175	301	406	467	840	Sep-97	97		ABCDEFGLPQZ
MOZAMBIQUE	LICHINGA	8,300	148		20FAXU	4,505	140	170	205	XXX	525	Feb-93		A	ACFRST5GLZ
MOZAMBIQUE	CUAMBA	8,202	148			1,920	XXX	XXX	XXX	XXX	XXX	Feb-93		A	123456Z
MOZAMBIQUE	NACALA	8,202	148	47		410	169	216	337	356	747	Jun-99			ACDEFGHLQRSZ
MOZAMBIQUE	TETE CHINGOZI	8,202	148	60	35FAXU	525	175	275	367	421	XXX	Jun-99		F	ACDEFGHLRSZ
MOZAMBIQUE	CHIMOIO	7,907	148		26FBXU	2,287	144	193	295	320	595	Feb-93		A	ACDEFRSGLZ
MOZAMBIQUE	BEIRA	7,874	148	70	044FAXU	33	175	322	437	503	840	May-97		F	ACDEFGLJTZ
MOZAMBIQUE	MUEDA	7,714	98	39		2,789	142	179	XXX	288	XXX	Jun-99		M	CDGILRS1256Z
MOZAMBIQUE	MOCIMBOA DA PRAIA	6,562	148	38		89	138	175	XXX	280	XXX	Jun-99			ACDFGHILORS5Z

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
MOZAMBIQUE	NAMPULA	6,562	148	45	25FAXU	1,444	160	204	289	330	625	Jun-99		M	ACDFGLOQTZ5
MOZAMBIQUE	ULONGWE	5,906	98	16		4,265	62	XXX	XXX	XXX	XXX	Jun-99		M	CQRS1245679
MOZAMBIQUE	PEMBA	5,905	148	43	24FAXU	331	156	197	XXX	321	606	Jun-99			ACDGLNQS56
MOZAMBIQUE	QUELIMANE	5,905	148	46	26FAXU	36	165	210	XXX	339	731	Jun-99			ACDGKLNQS56
MOZAMBIQUE	MARRUPA	5,660	98	14		2,480	XXX	XXX	XXX	XXX	XXX	Jun-99		MF	LRSZ1234567
MOZAMBIQUE	MUTARARA	5,249	98			159	XXX	XXX	XXX	XXX	XXX	Jun-99			12345679Z
MOZAMBIQUE	INHAMBANE	4,921	98	18		30	70	82	XXX	XXX	XXX	Feb-93		A	123456Z
MOZAMBIQUE	VILANCULO	4,823	98	25		46	93	XXX	XXX	XXX	XXX	Jun-99			CLQRS124567
MOZAMBIQUE	LUMBO	4,757	98	18		33	70	82	XXX	XXX	XXX	Feb-93		A	123456Z
NAMIBIA	HOSEA KUTAKO INTL	14,869	148	84		5,640	175	385	593	585	840	Sep-97	97	M	ABCDEFGLPQTZ
NAMIBIA	GROOTFONTEIN	11,680	148	74		4,636	175	340	567	585	840	Jun-99	93	M	ABCDEFGLQRS
NAMIBIA	ONDANGWA	9,751	98	65		3,592	175	XXX	XXX	490	XXX	Feb-00	88	M	CDGLQRSZ1256
NAMIBIA	KEETMANSHOOP	7,598	148	62		3,507	175	284	466	XXX	840	Jan-88	88	A	ACT56GLZ
NAMIBIA	KATIMA MULILO	7,500	130	29		3,230	93	XXX	XXX	XXX	XXX	Feb-00	88	M	CGLRSZ12456
NAMIBIA	WALVIS BAY	6,998	98	74		290	175	340	XXX	585	XXX	Sep-97			ACDGLPT256Z
NIGER	DIORI HAMANI INTL	9,842	148	75	59FBXT	728	175	345	554	579	840	Jun-99	86		ABCDEFGLPQZ
NIGERIA	LAGOS/MURTALA MUHAMMED	12,795	197	63		135	175	288	523	478	840	Feb-00			ABCDEFGLPZ
NIGERIA	ABUJA INTL	11,811	197	75		1,123	175	344	576	580	840	Oct-96		MF	ACDEFGLPQTZ
NIGERIA	MINNA	11,080	145	90		861	175	413	593	585	840	Dec-98		F	ABCDFGJLQRSSZ

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
NIGERIA	KAINJI	10,827	148	50		750	175	230	363	XXX	796	Jan-90		A	CRS56Z
NIGERIA	KANO-MALLAM AMINU INTL	10,827	197	90		1,565	175	411	XXX	585	XXX	Oct-99		F	ACDFGLPQRTZ2S
NIGERIA	ILORIN	10,171	200	90		1,125	175	414	620	XXX	840	Jan-89		A	ACT56GLZ
NIGERIA	KADUNA	9,843	197	100		2,073	175	456	593	585	840	Nov-99			ACDEFGLQTZ
NIGERIA	MAIDUGURI	9,843	197	90		1,102	175	414	620	XXX	840	Jan-89	70	A	ACT56GLZ
NIGERIA	KADUNA OLD	8,553	180	46		2,126	166	211	329	348	731	Oct-95		A	ACDEFRSGLZ
NIGERIA	ENUGU	7,874	148	46		466	160	210	330	335	840	Mar-96		A	ABCDEFTGLZ
RWANDA	KIGALI	11,483	148	68	50FBXU	4,891	175	309	484	508	840	Aug-98	96	M	ABCDEFGLPQZ
S AFRICA	PIERRE VAN RYNEVELD	16,076	197	77	50FA	2,791	175	354	484	558	840	Mar-99			ACDEFGLQTZ
S AFRICA	JOHANNESBURG INTL	14,495	200	84	56FAWU	5,558	175	386	530	585	840	Mar-98		M	ABCDEFGLPQTZ
S AFRICA	HOEDSPRUIT AFS	13,095	148	74		1,729	175	339	593	566	840	Mar-00	0		ABCDEFGLPQTZ
S AFRICA	WATERKLOOF	11,007	148	74		4,941	175	340	567	585	840	Apr-98	98	M	ABCDEFGLQZ
S AFRICA	CAPE TOWN INTL	10,502	200	85	57FAXU	151	175	391	538	585	840	Mar-98		M	ABCDEFGLPQZ
S AFRICA	PIETERSBURG	10,400	148	72		4,075	175	330	550	580	840	Jan-94		A	ACDEFJKRSGLZ
S AFRICA	LANSERIA	10,000	75	38		4,517	138	XXX	XXX	XXX	XXX	Feb-96		A	CT12S6Z
S AFRICA	KIMBERLEY	9,842	150	67	49FBXU	3,949	175	305	476	500	840	Mar-98		AM	ACDEFGLRTZ
S AFRICA	J B M HERTZOG	8,400	150	74		4,458	175	339	567	XXX	840	Jan-88		A	ACT56GLZ
S AFRICA	LOUIS BOTHA	8,005	200	76	49FAXU	25	175	349	476	549	840	Apr-97			ACDGLP56Z
S AFRICA	LANGEBAANWEG	7,689	150	60		102	175	276	448	467	840	Feb-98		F	ACDEFGLPQRT

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
S AFRICA	P W BOTHA	6,562	148	40		649	145	185	280	280	630	Jan-94		A	ACDOT56GLZ
S AFRICA	H F VERWOERD	6,529	148	62		225	175	284	466	XXX	840	Jan-88		A	ACT56GLZ
S AFRICA	SWARTKOP	6,516	100	50		4,780	175	230	363	302	795	Mar-93		A	ACRS256GLZ
S AFRICA	BEN SCHOEMAN	6,348	150	62		431	175	284	XXX	XXX	840	Jan-88		A	ACT56GLZ
S AFRICA	WONDERBOOM	6,000	100	40		4,095	144	183	XXX	XXX	XXX	Jan-89		A	C1256Z
S AFRICA	YSTERPLAAT	5,200	100			51	142	XXX	XXX	XXX	XXX	Jan-93		A	CRS12456Z
SAO TOME I	SAO TOME/SALAZAR	7,283	148	50	45FDWT	33	175	228	445	350	631	Mar-00	88	ML	ABCDEFGLQRZ
SENEGAL	LEOPOLD SEDAR SENGHOR INT	11,450	148	84	82FCXU	89	175	384	593	585	840	Oct-97	97		ABCDEFGLPZ8
SENEGAL	TAMBACOUNDA	6,562	98	72		161	175	330	XXX	570	XXX	Jul-99			ACDGLQRSZ256
SENEGAL	ST LOUIS	6,234	148	39		13	142	180	XXX	XXX	612	Jan-89		A	ACT56GLZ
SENEGAL	THIES	5,380	65	48		269	173	XXX	XXX	XXX	XXX	May-98	98		12345679RS
SIER LEONE	FREETOWN/LUNGI	10,498	150	80		84	175	367	593	585	840	Mar-00	96		ABCDEFGLQZ
SIER LEONE	BO	4,470	100	38		328	138	175		280		Nov-96			CDRS125679Z
SIER LEONE	HASTINGS	3,428	150	38		60	138	175		280		Nov-96			CDRS125679Z
SOMALIA	BERBERA	13,615	164	72		30	175	330	550	570	840	Jun-99	87	M	ABCDEFGHLQRSZ
SOMALIA	KISIMAYU	12,139	147	72		49	175	330	550	570	840	Jun-99	93	F	ABCDEFGLQRSZ
SOMALIA	BALEDOGLE	10,500	131	72		300	175	330	XXX	XXX	XXX	Apr-97	92		123456792
SOMALIA	MOGADISHU	9,900	150	74	44FAYT	31	175	322	437	503	840	Feb-97	87		ABCDEFGLQRSZ
SOMALIA	BAIDOA	9,855	131	30		1,520	110	XXX	XXX	211	XXX	Jun-99			CDGILQRSZ1256

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
SOMALIA	HARGEISA	7,480	148	72		4,423	175	330	550	522	840	Jun-99		M	ACDEFGHLQRSZ
SOMALIA	ODDUR	5,285	95	39		1,600	142	XXX	XXX	288	XXX	Jun-99	97		RS123456792
SOMALIA	GAROE	4,964	100	14		1,752	57	XXX	XXX	XXX	XXX	Feb-97	92		CQRS1245679Z
SOMALIA	BOSASO	4,915	90	39		6	XXX	XXX	XXX	XXX	XXX	Jun-99			QRS123456792
SOMALIA	OBBIA	3,609	167	29		65	107	XXX	XXX	XXX	XXX	Jun-99			RS12345679Z
SOMALIA	BARDERA	3,500	70	29		550	XXX	XXX	XXX	XXX	XXX	Feb-97	92		12345679Z
SUDAN	WADI SEIDNA	10,581	148	65		1,283	175	298	492	510	840	Dec-89	89	A	ABCDEFJRSGLZ
SUDAN	KHARTOUM	9,866	150	75		1,261	175	342	593	572	840	Feb-00	81		ABCDEPGLTZ
SUDAN	DAMAZIN	8,206	110	19		1,568	73	XXX	XXX	XXX	XXX	Nov-97			CLRS124567Z
SUDAN	EL OBEID	8,202	148	39		1,883	175	180	XXX	XXX	XXX	Jan-89	70	A	CRT1256Z
SUDAN	KASSALA	8,202	148	52		1,667	175	240	XXX	XXX	XXX	Jan-90	70	A	ACRS256GLZ
SUDAN	JUBA	7,874	148	66		1,509	175	230	363	XXX	800	Jan-89	70	A	ACERT6GLZ
SUDAN	MALAKAL	6,600	130	39		1,270	175	180	XXX	XXX	XXX	Jan-89		A	CRS256Z
SUDAN	PORT SUDAN	6,562	98	32		10	117	117	XXX	XXX	XXX	Jan-90	84	A	CT1256Z
SUDAN	GENEINA	5,250	148	10		264	XXX	XXX	XXX	XXX	XXX	Jan-90		A	CRST1256Z
SUDAN	YIROL	5,000	150	14		1,424	57	XXX	XXX	XXX	XXX	Jan-89		A	123456Z
SUDAN	WAU	4,938	148	39		1,420	175	XXX	XXX	XXX	XXX	Jan-89		A	CRS1256Z
SUDAN	BOR	4,199	148	14		1,394	57	XXX	XXX	XXX	XXX	Jan-89		A	123456Z
SUDAN	NYALA	4,000	135	39		2,149	175	XXX	XXX	XXX	XXX	Jan-89		A	CRS23456Z

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
SUDAN	YAMBIO	4,000	148	14		2,300	57	XXX	XXX	XXX	XXX	Jan-89		A	123456Z
SUDAN	KOSTI	3,901	131	14		1,289	57	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	EN NAHUD	3,600	120	14		1,955	57	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	ALUAKUAK	3,500	150	14		1,405	56	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	MVOLO SE	3,500	150	14		1,675	56	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	BENTIU	3,470	100	3		1,427	XXX	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	MVOLO	3,400	120	14		1,395	56	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	PIBOR	3,300	150	14		1,350	57	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	TONG	3,031	118	2		1,413	XXX	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	GOGRIAL	3,000	118	14		1,640	57	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	RAGA	3,000	118	3		1,900	XXX	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	AWEIL	2,657	131	3		1,394	XXX	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	ADOK	2,645	170	14		1,250	56	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SUDAN	NASIR	2,400	90	3		1,320	XXX	XXX	XXX	XXX	XXX	Jan-89		A	12345679Z
SWAZILAND	MANZINI	8,530	148	76	71FCWT	2,075	175	342	620	579	840	May-97			ACDEFGLPQTZ
TANZANIA	KILIMANJARO INTL	11,834	148	89	60FAWU	2,932	175	407	562	585	840	Aug-99	99	M	ABCDEFGLPQT
TANZANIA	MWANZA	10,827	148	27	15FCXU	3,763	83	122	XXX	XXX	357	Oct-99		MF	ACFGLQRSZ45
TANZANIA	DAR ES SALAAM	9,840	150	84	56FAWT	182	175	386	530	585	840	Aug-98	97		ABCDEFGLPQZ
TANZANIA	MTWARA	7,408	98	49	32FBYU	371	171	225	XXX	367	XXX	Mar-00		F	ACDGLQRSZ256

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
TOGO	LOME-TOKOIN	9,843	148	71	59FBXT	72	175	345	554	579	840	May-96	70	A	ACDEFPTGLZ
TUNISIA	TUNIS-CARTHAGE	10,499	148	71	56RBWU	20	175	323	565	585	840	Jul-98		MF	ACDEFGLPQ
TUNISIA	ZARZIS	10,171	148	69	52FBYU	16	175	317	525	XXX	840	Jan-89		A	ACEKPT6GL
TUNISIA	BIZERTE-SIDI AHMED	9,843	148	72		20	175	330	550	570	840	Nov-98	98		ABCDEFGLQS
TUNISIA	EL MAOU	9,843	148	61	52FCCU	85	175	278	457	XXX	840	Jan-90		A	ACIRSS6GL
TUNISIA	HABIB BOURGUIBA INTL	9,678	148	68	50 FBY	9	175	309	484	508	840	Mar-99			ACDEFGLPQT
TUNISIA	GAFSA	9,514	148	55	37FBXU	1,060	175	251	382	406	788	Oct-99	95	M	ABCDEFGLQ
TUNISIA	TABARKA	9,416	148	65	47FBXU	230	175	297	460	485	840	Nov-99		M	ACDEFGLQT
TUNISIA	REMADA	7,812	146	46		1,004	165	210	330	348	730	Jan-97	84		ACDGIJLQRS
TUNISIA	GABES	3,708	82	14		26	55	XXX	XXX	XXX	XXX	Jan-97		A	Q12345679
UGANDA	ENTEBBE INTL	12,071	149	51	30FAXT	3,782	175	235	328	376	718	Mar-97	96	M	ABCDEPGLPQZ
UGANDA	GULU	10,203	98	55		3,510	175	253	XXX	425	XXX	May-99		MF	ACDGLRS256Z
UGANDA	SOROTI	6,100	98	50		3,697	175	227	XXX	377	XXX	Mar-00		M	ACDGLQRSTZ256
W SAHARA	HASSAN I	8,858	148	58	40FBWT	207	175	265	406	430	833	Jul-99			ACDEFGLQRSZ
ZAMBIA	LUSAKA INTL	13,000	150	68		3,779	175	312	516	536	840	Nov-96	70	M	ABCDEPGLPQTZ
ZAMBIA	NDOLA	8,250	150	70		4,167	175	321	533	553	840	Jan-93		A	ACDEFRTGLPZ
ZAMBIA	MUMBWA MILITARY	8,120	150	71		3,925	175	325	543	XXX	840	Jan-89		A	ACRSS6GLZ
ZAMBIA	LIVINGSTONE	7,520	200	32		3,250	117	147	210	228	495	Mar-98		AMF	ACDEFGLPQRSZ
ZAMBIA	MONGU	4,800	70	20		3,465	75	XXX	XXX	XXX	XXX	Feb-96		A	CRS12456Z

Country	Airfield Name	Runway Length	Wid	LCN	PCN	Elev	ST	TT	SBTT	TRT	TDT	RD	SD	Misc	Suitability
ZIMBABWE	HARARE INTL	15,508	151	77	50FAWT	4,901	175	354	484	558	840	Mar-00			ABCDEFGLPQZ
ZIMBABWE	HWANGE NAT PARK	15,092	98	40	25FBXU	3,543	141	190	XXX	XXX	XXX	Jan-90		A	CT1256Z
ZIMBABWE	FYLDE	10,600	98	70		3,725	175	322	533	553	840	Feb-97			ACDGLRS256Z
ZIMBABWE	BULAWAYO	8,491	148	66	40FAXU	4,366	175	301	406	467	840	Feb-00		M	ACDEFGLQTZ
ZIMBABWE	VICTORIA FALLS	7,500	98	45	28FBXU	3,490	154	206	XXX	336	XXX	Mar-97	70		CDGLRS1256Z

SUITABILITY CODES EXPLAINED

A = Suitable C-141B
B = Suitable C-5
C = Suitable C-130
D = Suitable C-17
E = Suitable KC-10
F = Suitable KC-135
G = Suitable C-9
H = If suitable- C-5, KC-10, and KC-135 operations limited to runway only
I = If suitable- C-17 and C-141B operations limited to runway only
J = If suitable- C-5, KC-10, KC-135 ops require prior DOVS approval for runway width
K = If suitable- C-5, KC-10, KC-135 ops require prior DOVS approval for taxiway width
L = Suitable C-21
M = If suitable- C-17, C-141 ops require prior DOVS approval for taxiway width
N = Rwy less than 6,000 ft., approval required for C-5/C-141 ops
O = Rwy less than 7,000 ft., approval required for KC-135E and KC135R ops
P = Jeppesen- See GDSS or Web for explicit authorization
Q = Approval/advisory req'd- **See GDSS for obstructions and restrictions information**
R = Daylight operations only
S = VFR only
T = No DOD published approach (other than NDB). Jeppesen available, approval req'd
Z = See STIF for MAJCOM supplemental information.
1 = Unsuitable C-141B
2 = Unsuitable C-5
3 = Unsuitable C-130

4 = Unsuitable C-17
5 = Unsuitable KC-10
6 = Unsuitable KC-135
7 = Unsuitable C-9
8 = Airfield has restrictions imposed. See restrictions information in Part Two of this publication or related media
9 = Unsuitable C-21

· African Airfield Data from the AMC ASRR, 11 April 2000 (selected fields) (sorted on country, then runway length)

Appendix C

Questionnaire Responses from Attachés

Questionnaire on Infrastructure and Process Challenges to Expeditionary Air Operations in Africa

The objective of this questionnaire is to better understand and evaluate the numerous air and transportation challenges of African air operations, from an operator and planner perspective, to determine possible future directions for EAF planning in Africa. These problems may relate to air safety, navigation, ground transportation network and airport infrastructure immaturity, security, geography, culture, or governmental mismanagement.

This questionnaire is in support of an Institute for National Security Studies (INSS)-sponsored research project by Maj Karen U. Kwiatkowski, Africa Branch, Headquarters United States Air Force Regional Plans and Issues Division, Washington, D.C. The final report will be written no later than 1 August 2000.

I am seeking your help because of your ability to share experiences, anecdotes, perspective, insight, and suggestions regarding the conduct of military air operations in Africa. Your anonymity will be protected and your responses will not be attributed to you, if you desire. This questionnaire contains eight questions, most of which include a simple rating scheme, and should take about fifteen minutes. I greatly appreciate your assistance and comments.

NOTE: I encourage you to E-mail this questionnaire to any associates or peers. I can be reached at (703) 695-1539, DSN prefix is 22X. Web site location for this questionnaire is http://www.xo.hq.af.mil/xop/xopx/attache1.shtml.

Name:

E-mail Address:

Mail Address (optional):

Phone (optional):

Fax (optional):

Would like a copy of the completed study mailed to the above address? Yes/No

1. What country (ies) do you have direct experience with for purposes of this study?

No significant inputs to report

2. In what parts of Africa is the bulk of your experience?

# of responses

XX North Africa
West Africa
East Africa
X Central Africa
XX Southern Africa

3. How would you characterize the missions you have been involved in:

	# of Responses
Routine channel and supply flights for embassy support	XX
Non-routine transports of material (non-emergency)	X
Non-routine transport of VIPs (including EAGLE VISTA)	XXXX
Support to exercises in the region (Gabon 1998, 2000, Blue Hungwe/Crane, etc.)	XX
Humanitarian response missions	X
Contingency Ops	
NEOs	

Other (please list) • NASA space shuttle support	X

4. Theater Command Support: How well does your theater command and your air component support your specific needs to fly safely and effectively in Africa? This time, 1 is "does not support noticeably" and 5 is "supports in a responsive, reliable and innovative manner."

Support Category	# and type of Responses
	1= not supportive, 5 = consistently supportive

Scheduling	1, 4, 3, 4
Flight Planning	1, 4, 4, 4
Execution stage (real time support)	1, 4, 4, 4
Response to concerns identified/process improvement cycle	1, 4, 4, 3
Adequate threat briefing/intelligence preparation	1, 4, 4, 3
If you gave an extreme score, can you elaborate? • We support USAF (fueling), but receive none (e.g., we have been trying to get a C-130 engine here for three months. AF cannot do because the channel flights are full of rations. In my year here in Niamey we have had no channel flights. Oreos seem to have priority over an engine. Something's wrong here). • Scheduling problems are probably due to VIP short notices to fly. With all the problems happening on the African continent, there are short notice requirements for VIP flights. It creates problems in trying to get overflight and landing clearances for the days requested, some as short as one or two days.	

5. How many of the following programs are you familiar with?

	# of Responses
Phoenix Raven	XXXX
Safe Skies for Africa	
Falconview	
TCAS	
Proposal to install antiground to air radar on selected transport aircraft	
Contingency Response Group	
ACSA	X

6. What are the three top problems facing you in supporting air operations in your AOR?

- Aside from coordination problems, we have few air op difficulties. We have a lot of refueling stops, because of the effectiveness of our local staff the planes are fueled and back in the air quickly.

- Lack of resources (only three people in the DAO); Not enough lead time, or lack of information on the exact intent or needs from the aircrew.
- Timely submission and issue of overflight/landing clearances. There is currently a civil war in Angola. The government strictly controls its airspace and requires prior permission for overflights and landings, no exceptions. The issuance of clearances. The government is also at fault by not issuing the clearances in a timely manner. Usually they are issues the day before the overflight or landing. This is due to bureaucracy and ineptness.
- Search and rescue operations (for Angola government). In 1997 a C-141 crashed off the coast of Angola and Namibia. The government of Angola did not have and capability for search and rescue. It was a day and a half before search and rescue operations could begin. The assistance was from another country.
- Communications and radar. The current airport has no radar. All operations are accomplished by communications and sight. Communications are usually accomplished by NOTAMS when sending flight plans to the next destination. They recently installed a VSAT to improve communications.
- Uncertified or unpublished approaches.
- High volume vis a vis support staff here.

7. What recommendations do you have for the Air Force to improve safety, reliability and effectiveness of air operations in Africa?

- We in Niamey need a permanent military presence. A attaché with good relations with the local military would make it much easier to coordinate air ops.
- A team should come to Africa to review hands on the different airfields and procedures with each of the embassies and DAOs in the respective countries.

- Work with host country to certify more approaches and get host military to publish their approaches.

8. The idea of expeditionary air ops is not new. Do you have any other comments or suggestions to help improve how we do these expeditionary operations in Africa?

- Train local military folks re US air ops. These guys respect greatly the US military. They would love to work more closely with you. Training them about how we do business would make coordination easier and be a great PR and bilateral relations coup.

Glossary

Abbrevations, Acronyms, Terms, and Explanations

ACI	Airports Council International
ACSA	acquisition and cross servicing agreement
AFTTP	Air Force Tactics, Techniques and Procedures
Air Combat Command	Langley AFB, Va.
AMC	Air Mobility Command, Scott AFB, Ill.
AMOCC	air mobility operations control center
AOC	air operations center
AOR	area of responsibility
ASECNA	*L'agence pour la Sécurité de la Navigation Aérienne en Afrique Et à Madagascar*, or Agency for Air Navigation Safety in Africa and Madagascar
ASI	Air Security International, Inc.
ASRR	Airfield Suitability and Restrictions Report (produced by AMC/DOV)
ATC	air traffic control
CENTCOM	Central Command (also USCENTCOM), MacDill AFB, Fla.; AOR Horn of Africa
CFP	commercial flight publications
CINC	commander in chief
CNN	Cable News Network
COMESA	Common Market for Eastern and Southern Africa
CONUS	continental United States
DIRMOBFOR	Director of Mobility Forces
DHL	DHL Air Express, worldwide air delivery service
DOD	Department of Defense
DOT	Department of Transportation (US federal department)
DROC	Democratic Republic of the Congo (prior to 1998, known as Zaire)
DSN	defense switched network
ECOMOG	Economic Community of West African States Military Observer Group
EUCOM	European Command (also USEUCOM), Stuttgart, Germany
FAA	Federal Aviation Administration (US federal agency)
FalconView	Georgia Tech Research Institute, developed under DOD contract, map integration software
FLIP	flight information publications
FOL	forward operating location
GCCI	Global Crisis Control International, Inc.

GDSS	global decision support system (AMC Internet mobility system)
GPS	Global Positioning System
HAST	Humanitarian Assistance Survey Team
HEF	Humanitarian Expeditionary Force
HF	high frequency (long-range radio, 3–30 MHz)
IAP	International Airport
IASA	International Aviation Safety Assessment
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFALPA	International Federation of Airline Pilots' Associations
INMARSAT	international marine/maritime satellite
ISB	intermediate staging bases
JCS	Joint Chiefs of Staff
Jeppesen	commercial company that produces flight information publications worldwide
JSOTF	joint special operations task force
JTF	Joint Task Force
JULLS	joint universal lessons learned system
LAPES	low-altitude parachute extraction system
lb	pound
LCCO	low-cost combat offload
NAVAID	navigational aids
NGO	nongovernment organizations
NIMA	National Imagery and Mapping Agency (US agency)
NOTAM	notice to airmen
OPDS	offshore petroleum distribution system
PACAF	Pacific Command (Hickam AFB, Hawaii; AOR Madagascar, Pacific Islands)
PFPS	portable flight planning software
RAI	regional airspace initiative (Eastern Europe)
RFIC	reduced footprint initial communication (package)
SAAF	South African Air Force
SASG	South African Skies Group
SATCOM	satellite communications
SOFA	status of forces agreement
SPP	State Partnership Program
TALCE	Tanker Airlift Liaison and Control Element
TACC	Tanker Airlift Control Center
TCAS	Traffic Alert/Collision Avoidance System
TDC	theater deployable communications (package)
TERPS	terminal en route radar procedures system

3AF	Third Air Force, RAF Mildenhall, UK (numbered Air Force responsible for most of sub-Saharan Africa)
UHF	ultrahigh frequency (midrange radio, .3–3 GHz)
USAFE	United States Air Forces Europe, Ramstein AB, Germany
very high frequency	short-range radio, 30–300 MHz
VIP	very important person
VOR	VHF omni-directional radio-range
WFP	World Food Programme

Bibliography

After Action Briefing. "Operation NOBLE RESPONSE Flash 06 and Flash 25," Flt Lt Mick Aspinall, Australian Air Force exchange officer flying for US Air Force Central Command, slide 6. Provided to author by Maj Q Schlortt, AMC/DOK, Scott AFB, Ill., 18 July 2000.

Airports Council International World Airport Ranking, 1999. Calculated from database. Also available on-line, Internet, http://www.airports.org/.

Air Security International, Inc. Web site, n.d., n.p. On-line. Internet, 23 July 2000. Available from http://www.airsecurity.com/surveys.htm.

AMCI 31-104, Phoenix Raven Program, n.p., n.d. On-line. Internet, 25 August 2000. Available from http://amc.scott.af.mil/pubs/amci/31series/31-104.pdf.

Amponin, Kathy. "Flying in Africa." Institute for National Security Studies (INSS) Paper, November 1999, 9–12.

"Army Study: Poor Forward Airfields Jeopardize Deployment Goals." *Inside the Army*, 21 August 2000, 1. On-line. Internet, 21 August 2000. Available from https://ca.dtic.mil/cgi-bin/ebird?doc_url+/Aug2000/e20000821armystudy.htm.

Bates, Stephen. "Dead Stowaways Left Plea for Africa." *The Guardian*, 5 August 1999, n.p. On-line. Internet, 25 January 2000. Available from http://www.mg.co.za/mg/news/99aug1/5aug-stowaway.html.

Bender, Brian. "Transports to Get Missile Jammers." *Jane's Defence Weekly*, 16 February 2000, n.p. On-line. Internet, 17 February 2000. Available from http://ebird.dtic.mil/Feb2000/s20000216transports.htm.

Biernesser, Dorotha. Headquarters AF/XOO-CA. E-mail received 15 August 2000.

Binn, Col Brian. "Current and Consistent Airfield Survey Information." JULLS 11745-44991.

Caires, Greg. "Jumper: USAFE to Conduct Humanitarian 'AEF' Next Year." *Defense Daily*, 22 July 1998, 3.

CINCTRANS MSG 271954Z APR 98. "African Airspace Concerns."

Cirafici, John. *Airhead Operations—Where AMC Delivers: The Linchpin of Rapid Force Projection*. Maxwell AFB, Ala.: Air University Press, March 1995, 69.

Coulibaly, Adama Nibi, Côte d'Ivoire Transportation Minister. "Aviation in the 21st Century—Beyond Open Skies Ministerial." Chicago, Ill., 6–8 December 1999, n.p. On-line. Internet, 23 March 2000. Available from http://www.faa.gov/dotconf/body.html.

Davis, Maj Ed, USEUCOM/J4-ML. E-mail received 23 March 2000.

DOD News Release No. 285-97. "Air Reserve Software Program Wins Worldwide Recognition," 3 June 1997, n.p. On-line. Internet, 3 July 2000. Available from http://www.defenselink.mil/news/Jun1997/b060397_bt285-97.html.

Dronkers, Lt Col Tony. "Integrated Decision Support Tools to Tailor Support Forces." Bullet background paper. Headquarters AF/ILXX, 9 September 1999.

Dye, Steven. "Improving African Fuel Availability in Support of Humanitarian Relief Operations." AFIT/GMO/LAC/99E-3, June 1999, 14.

Edlow, Jack, and Erastus J. O. Mwencha. "Improving Air Traffic Management in Africa." *Perspectives on Africa*, Winter 1999/2000, 46–53.

EUCOM ATLAS RESPONSE Web page, n.d., n.p. On-line, Internet, 2 July 2000. Available from http://www.eucom.mil/operations/SilentPromise/index.htm.

FalconView information sheet, n.d., n.p. On-line. Internet, 3 July 2000. Available from http://www.falconview.org.

"FAA Flight Standards Service International Aviation Safety Assessment Program (IASA)," 12 October 1999, n.p. On-line, Internet, 20 January 2000, available from http://www.faa.gov/avr/iasa/iasaxls.htm, September 1998.

Findlay, Colonel. "AMC Use of Joint Universal Lessons Learned System (JULLS)," 25 January 1993. JULLS 11558–61000.

Fuhrman, Capt Timothy. "Humanitarian Airlift: USAF Response to Natural Calamity, 1960–1974." Research

Report. Maxwell AFB, Ala.: Air Command and Staff College, May 1981, 37.

Gilbert, Col Taco. "JTF ATLAS RESPONSE DIRMOBFOR After Action Report." Dover AFB, Del., 4 May 2000.

Giletti, Gregory. "The United Nations' Capacity for Strategic Airlift," n.d. Received via fax 28 January 1998 from United Nations Headquarters, New York.

Global Crisis Control International, Inc. ASAP Web site, n.d., n.p. On-line. Internet, June 2000. Available from http://crisis-control.com.

Gunther, John. *Inside Africa*. New York: Harper and Brothers, 1953, 8.

Hahn, Maj Pete. Ramstein AB, Germany. Interviewed by author, 2 December 1999.

Headquarters AF/XOO-CA. "U-154/C-141 Mishap African Air Traffic Control Recommendations Course of Action." Document dated 15 January 1998 (FOUO).

IATA Air Bulletin, 30 January 1998. Accessed 6 January 2000.

"ICAO Endorses Major Recommendations for Improving Safety of African Airspace." ICAO Press Release, 5 December 1997, n.p. On-line, Internet, 6 January 2000. Available from http://www.Icao.org/icao/en/nr/pio9723.htm.

JULLS 11246-61510, JULLS 11236-95551, JULLS 11155-92755, and JULLS 11139-41744. On-line. Internet, 10 July 2000. Available from http://www.amc.af.mil/do/dop/julls, accessed 10 July 2000.

Kenney, MSgt. AMWC Battlelab, Fort Dix, N.J. Interviewed by author, 25 July 2000.

Lange, John E. "Civilian-Military Cooperation and Humanitarian Assistance: Lessons Learned from Rwanda," *Parameters*, Summer 1998, 106–22. On-line. Internet, 3 July 2000. Available from http://carlislewww.army.mil/usawc/Parameters/98summer/lange.htm.

Lowe, Christian. "Navy, Marine Corps Consider Privatizing Some Aerial Refueling," *Defense Week*, 21 August 2000, 1.

Martinson, Col Jon. "JTF PROVIDE RELIEF DIRMOBFOR End of Tour Report," JULLS 80429-34592, 5 December 1992.

"Muted Outlook for Air Freight." IATA Press Release PS/01/00, 12 January 2000, n.p.. On-line. Internet, 25

January 2000. Available from http://www.iata.org/pr/pr00janb.htm.

"National Guard State Partnership Program." Information Paper. International Affairs Directorate of the National Guard Bureau, Washington, D.C., 3 January 2000.

"Operation GUARDIAN ASSISTANCE After Action Review." Chapter 2, *Air Operations*, n.d., 27–47. On-line. Internet, 11 July 2000. Available from http://jcll.jwfc.smil.mil/Other/AARs/GUARDast.htm.

"Operation Guardian Retrieval." FAS Military Analysis Network, n.d., n.p. On-Line. Internet, 5 August 2000. Available from http://www.fas.org/man/dod101/ops/guardian_retrieval.htm.

"Operation SUPPORT HOPE After Action Review." Chapter 2, n.d., 6. On-line. Internet, 11 July 2000. Available from http://www1.eucom.smil.mil/eccs-or/library/operations/completed/operation_support_hope/osh_m_02.html.

"Operation SUPPORT HOPE After Action Review." Chapter 8, n.d., n.p. On-line. Internet, 11 July 2000. Available from http://www1.eucom.smil.mil/eccs-or/library/operations/completed/operation_support_hope/osh_m_08.html.

Ott, James. "African ATC Crisis Escalates." *Aviation Week and Space Technology*, 20 January 1997, 45.

———. "Safety Groups Respond to African ATC Crisis." *Aviation Week and Space Technology*, 12 May 1997, 66.

Pawson, Lara. "Africa's Deadly Skies." *African Business*, March 1997, 11.

Perry, Jim. "37 AS Delivers the Goods." *ATLAS RESPONSE Cheetah*, vol. 1, issue 3, Air Force Base Hoedspruit, South Africa, 20 March 2000, 4.

Petitt, Karen. "Phoenix Raven, Antiterrorism Programs Earn DOD Awards." *Air Force News*, 7 September 1999, n.p. On-line. Internet, 3 July 2000. Available from http://www.af.mil/news/Sep1999/n19990907_991640.html.

"Phoenix Raven Required Locations," 11 July 2000. On-line. Internet, 11 July 2000. Available from http://web.amcin.scott.af.smil.mil/TWG/backup/raven.asp.

Plattner, Gaby. "Choppy Skies: A White Knuckle Flight on Air Zimbabwe." *Chicago Tribune*, 6 June 1999.

Purtell, Bryan. "Teamwork Key to Flood Relief Mission Success." *ATLAS RESPONSE Cheetah,* vol. 1, issue 4. Air Force Base Hoedspruit, South Africa, 24 March 2000, 2.

Roberts, Chuck. "SOCEUR Element Keeps Operation Communications Flowing Smoothly." *ATLAS RESPONSE Cheetah,* vol. 1, issue 4, Air Force Base Hoedspruit, South Africa, 24 March 2000, 4.

Robinson, Lieutenant Colonel, and Major Curran, GUARDIAN RETRIEVAL JULLS 51653-86663, 51336-17008, and 51335-65169, dated 9 May 1997.

"Safe Skies for Africa." FAA Information Sheet, 22 March 2000, n.p. On-line. Internet, 2 July 2000. Available from http://www.intl.faa.gov/AIA-300/ssfa.html.

Schlortt, Maj Q. AMC/DOK, Scott AFB, Ill. Interviewed by author, 18 July 2000.

———. "Closing Remarks at the US–Africa Transportation Ministerial," 29 September 1999, n.p. On-line. Internet, 23 July 2000. Available from http://www.dot.gov/affairs/1999/92999sp.htm.

Slater, Rodney. "US–Africa Ministerial Panel on Economic Partnership," 16 March 1999, n.p. On-line. Internet, 23 July 2000. Available from http://www.dot.gov/affairs/1999/31699sp.htm.

"Slater to Push African Safety." *Aviation Week and Space Technology*, 6 July 1998, 47.

Sligh, Dr. Robert B. "Operation ASSURED LIFT: The First Price Tagged Operation." Headquarters Third Air Force, History Office, RAF Mildenhall, U.K., 3.

Starr, MSgt Charles. "OPERATION SUPPORT HOPE: An Air Force Humanitarian Airlift to Rwanda via Entebbe, Uganda." History Office, Headquarters 60th Air Mobility Wing, Travis AFB, Calif., September 1995, 16.

"Summary – Report to Congress on US Military Activities in Rwanda, 1994–August 1997," 15 June 1998. On-line, Internet, 3 July 2000. Available from http://www.defenselink.mil/pubs/rwanda/summary.html.

Surina, Lt Col Mark J. Interviewed by author at the Air Mobility Battlelab, 25 July 2000; the Air Mobility Battlelab

brochure, 25 July 2000; and E-mail received 15 August 2000.

"TIP:00-13: Description of Low Cost Combat Offload Requirement," n.d., n.p.

"TU-154/C-141 Mishap African Air Traffic Control Recommendations, Course of Action." Point Paper. Headquarters AF/XOO-CA, Washington, D.C.: Pentagon, 15 January 1998, 1.

US DOT News Release. "Safe Skies Initiative Is Improving US–Africa Air Service, Slater Tells Committee," 30 July 1998, n.p. On-line. Internet, 3 July 2000. Available from http:// www.dot.gov/affairs/1998/dot14498.htm.

USEUCOM summary results collected at the annual Regional Engagement Planning Conference for Africa, held at Garmisch, Germany, in March 2000. The captured data for Objective Question Sets 7 and 9 E-mailed to author by EUCOM/ECJ5-OR, May 2000.

Vick, Alan, et al. *Preparing the US Air Force for Military Operations Other Than War*. Santa Monica, Calif.: RAND, Project Air Force, 1997, 137–40.

Walton, Edwina, and John Price Jr. "Wing Team Saddles up for First AMC Rodeo." *MacDill AFB On-line*, 19 June 1998, n.p. On-line. Internet, 3 July 2000. Available from http://www.macdill.af.mil/Staffagn/pa/news/tbolt/June19/Rodeo.htm.

Wehrle, Maj Gen Joseph. Briefing. "Joint Task Force ATLAS RESPONSE—A Commander's Perspective," May 2000.

Wheeler, Lt Col Joel, and Lt Col T. J. McCarthy. Headquarters AMC/DOVS. Interviewed by author, 18 July 2000.

Winkler, Lt Col Robert. "Lack of Adequate Air Bases," JULLS 11141-47511, 20 July 1994.

Index

Expeditionary Air Operations in Africa

Challenges and Solutions

Air University Press Team

Chief Editor
Hattie D. Minter

Copy Editor
Rita B. Mathis

Book Design and Cover Art
Daniel M. Armstrong

Composition and
Prepress Production
Vivian D. O'Neal