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War Potentials of the African States South of the Sahara

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THE SOUTH AFRICAN INSTITUTE OF INTERNATIONAL AFFAIRS

JAN SMUTS HOUSE
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Preface

Belligerent threats against Southern Africa, and South Africa in particular, and not any warlike tendencies on South Africa's part, prompted this study of the capabilities for war of the countries between the Sahara and the Zambezi River. These threats have not stopped at the open advocacy of military action against South Africa, of which the former Minister for Defence of the Republic warned the Senate in March 1962, nor at the proposals made in 1965 in the Defence Committee of the Organisation for African Unity for the military occupation of Rhodesia. They have been implemented by incursions by armed bands into Angola, Moçambique, Rhodesia, South West Africa and Malawi, for the purpose of creating conditions in which a general insurrection might become possible.

South Africa has recently had considerable success in developing friendly relations with her immediate neighbours and has expressed her genuine intention to promote amicable economic relations with all African States. The success of this policy in Southern Africa has interposed a barrier between her territory and those of the African countries still committed to aggressive steps towards ending white rule in Southern Africa. The latter have therefore been obliged to step up the scale and determination of the guerrilla incursions in the hope of breaking through that barrier, and an assessment of their capacity to do so is highly relevant to all future planning in the area.

The assessment of their capacities for conventional warfare is also basic to any calculation of their capacity fully to develop guerrilla warfare, even though the latter require lighter arms, fewer forces and much less logistic support, because guerrilla warfare is not regarded as capable of producing final decisions. It is widely accepted that during the terminal stage, called the stage of the strategic offensive by Mao Tse-tung, a conventional force must be used to complete the overthrow of the government forces.

This study was originally entitled "War Potentials of the Countries South of the Maghreb and North of 15° South". The separation of North Africa from the rest of Africa by the Sahara desert has led the North African countries to identify themselves primarily with other Arab countries outside Africa, and therefore with the Arab preoccupation with Israel.

Recent figures for armaments reported in the press do not differ radically from those given in this study, with the exception of those for Nigeria. One can only speculate on the future employment of the considerably expanding Nigerian forces once the civil war with Biafra is over.

Although responsibility for errors and opinions remains mine, I should like to thank Professor Ben Cockram for his valuable guidance and advice in the preparation of this paper. Thanks are also due to the Department of Defence for its co-operation, to Major Jan Klopper and Captain John Stegmann for their comments, and to Cmdt. V. C. Muller and Miss M. J. Graham of the Central Library, Defence Headquarters, for their help. I am especially grateful to Mrs. Shirley Berman for typing the manuscript.

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Introduction

"War is not as easy as everybody thinks".

Lt.-Gen. Joseph Ankrah, Chairman of
Ghana's National Liberation Council.

The object of this study is the assessment of the capabilities of the sub-Saharan states to conduct a prolonged campaign against the Southern African states.

Its depth has of necessity been limited by its breadth. Only a detailed study into Africa in all its facets could do justice to the problem. To begin with, the conditions in Africa are such that variables determining military conditions are ever changing. The substance of war potential is a mass of continually varying factors: man, his political life, education, the economy, invention, new techniques, topography and geography, material wealth and poverty. These factors place an imponderable time limit on the conclusions. One cannot place the time limit too far away, but the parlous economics of sub-Saharan Africa allow more latitude than would be permissible for more advanced economies. To avoid fixing a period, the expressions "short period", "long period" and even "intermediate period" have impertinently been filched from economics. The "short period" is a period of time too short to allow for re-equipment, re-organisation, changes in standards of training and other factors influencing combat efficiency or fighting capacity of a military force. In the "intermediate period", although these changes may have been commenced their effects are yet to be felt. The "long period" is one in which changes may have been made and their effect felt. The periods may vary with technical advances, availability of technicians, trained staff officers and instructors and existing standards of training. It has been assumed that five years is the intermediate period insofar as military factors are concerned. Armies have taken the field with less training. But von Brauchitsch could still find in the Polish campaign that training was not producing the desired results five years after the introduction of conscription had suddenly inflated the 100,000 army. A rapid expansion lowers the quality of any army. It is accompanied by a shortage of staff officers and instructors, while control and battle drill tend to relax until a long enough time has elapsed for a consolidation of training and experience. When the existing forces have a low standard of training to begin with, battle efficiency will be even lower after expansion.

Rather than abide by a restricted definition of war potential and prompted by the poverty of sources of information on Africa, this study has been guided by four elements upon which the conduct of a protracted campaign against Southern Africa would have to rely. The elements are that:

- (a) an invader must have forces large enough and equipped to engage upon lengthy operations a great distance from home;
- (b) an invader must have a balanced force of conventional arms successfully to cope with the firepower of the defending forces;
- (c) an invader must be able to move and maintain forces long enough to complete the operation;
- (d) an invader must have unified political leadership effectively to establish an agreed strategy and sound command and control by general staffs for the effective execution of the politico-strategic decisions.

Many factors have had to be ignored for want of information, but the details which have been collated do give a reasonably adequate conception of the war potential between the Maghreb and 15° South.

The Geography of the Area

South Africa

The planning of an attack on South Africa would have to take account of the fact that the country has an area greater than the combined areas of France, Germany and Italy, i.e. approximately 472,359 square miles. While this poses certain problems of deployment of forces for the defender, it also enables the defence of the country to be sited in considerable depth. This in turn places a heavy requirement for reserves on the shoulders of the invader if he is to cope with the depth defences. What is more, the length and breadth of the country, roughly 800 to 850 miles each way, leaving considerable manoeuvre space, make imperative the presence of highly mobile forces, strong in fighting as well as transportation vehicles. While the defenders of South Africa are mounted in vehicles and aircraft, no conventional invader of the country could go trudging across the veld—as the British army soon learned in 1900 after which it resorted to masses of mounted infantry to cope with the mounted Boers.

To the North, South Africa has a border lying 595 miles along South West Africa, 1,007 miles along Botswana, 138 miles along Rhodesia, 309 miles along Mozambique and 275 miles around Swaziland. The South African coastline winds 1,836 miles from the Orange River in the west to Ponta do Ouro on the Mozambique border in the east. To these dimensions should be added the internal border surrounding Lesotho for 564 miles, the South West African coast and the northern borders from the Atlantic round the Caprivi Strip down to Botswana. The coastline, which has few large sheltered bays which could be used for beach-heads in support of landings, is generally low and sandy along the Atlantic, becoming more rocky as it moves eastward from Cape Town. The widest coastal plain is north of St. Lucia Bay in the east, where it is only 40 miles in width.

The physiographic pattern of the country has been likened to an upturned saucer.⁽¹⁾ A central plateau with an outer fringe of slightly higher land falls away steeply to the coast. The central plateau reaches as far back as Botswana where it is a sandy plain roughly 3,000 feet above sea level. Such rivers as flow into it have no exit to the sea, by and large, and die in the

(1) Development Atlas, 1. 1 Topography, RSA Dept. of Planning, 1966, GPW.

vast pans. The outer fringe of slightly higher land varies in altitude from 3,000 to over 11,000 feet. It includes the highveld, covering an area within a line from Calvinia in the Cape, moving in a wide arc north to Belfast, Transvaal, and west to Mafeking. This has an altitude of 4,000 feet to 6,000 feet. The highveld is characterised by flat hills, frequently capped with dolerite in the Cape and Orange Free State. This contains the catchment area for the Vaal and Orange Rivers. The hill features of the highveld lend themselves to local defensive positioning and enhance the capacity to fight a succession of delaying actions on a planned withdrawal into the vital industrial-governmental complex of the Transvaal, which would be the key to the success of an attack on South Africa. To the west the plateau slopes gradually from 4,000 feet down to 2,000 feet as it melts into the semi-arid Karoo in the West-Central Cape where, west of Kimberley, the lower basin of the Orange River lies. Here, at the Augrabies Falls, the Orange falls 480 feet down into a 300 mile gorge running almost to the mouth of the river. Thus the South West African border is secured against a conventional crossing for half its length.

To the north of a line running from Zeerust in the west, past Rustenburg—Pretoria—Loskop Dam—Marble Hall the highveld descends into the country called the Bushveld Basin, falling to 2,000 feet. Rocks of the Bushveld Igneous Complex lie below the Basin, giving long unending views of almost flat country, such as the Springbok Flats. The Bushveld Basin is ringed by hard rocks which form an almost continuous series of ridges and valleys called the *Bankeveld*. To these advantages of a defensive force facing north is added the Olifants River which, rising east of Pretoria, drains the Bushveld into a magnificent gorge on the eastern edge where the highveld meets the Drakensberg. North of the Basin, just east of Thabazimbi and continuing east until it joins the Drakensberg south of Tzaneen, where the Olifants breaks through, the land rises to the Waterberg Plateau and Pietersburg Plain. Their altitude is, like that of the highveld, upwards of 4,000 feet. Beyond Pietersburg the ground falls again to an altitude like that of the Bushveld Basin until it climbs again to where the Blouberg-Zoutpanenberg range lies across the Great North Road and canalises it through the ravine of Wylie's Poort. To the north the ground then falls steadily to the valley of the eastward flowing Limpopo River.

The interior of the Republic therefore, while by no means an Alpine redoubt, and in many respects open, flat country suitable for manoeuvre, offers to a reasonably armed, well-handled defence excellent areas for prepared defences in depth in which the forces of an invader can be channelled. Although there is a widespread network of roads, only a few improved, all-weather roads, able to support military heavy traffic without a high rate

of maintenance, exist in the fringe on the north and north-west. From Rhodesia and Botswana there are extremely limited approaches to these roads, and along them must come the logistic support of an invader. Optimum benefits can be derived from the natural advantages of observation, long fields of fire and armour-going country.

The flanks of the plateau are guarded to the east by the Great Escarpment which is prominent from the north-eastern Transvaal southward through the Natal Drakensberg. In the Transvaal it includes the Wolkberg (6,700 feet) and Mt. Anderson (7,498), in Natal Majuba (7,046), Mont-aux-Sources (10,822) and down south the Nuweveld Range (6,389) in the Cape. Not only is the escarpment difficult to enter for an army not sufficiently strong in artillery and armour to saturate the approaches, but beyond, on the coastal side, there is a steeply sloping, often broken, tract of country leading to the Indian Ocean. There is an abrupt break from highveld to lowveld in the eastern Transvaal, especially north of Barberton and the lowveld falls to 3,000 feet before sloping to the Lebombo Mountains on the Portuguese border. In Natal, the Transkei and the eastern Cape the fall is more gradual, down a series of steps and intervening scarps where the nearly horizontal Karoo strata crop out. Deep valleys, such as the 4,000 foot deep Tugela Valley, have been cut, transversally to the steps, by the principal eastward flowing rivers. The Cape fold mountains dominate the coastal margin in the southern and south-western Cape and between them and the Escarpment the semi-arid Great Karoo lies. To the south these mountains include the 300 mile long Langeberg and the Swartberg. Moving north, from the Hex River Valley up to about Clanwilliam, are more fold mountains which help to block the routes to Kimberley and Bloemfontein.

Conclusions

Generally, the picture is discouraging to anyone seeking to move inland from a coastal landing between Saldanha and Lourenço Marques. Such a force would have to be strong in heavy weapons, supporting arms and logistic services to be able to engage upon a lengthy campaign, first to establish itself on the coastal margin and then to work its way inland over the Great Escarpment on to the vital highveld. For a modern, highly-equipped conventional army this might prove to be a considerable though not impossible task. To a poorly equipped army, lacking in highly trained and experienced staff officers, supporting arms, engineers, logistic services, large stocks of vehicles, shipping, a nearby base so as not to over-extend communications, and strong, dynamic leadership, the task would be formidable.

The landings themselves, at a great range from a base — Madagascar, the nearest, is almost 1,000 miles away—would

have to be built up on a scale much like the Normandy landings to compensate for the absence of nearby bases. The build-up and establishment of a beach-head in depth sufficient to prevent dislodgement would not only have to be rapid but would require the very early capture of a port. If the experience of Cherbourg can be used as a guide, the imminent capture of a port would lead to its total disablement, defeating the object of the attack. This could possibly be avoided by high speed operations, probably against more than one port simultaneously. But such operations would require large numbers of highly-trained forces, such as parachutists, for use in the same way as the German attack on Fort Eben-Emael near Liège in 1940, together with diversified, balanced forces for adequate operations at each objective. The equipment, and the staffs and specialists to use it, are not available between the Sahara and the Limpopo.

The more feasible approach therefore, would seem to be overland.

An invasion of South Africa from the north would also set a high requirement for mobility. No matter how large the infantry mass, it would be of little value without fighting vehicles, vehicles for the transportation of supplies, food, ammunition, and fuel, and the attendant equipment for the repair of roads as well as vehicles. For an invader not strong economically, or without a great deal of foreign military grant-aid, geography places severe limitations on his capacity to fight.

The disadvantages apparent in the geography of South Africa rest almost entirely in her centralisation of industry around certain principal nodes, the Southern Transvaal, Durban and Cape Town. Durban and Cape Town are dangerously exposed, being outside the mountain barrier. The Transvaal industrial-governmental complex is sited in depth while South Africa has friendly neighbours to the north and retains South West Africa. But without them her weakness will have to be given particular attention if it is not to become an advantage to an invader.

The Northern Approaches

Because Africa lies relatively symmetrically astride the equator, a belt some 8° to 10° wide spreads south from the equator where tropical rain causes dense rain forests, a teeming growth of tall trees, as far south as Luluabourg-Kasongo and east to the Rift Valley Lakes. The soils in the area are poor in plant food and the dark, dank forest encourages insects, worms and bacteria, many of which use man as a host or food source, leaving in exchange diseases endemic among the inhabitants. The debilitating effects of these diseases make it essential that a highly organised medical service should be part of any expeditionary force passing through or fighting in the area if the effects are not

speedily to weaken the troops below the standards needed for an active campaign.

To the south of this belt is another some 15° wide known as the small bush where short, hardy trees, principally thorn, spread widely among the coarse grass savanna, both produced by the alternation of drought with rainy seasons. These are the areas of the Southern Congo, Katanga, Zambia, Rhodesia, Malawi, Tanzania, Northern Mozambique and the Northern Transvaal.

Southward again and to the west the bush gradually changes to desert or semi-arid country. Here is little rain and widely scattered shrubs. Water is scarce except in the neighbourhood of the Rio Cunene, the Etosha basin, the Okavango River and the Okavango-Makarikari swamps.

To the Portuguese post on the northern bank where the Cunene meets the sea, from the 406 foot Ruacana Falls on the Angolan-South West African border, the river crashes through the Baynes mountains, alternating still, crocodile-infested waters with roaring rapids and waterfalls of varying heights.⁽²⁾ Some 300 miles east of the Ruacana Falls the ruler-straight border which crosses a flat area overgrown with mopani, meets the Okavango where it flows out of the hills over the sand flats of South Angola forming a natural frontier of 250 miles with South West Africa until it flows across the Caprivi Strip at Andara. The Okavango, after tumbling down the low Popa Falls into Botswana, is broad and calm, and on both sides hills reach away from the river. From Shakawe on the west bank the Okavango meanders into the swamps known as the Okavango Basin, about 140 miles square in the rainy season. One hundred and fifty miles from Maun lie the seasonal lakes Dow and Makarikari, roughly 110 miles from north to south and reaching 80 miles east to a point 90 miles from the Rhodesian border.

To the north-east of Makarikari, at a distance of 130 miles at its southernmost edge, the Zambezi meets the Caprivi frontier at Katima Mulilo, beyond the Caprivi swampland, flowing broadly to the Victoria Falls, thence to Lake Kariba, past the dam into Mozambique, where growing wider all the while it pours into the Indian Ocean.

Thus, for a conventional army an effective water barrier reaches across the breadth of the sub-continent, broken only for 300 miles on the Angolan frontier, in Zambia where the Zambezi turns north at Katima Mulilo just 26 to 30 miles from the Caprivi swamps which run into the Rio Cuando, 50 miles west of the Zambezi, and also broken by the fifty mile gap between Rio Cuando and the Okavango swamps. South of the 300 mile straight-edge frontier of Angola the Etosha Pan and the numerous streams forming a 90 mile wide delta shorten the

(2) *Stroom af In My Kano*, W. van Riet, Tafelberg, Cape Town, 1966.

gap to 200 miles, of which 30 lie between Ruacana Falls and the delta. In the rainy season the delta becomes a swamp-land. During the summer the roads in South Angola become virtually impassable so that the authorities control the area only with difficulty.⁽³⁾ Criss-crossing Southern Angola numerous tributaries flow into the Okavango. The largest is the Cuito which flows deep and fast so that crossing is difficult.⁽⁴⁾

The absence of any but very poor roads in Southern Angola, the difficult South West African country south of the Angolan border, and the tributaries of the Okavango make any movement by a conventional army moving south strategically and logistically difficult and inadvisable without superlative staffs, logistic facilities and air cover. For this reason the open 200 mile frontier strip which does not lie on a river line, is perhaps less favourable to an invader than at first it seems to be.

The better roads from the north, whether the approach is from the Congo or Tanzania, lie through Zambia and Rhodesia.

The friendly state of Rhodesia which lies immediately north of the Transvaal, across the Limpopo and south of the Zambezi-Kariba barrier encloses 150,000 square miles between these rivers. An altitude mostly between 4,000 feet and 5,000 feet lies between Plumtree on the Botswana border, some 90 miles from Lake Makarikari, and Mount Darwin, north-east of Salisbury. A branch of the plateau leads to the highlands along the eastern border, which are over 6,000 feet high in parts, the Inyangani mountains reaching 8,250 feet. To the north of the plateau the ground falls away to a so-called middleveld at 3,000 feet to 4,000 feet then a narrow lowveld along the Zambezi. The same fall occurs to the south toward the Limpopo, but there the lowveld is the much wider Limpopo Valley.⁽⁵⁾ But for the heavily forested zones around Melsetter on the Portuguese border, where the rainfall is 60 inches annually, savanna is common, trees being short with spreading crowns, and grass being more common in the Bulawayo-Umtali area.

The topography of Rhodesia, by no means an impregnable barrier, nevertheless provides ample opportunity, as does that of South Africa, for employing elastic defence, using depth and high ground in combination with the limited strategic avenues of access to exhaust and discourage an invading expeditionary force by drawing it into prepared defences in high ground not easily accessible to a force poor in artillery, armour, aircraft and command. As far as South Africa is concerned the neighbour to the north provides considerable strategic depth, so that much of the force of an attack from the north could be absorbed

(3) *Stroom af in my Kano*, W. van Riet, Tafelberg, Cape Town, 1966.

(4) *Ibid.*

(5) and (6) *Man's Environment*: Vol. II, Africa. Nicolson and Morton. Shuter and Shooter, Pietermaritzburg, 1955.

by Rhodesia. With her system of roads and railways, Rhodesia would be an inevitable intermediate objective for an army moving against South Africa. At the same time her topography would be of much value in dissipating the force of the invader before he could close with South Africa.

Mozambique

Falling mainly within the low-lying coastal plain, here at its widest, Mozambique covers an area of 298,000 square miles.⁽⁶⁾ Almost the whole area between the Zululand border and Quelimane to the north of the Zambezi River is very low-lying, with a gradual rise to the west. The country is separated from the Transvaal lowveld and Swaziland by the Lebombo Mountains while the main highlands lie to the north of the Zambezi where some altitudes reach 7,000 feet. Principally the vegetation is savanna while scattered mangrove swamps occur from where the country meets Zululand, for about one hundred miles to the mouth of the Limpopo, from the mouth of the Limpopo along the coastal area to Inhambane, from Vilanculos along the coast to Beira where they move inland about one hundred miles to form a belt up to the Zambezi while south of the Beira-Umtali Road a large area of mangrove spreads around Dombe about fifty miles square, leaving only a fifty mile gap to the Coast.

Mozambique is flanked in the north-west by Lake Tanganyika and Lake Chilwa. Between Beira and Quelimane the broad Zambezi sweeps down to the sea for nearly 500 miles, while the Rio Save (Sabi) flows across the country for two hundred miles, after coming south for one hundred miles along the Western border, just east of Fort Victoria. From Pafuri the Limpopo flows across Mozambique into the sea at Joao Belo, 169 miles north of Lourenço Marques.

While these are typically Southern African rivers, they are at their widest in Mozambique and would provide effective barriers to a conventional army fighting its way south so as to outflank Rhodesia and South Africa.

Although there are 18,000 miles of road only a little over 150 miles are tarred. The better roads lie astride the country, going inland to the neighbouring states. In the hinterland roads are poor and worse in the rains. North of Nampula, roads are few and far between. Anyone wishing to bring a motorised force south would require considerable road-building capacity.

Railways also bear inland to the trading neighbours and there are none north of the Nampula-Vila Cabral line running to the western border. Only the short line from Beira to Port Herald in Malawi runs north.

An army moving into Mozambique would require strong medical support because of the widespread areas where malaria and sleeping sickness are still endemic.

Topography in this country also would permit elastic defence using the swampland, the little and the large rivers, the poor communications and the high ground from Swaziland-Lebombo, and east of the Rhodesian plateau where the Rift Valley tails off. As with Rhodesia, South Africa would benefit enormously from the depth which Mozambique gives to the defence of the Transvaal industrial-governmental complex, and would also weaken a military blow before it could reach South Africa.

The Force in Being

“L'homme est l'instrument premier du combat”

Ardant du Picq.

Introduction

The forces available to the African states south of the Sahara and north of the Zambezi will be examined in the light of their present strength, in the light of the possibilities of supplementing them, as far as possible in the light of the weapons available to them, and with an eye to the aid which may be given them from outside. It will be seen that armies predominate over air force and naval forces in these countries. Most of the countries have no naval forces at all and apart from Ethiopia and Somalia the air forces which exist are rudimentary. The armies are largely infantry armies, having few supporting arms and few service forces. Many have no armour, no artillery, no combat engineers, only regimental signalers, and no services to undertake maintenance or logistic support in the way of supply, transport and general replenishment other than logistic sub-units within battalions. These are all features without which a modern conventional army is unrecognisable. The capacity of a modern army to keep itself alive, to move and to fight depends on these sinews. Nor can they be provided at a moment's notice but require lengthy specialised and technical training.

The Armies of Sub-Saharan Africa

It will be seen from Table No. 3.1 that in 1966 the total armed forces in Africa amounted to 183,420. Of this figure armies constitute 157,200. These figures do not take account of police forces in the African countries which are shown separately on the table.

These numbers taken as a whole show that a very sizable force can be mustered by the African states between the Sahara and the Zambezi. The figures tend to be misleading however unless they are related to the order of battle of the African armies i.e. to their constituent fighting arms and services.

Any assessment of conventional strength assumes not only a conventional war, but also a balanced force containing the necessary proportions of all arms and services essential to cope with the conventional armies of a prospective enemy. Analysis of the orders of battle of the sub-Saharan states however, shows that relatively few countries have diversified, balanced armies.

While Ethiopia has 35 infantry battalions and one airborne battalion it has but one armoured car squadron and, apparently, nothing above battalion support services. The Congo (Kinshasa) has 10 infantry battalions and two parachute battalions, a few improvised armoured cars and some armoured scout cars with no services, engineers or signals. With six infantry battalions organised into two brigades, Ghana has also a few airborne troops, some reconnaissance forces and probably one squadron of Saladin armoured cars, but no other organised services, engineers or signals. The Nigerian forces are better balanced: there are five infantry battalions backed by two armoured scout car squadrons, one field battery, one squadron of engineers and one squadron of signals. Senegal has four infantry battalions, one armoured car squadron, one squadron of engineers and one signals squadron. The Sudan has 13 infantry battalions, one composite armoured regiment of tanks, scout cars and Saladin armoured cars, one field regiment and one light anti-aircraft regiment. Somalia has nine battalions of infantry, one battalion of mobile scouts, some tanks and some Russian artillery. For the rest elements of armour can be found in Guinea, which has some Soviet armoured personnel carriers, and Malagasy, Cameroun, Zambia and Upper Volta, each of which has an armoured car squadron. Guinea also has some artillery, received from Russia, and Malagasy and Zambia each have one battery of

artillery, while Liberia has one heavy weapons company which would probably include anti-tank artillery and heavy mortars. The Germans are training one battalion of engineers in Liberia and one company each of engineers are to be found in the Camerouns and in Upper Volta, while Sierra Leone has a squadron of signals.

Of the 30 countries mentioned in Table No. 3.2 only 8 countries have armies totalling 5,000 troops or more. Fourteen have armies of less than 2,000 men and of these 12 have only one infantry battalion each. Of the countries having less than 5,000 troops 3 have 3½ thousand troops and 3 countries have only 3,000 troops.

In terms of fighting formations, which are the actual key to the capacity of an army to engage in operations, the 140 infantry and airborne battalions can provide approximately 46 three-battalion brigades. But the 46 brigades would have to rely on 12 armoured car squadrons and 2 tank battalions together with 9 field batteries, one light anti-aircraft regiment and two engineer battalions.

This strength should be compared with the standard British infantry brigades of 3 or 4 battalions, of approximately 900 men each, one field regiment of 24 guns, one field engineer squadron for tactical support, and for logistic support, one ordnance field park, one supply and transport company, one field ambulance and a brigade workshop squadron. It should also be compared with divisional or corps troops of the British organisation which consists of heavier artillery, anti-aircraft artillery and a field engineer regiment for tactical support. For logistic support there are an ordnance maintenance park, a supply and transport company for the divisional or corps troops, as well as a general supply and transport company, a medium workshop and a field dressing station. Furthermore, any force of the size of a division or of a corps, especially one operating on long lines of communication, has to be backed up by a Communication Zone Headquarters with all the units to enable it to establish a forward maintenance area. The conclusion is inescapable that although the 140 battalions may produce 15 divisions of infantry they will be divisions of the most primitive kind, deficient in armour, artillery, engineers, signals and all other technical and logistical services. What this means in effect is that although an overwhelmingly large infantry army could be sent south it would be virtually entirely without protection against the armour and artillery and other advanced fire power which could be brought to bear upon it by the defending forces in a conventional operation.

It is hardly necessary to recapitulate the events accompanying the opening battles on the Marne and in Lorraine in August 1914 to emphasise the effect on an infantry mass of taking the

offensive against the defensive power of modern small arms and artillery.

The Armed forces of South Africa

In the course of barely a few hours fighting during the 1965 Indo-Pakistan war, Pakistan lost the equivalent of one regiment of tanks. Southern Africa is reasonably stronger in armoured fighting vehicles than the twelve squadrons of armoured cars and two regiments of tanks possessed by the sub-Saharan states. Moreover, she has not only armoured forces with experience in modern war, but also armoured vehicles mounting new 90 mm weapons. If these forces were well-handled they could quickly destroy or cripple the armoured forces of the sub-Saharan army, leaving the infantry mass entirely exposed. The artillery balance is also heavily weighted in favour of Southern Africa. The nine field batteries available to the sub-Saharan states would have to be exceedingly well handled to be able to cope with the quantity of field artillery and self-propelled artillery which Southern Africa could bring into the field. Moreover, artillery has always been the favoured weapon of South Africans who have in two World Wars (and in Korea), shown a high standard of gunnery. The virtual absence of anti-aircraft weapons to be found in the order of battle of the Black African states means that without superiority in the air the invading force would face annihilation by the modern aircraft of the South African Air Force which have ground strike capability. In fact, there would be every justification for the employment of the older piston-engined aircraft against so poorly defended an invading force. When the conditions prevailing in the Normandy defences on 6 June, 1944, and in Sinai during June, 1967, where the defending air arm was virtually non-existent, are remembered, it will be possible to judge under what conditions the sub-Saharan army would have to fight.

It would not even require the destruction of the armour and artillery of the invading force in order to place the army at the mercy of the defending force; with the invader's armour outnumbered and unable to give adequate cover, swift-moving South African armoured vehicles would be able to fix and hold the invader's limited armour with a small detached force, while the remaining armoured forces made deep penetrations behind the invading forces to sever the lines of communication and destroy supply convoys and dumps leaving the mass army immobile for want of fuel and food. It would be enough to wait for the army to grind to a halt once its supplies were exhausted. There would be scarcely any need for using the superior fire power, except perhaps where occasional determined leadership was shown. Even this could be overcome by patient feints and parries, without too much fighting.

It is neither requisite nor desirable to set out the capacity of the South African armed forces in detail here. Nevertheless, since an assessment of the strength and capabilities of the sub-Saharan states must of necessity be related to the probable potential of the Republic of South Africa, an examination of the capacity which South Africa displayed in the two World Wars may give some measure of comparison. It may indeed be a better indication of her potential than an examination of her present order of battle. In World War I South Africans participated in campaigns in South West Africa—"one which alone was planned, conducted and brought to a successful conclusion by a self-governing Dominion of the British Empire—"⁽¹⁾, German East Africa, Palestine, Egypt (against the Senussi), France and even Russia. In all except Russia and Egypt, participation was at formation (or at least no less than unit) level, while many served in British units, including the Royal Flying Corps. The total number of fighting men raised for all theatres of war during the entire 1914-1918 campaign was 136,070.⁽²⁾ In a war infamous for its unjustifiable loss of life the casualties sustained were 21,245 and this excluded those who became casualties while serving in the Imperial Army.⁽³⁾

During the second World War South Africa sent forces to fight in Ethiopia, Madagascar, Egypt and the Western Desert, and Italy. In Italy the South African Air Force was larger than that of the United States of America or Britain⁽⁴⁾, and this resulted in South African airmen participating even in the Battle for Warsaw where many were killed during the period in which the Russian forces allowed the Polish Home Army to be destroyed by the Nazis. South Africans once again were found gaining experience in every theatre, in the Air Force in Burma, in midgeet submarines off New Guinea, parachuting into Albania and Morotai, in the Royal Marine Commandos in Malaya, or the Royal Welsh Fusiliers in Europe. Something like 386,000 served in the armed forces, including about 125,000 non-Whites. Of the 37,963 casualties sustained, 9,027 were killed.⁽⁵⁾ In Ethiopia, or Abyssinia as it was then, the First South African Infantry Division served with three brigades. A Second Division was subsequently sent to North Africa. Within South Africa there were other divisions, including one set aside for home defence, and one for training. The 7th Infantry Brigade served in Madagascar in 1942 and on its return to South Africa, it was disbanded for the reorganisation required when in 1943 the 6th South African Armoured Division, consisting of 11th Armoured Brigade and 12th and 13th Motorised Infantry Brigades, was established for

(1) *The Campaign in German South West Africa*, Brig-Genl. J. J. Collyer, Govt. Printer, 1937.

(2) *Encyclopaedia Americana*, Vol. 27, p. 290a, 1949 Edition.

(3) *Ibid.*

(4) *Ibid.*

(5) *Ibid.*

service in Italy in the British Eighth Army and then in the United States Seventh Army.⁽⁶⁾ In the course of the second World War, as in the first, there was in South Africa considerable opposition to the participation of the country in the war. This meant that, since there was only voluntary enlistment for military service, fewer took part than would have been expected if the war had had general approval. Nevertheless, between 1939 and 1945 one-tenth of the White population enlisted, as great a percentage as achieved by any other of the more industrialised countries through compulsion.⁽⁷⁾

Immediately following the second World War the peacetime South African organisation provided for the establishment of one Armoured Brigade Group, two Citizen Force Infantry Divisions, Coast Garrison Forces, an Air Force of fifteen squadrons and a Naval Force of four frigates and 18 smaller craft.⁽⁸⁾ Since 1945 the South African Defence Force has undergone considerable change and, if anything, is larger than at that time. The *Encyclopaedia Britannica* for 1963 shows that in 1955 the Permanent Force consisted of 1,038 officers and 5,660 men, the Citizen Force contained 30,000 officers and men and the Commando 100,000 men. The most recently published estimate⁽⁹⁾ is that the Permanent Force is 5,700 with a Full-time Force, under training, of 10,500, while the Citizen Force (Army) trained officers and men number 55,000. The same source mentions that the Army is equipped with Sherman and Centurion tanks and French armoured cars. The Commandos are shown as having 51,500 men.

Whether these estimates are correct cannot be said, but having regard to the South African achievement in the two World Wars it is not unlikely that 300,000 to 400,000 men could be mobilised in the event of war. In 1936 the South African white population was 2,003,857 while in 1960 it was 3,067,638. Although the increase in industrialisation (which raised the number of factories from 4,000 in 1914 to 16,000 in 1953 employing correspondingly more men), would militate against a proportional increase in the armed forces, there has been almost universal service since 1962, and South Africa has understood the threats and may thus be better organised for war if it comes than she was in 1939 when her preparations were delayed until the last minute.

(6) *Calculated Risk*, Genl. Mark Clark, New York, Harper, 1950.

(7) *Encyclopaedia Americana*, op cit.

(8) *Ibid.*

(9) *Armed Forces of African States*, April 1966, D. Wood, ISS, London.

Air Forces in Africa

Introduction

Since this assessment seeks to determine the capacity of the sub-Saharan states to conduct a prolonged conventional campaign against the states in Southern Africa, perhaps the correct approach to the question of the sufficiency of air forces should begin with what the defenders have.

An assessment published in April 1966 by the British Institute for Strategic Studies showed the South African Air Force to have a strength of 3,000 all ranks, operating one squadron of 28 Sabre Mk. 6 interceptors (with 10-15 in reserve), one squadron of 20-25 Mirage IIIC and IIIE fighter-bombers with AS-30 air-to-surface missiles, one squadron of Canberra B-12 light bombers, 8 Shackleton maritime aircraft, one squadron of Buccaneer light bombers, 40 helicopters and various transport aircraft including C-47s, C-130 Bs and Viscounts, while there are about 6 to 8 squadrons of about 150 Harvard aircraft capable of bombing operations, with 100 Harvards believed to be in storage.⁽¹⁾ (See also Table No. 4.1).

The same monograph credits Rhodesia with an air force of 900 all ranks, operating one squadron each of Hunter and Vampire day-fighter/ground attack aircraft, one squadron of Canberra light bombers and one squadron each of armed Provost reconnaissance and Dakota or DC-4M aircraft and one squadron of helicopters.

The Sub-Saharan States' Air Forces

In contrast to these air forces and those in the Portuguese territories — not given in the assessment by the British Institute —, Table No. 4.1 shows which of the sub-Saharan states have any air element and of what kind. For a total of 10,760 all ranks, these countries have 63 combat aircraft—which are confined to 30 in Ethiopia, 18 in Somalia, 10 in Ghana and 5 in the Congo (Kinshasa). Transport aircraft, medium and heavy, are slightly more abundant, and number 97. Only four countries have more than 10 transport aircraft; eight have only one each and seven have from two to 6 transport aircraft each. There are considerably more helicopters, light aircraft and training machines with limited carrying capacity, i.e. 222 inclusive of all three kinds of machines. Nine countries have less than ten each; three have ten, one has seventeen; two countries have none;

(1) *The Armed Forces of African States*, Wood, ISS, April 1966, London.

the exact number in the Congo (Kinshasa) is undetermined. Of the remainder Nigeria has 56, Ghana has 52 and Ethiopia has 25.

In the internal disorders in Nigeria the West German instructors who were training the Nigerian Air Force have withdrawn, taking home three long-distance Noratlas transports. Most of the Air Force's aircraft are in Kaduna, the dissident Northern Region. Half the Air Force's flying officers have fled to the Eastern Region where they have no aircraft. They include Lt.-Col. G. T. Kurubo, who succeeded the German commander of the Nigerian Air Force in January 1965. He has not yet been replaced by the Nigerian government although a Northerner, Major Shittu Alao, is acting in his place.⁽²⁾

A study undertaken under the auspices of the Carnegie Foundation has estimated that aircraft requirements for "direct military intervention" would be 200 frontline aircraft and 200 transport with a further 100 frontline and 200 transport in reserve. It was estimated that the operation if undertaken by the U.N. would take four months, with 3,000 flying hours for a direct assault and 3,000 for a 30 day period.

One hundred and sixty combat and transport aircraft hardly bear comparison with the estimated requirement of 700. Not only would the number not outlast normal combat attrition, but it would not be able to outlast the high rate of use which operations would demand. Time out for maintenance would be hazardous to operations and timetables, while failure to undertake rigorous maintenance would soon cost sub-Saharan forces their small air support altogether.

When it is remembered that these aircraft might have to be used both for conveying forces to the concentration areas and for operational flying, the flying time will be seen to be far higher. The demands for aircraft for various tasks will be much more than were the operations to be over shorter distances with use of aircraft limited to operations. It is very likely that a number of these aircraft, e.g. the C-47s given to the Francophone states, are already quite old and capable only of occasional use, as it is.

In addition to all these factors one should take account of the assessment by the British aviation journal "Flying Review International", which in 1966 wrote of African air forces, "apart from Egypt, South Africa has the largest and best equipped air force and its high standard ensures that it is easily the most effective". Incidentally, while adding that Egypt can claim the biggest and best equipped air force in Africa the Review adds ".....there is less evidence of a correspondingly high standard of training and aptitude".

Conclusion

While troops dug-in in deep, well constructed positions, as

(2) Pretoria News, Pretoria, 31 December, 1966.

were the Chinese in Korea, may be free of the need, it has been understood since the conquest of Poland in 1939, that forces in the open engaged either in mobile defence or attack must have strong air cover if not complete air superiority. While the South African Air Force and the Rhodesian Air Force continue to have their present superiority in numbers, modern aircraft and effectiveness, it would be folly indeed for an army moving south to do so without adequate air cover. Moreover, it would be folly for the scrappy air strength apparently available in the sub-Saharan states to attempt to provide the air cover, for they would soon cease to exist.

An attacking force must not only have sufficient fighter-bombers and ground attack aircraft to co-operate in close support with the land forces to neutralize or break up and destroy defending armour and artillery and defensive positions. It must also be able to provide sufficient air power to disrupt and interdict the lines of communication so that the defender need not be engaged by the land forces in actual battle to be overcome, but may be forced to terms through inability to supply himself with his needs, especially ammunition, fuel and food.

In addition to these tasks the attackers' air arm must be able to carry out the important one of defending the attacker on the ground against the same air interdiction of his supplies and against the demoralising destruction from the air of his fighting echelons. For this fighter or fighter-bomber and interceptor aircraft are very necessary. Against forces of the size and apparent repute of the Southern African air forces the attacker will therefore need large numbers to make up for quality, and should probably outnumber them by two to one or more. This the sub-Saharan states certainly cannot do now: nor can they be expected to be able to do so in under five years, assuming that they will first have to train sufficient flyers, then to train them as combat pilots and finally to train them to use modern aircraft capable of coping with what the south has.

To supply the ground formations over long distances and to undertake the many other flying tasks required of transport air forces, the sub-Saharan states will also have to add to their transport aircraft and to the number of airmen to fly and maintain them. To accomplish this task together with that mentioned in the preceding paragraph is certainly outside the capacity of the Black African states without depriving their economies of the wherewithal to obtain the aircraft, to pay for training and also of the services of the very small numbers of educated men whose efforts could be better employed in building viable economies. An examination of the discussion relating to the economies of these countries will show that they do not have the potential to do this without serious damage to their economies, whose development is already seriously retarded.

Naval Forces in Africa

Introduction

One can hardly refer to the naval forces in Africa south of the Sahara and north of the Limpopo as navies.

After having some fifty-five 'little ships'—corvettes converted from whaling ships, and minesweepers—in the Mediterranean during the second World War, the South African Naval Forces returned to modest proportions immediately after 1945. For a while their complement was no more than a frigate or two, some minesweepers, and some smaller craft. At the time of the Simonstown Agreements in 1955, however, a programme of expansion commenced which turned the force into the South African Navy commanded today by a Vice-Admiral with a Rear-Admiral as Chief of Naval Staff. A Marine Corps which was established in 1952 was disbanded in 1955, however, and its duties shared out among the Army and Navy.

Present-day Comparisons

Today the South African Navy is reported to have a strength of 2,500 officers and ratings operating 2 destroyers carrying anti-submarine warfare helicopters, 6 frigates, including 5 recently modernised for ASW, 2 escort and 10 coastal minesweepers, 5 seaward defence boats, 1 survey ship and 7 other vessels.⁽¹⁾ The Navy has converted an oil tanker for use as a fleet supply ship.

In addition the organisation for operations provides for the S.A.A.F. Maritime Group to fall under the command of the Chief of the Navy, who is Commander Maritime Forces, sea and air.

This cannot be considered to be a navy falling in the class of what would be needed to fight a pitched sea battle of any magnitude. Nevertheless the South African Navy is certainly strong enough to cope with the naval forces which the sub-Saharan states can muster—were the latter even able to reach the southern shores.

The strengths of the naval forces are shown in Table No. 5.1.⁽²⁾

Nigeria has one frigate, while one which ex-president Nkrumah ordered for Ghana seems to have been rejected by the revo-

(1) *The Armed Forces of African States*, Wood, ISS, April 1966, London.

(2) *The Armed Forces of African States*, ISS, London, 1966.

(3) S.A.B.C. News Bulletin, 0700 hrs., 29 December, 1966.

lutionary government. Reports are that, although it has been built, the government of Ghana has not communicated any decision to the builders.⁽³⁾

Ghana has two corvettes and Nigeria has a submarine-chaser.

While Nigeria has two minesweepers, they are in fact motor launches. Ghana has three coastal minesweepers, however.

The most numerous vessels in the sub-Saharan naval forces are patrol boats: there are at least 35, not taking account of those in the Congo (Kinshasa) manned by the A.N.C. or by the Gendarmes, and some owned by Somalia. Nowhere are they in any concentrated strength, however: Ethiopia and the Brazzaville Congo have 5 each; the Sudan has 4; four countries have three each; and one has one only.

The rest of the picture is a miscellany: Ethiopia has 4 landing craft and Nigeria one, a LCT; Liberia has a motor gunboat and Cameroun and Togo each have a river gunboat. There remains one tender, one escort vessel, 5 seaward and some harbour defence vessels, and two motor launches.

An examination of Jane's *Fighting Ships*—1966 shows that most of these vessels are old, worn-out 'hand-me-downs' from the old metropolitan countries. Quite apart from the condition and therefore the maintenance of these vessels, the capacity of the smaller vessels to move south is likely to be severely limited to close inshore: this means that they would not easily be able to take evasive action against aircraft seeking them out.

There is the difficulty of amalgamating these units into a fleet, or more properly a flotilla: Ethiopia, Somalia, Kenya, Malagasy, are on the east coast, and the Sudan is on the Nile; on the west coast are the Congos, Ghana, Nigeria, Senegal, Ivory Coast, Cameroun, Togo, Gabon, Sierra Leone and Liberia.

Then there is the fact that a number of these vessels are used for police and harbour control tasks which would have to be neglected if they were to be withdrawn for war.

Once again, there is the conflict of language: the Anglophones versus the Francophones, the indigenous versus the foreign languages, which would make the problem of control and co-ordination so difficult.

Command would probably go to Nigeria's Rear-Adm. J.E.A. Wey, who after Merchant Marine and Indian Navy experience before returning to Nigeria in 1958, was appointed to command in 1964.⁽⁴⁾ But he again would find himself without the trained staff to plan, organise and direct naval activity.

Conclusion

Finally, a look at the flotilla as a whole: is it indeed a navy? In spite of the development in modern warfare one may still conceive of naval battles being fought between the small Latin

(4) *The Star*, Johannesburg, 20 March, 1964.

American and the Asian states — but for Africa only in the distant future. None of these little forces is supplemented with a Maritime Air Force as is the South African Navy with its Blackburn Buccaneers and other aircraft. None of these forces is strong enough to risk a pitched battle with the South African Navy. Two destroyers and 6 frigates are but little in naval strength. But they are a match for one frigate and three corvettes, with some patrol boats and gunboats thrown in for good measure. They have modern guns to outrange the lighter craft, and well trained guncrews. They have torpedos and they are capable of minelaying and of making good use of mining tactics. It may be possible but it is rather improbable that the light craft could saturate the South African ships with numbers in order to close with them. For even if they did, they would be checkmated by the armour plating on the larger vessels, which would be difficult for the light weapons on the small craft to penetrate. Moreover, the use of the Maritime Air Force would probably ensure that the attackers would never close with the South African vessels at all. In addition, the South African Navy has a reasonably good coast artillery capable of protecting ports and harbours. The purchases of submarines will also give the South African Navy a deterrent value which would discourage any but the most modern and well balanced fleet from threatening South African shores.

It is probably by no means an over-simplification to conclude that the naval capabilities of the sub-Saharan states are so negligible as to be regarded as zero.

Command and Control

"The qualities which commonly make an army formidable are long habits of regularity, great exactness of discipline and great confidence in the commander."

Dr. Johnson.

Time and again mutual suspicion and mistrust, especially French-African doubts during the period of Nkrumah's regime, blocked advance to the objective of an All-African Army or an African High Command.

In September, 1964, Prime Minister Tshombe responded to condemnation of his use of white mercenaries, by asking the O.A.U. Conference in Addis Ababa for military aid. But the Organisation was able only to promise him moral support and did no more than establish a committee to assist in the solution of the Congo's problems. In 1966, with Tshombe gone and Leopoldville called Kinshasa, the mercenaries were still policing the rebels in the Congo. The February, 1964, discussion, called to put an end to what President Nyerere of Tanzania called the "national humiliation" of having to call in white imperialist troops so soon after independence, ended with two specially constituted committees rejecting the scheme for a joint military force which could have taken the role played by the British and French troops in Africa. These failures cannot be explained only as the result of hasty seeking of solutions for complex problems. Soon after the creation of the O.A.U., a Defence Commission met in May 1963, with A. K. Wodojo, the Secretary-General, "..... to act as an organ of consultation, preparation and recommendation for collective and individual self-defence". This machinery aimed at combined action for external and internal defence as well as the liberation of "Colonial" Africa.

So little was accomplished in the ensuing eight months however, that no force or central machinery was available to cope with the East African army mutinies, and a special meeting of foreign and defence ministers summoned to Dar es Salaam by President Nyerere, could do no more than recommend replacing British troops with others chosen by and under "... command, direction and control . . ." of Tanganyika. No advance on this was made when the regular conference was held in Lagos later in 1963. The chief advocates of a Pan-African army, Ghana, Nigeria and Ethiopia, again encountered severe opposition from

the French-speaking states. A general fear, more prevalent among the French language states but not exclusive to them, is that a country nominating the commander of a Pan-African Army would be able to influence the force systematically to subjugate other states—as apparently happened to Syria within the United Arab Republic.

In the sociological setting of Africa, any controversial course the Pan-African Army were to take would inevitably be interpreted as the furtherance of the policies of the Government or the Commander of the Army. Not only does this obstruct the creation of a joint army, but it will continue to threaten its morale and thus its stability. And absolute stability is a prerequisite for an army designed to keep the peace between and within nations. It could never count on the discipline and loyalty of troops who are being suspected of being a partisan instrument of one politically ambitious participant. Nor would the O.A.U. as a whole find it easy to survive the accusation that its army existed to impose the dictatorship of one state on others. The first problem of command therefore, is to find a commander who would stand above suspicion.

Who is capable of producing a commander for a continental African army? Of the six countries having 8,000 or more troops, Ethiopia is the only one with a large, established army long officered by its own countrymen. The Congo, Sudan, Ghana, Nigeria and Somalia, although they have relatively large armies, lack the large resources of African officers of the experience and of the seniority necessary for a joint military force commander. By 1960 the four senior Ghanaian army officers were the only ones from Ghana to have qualified at Camberley Staff College. On the Commonwealth quota entry system not many more are likely to have been added by now. Nigeria had only 81 African officers out of 300 in her army of 7,000 in 1961.⁽¹⁾ The subsequent rapid promotion of non-commissioned officers and of officer cadets is no guarantee of an adequate officer corps for some time to come, and certainly does not provide the cadre from which a joint force commander could be selected. Moreover, since the murder of General Ironsi and other senior officers, the flight to the Eastern Region of 18 Ibo Lieutenant-Colonels and the Nigerian civil war, the command structure in Nigeria has been radically affected⁽²⁾. Uganda, Kenya and Tanganyika have increased their officer strength from three in 1961, but they need time and experience at sub-unit and regimental level before they can even be thought of for superior command.

In the French-speaking states there are a number of officers who have had experience in the French army and there are people such as General Soglo of Dahomey (subsequently deposed)

(1) *Armed Forces in New States*, W. Gutteridge, Oxford U.P.

(2) *Pretoria News*, Pretoria, 31 December, 1966.

and Colonel Lamizana of Upper Volta who both ended their careers in the French army as Majors after long service in the various wars in which France has participated over the last 25-30 years. But the majority of the French States have diminutive armies of only one to three battalions and therefore their ability to stake a claim to superior command is distinctly limited.

Political tensions and disruptive forces in all of the countries make their ability to furnish commanders as tenuous as they make their ability to provide forces to fight abroad. Internal tensions have led to the participation in Government by the armed forces in no less than nine countries south of the Sahara. In Togo, Gabon, and the Brazzaville Congo the army has changed the existing Governments. In Senegal the army intervened to save President Senghor at the time of the revolt by Prime Minister Mamadou Dia. In November 1965 General Joseph Mobutu took control of the former Belgian Congo; in December 1965 General Soglo assumed power in Dahomey;⁽³⁾ Colonel Bedel Bokassa, Army Chief of Staff in the Central African Republic took over the Government on January 1st, 1966 and on 4th of January Lieut.-Colonel Sangoule Lamizana, Army Chief of Staff, became Chief of State of Upper Volta on overthrowing the President. Then on January 15th, 1966, three days after the Commonwealth Conference in Lagos, the junior Ibo army officers from the Eastern Region revolted and installed as head of a military Government Major-General Aguiyi-Ironsi and before he was in turn killed and his Government replaced by Lieut.-Colonel Yakubu Gowon, a joint revolutionary movement led by the Commissioner of Police and the former Chief of the General Staff in Ghana overthrew the regime of Dr. Nkrumah in February 1966 and installed a joint military and police ruling authority. On 13 January, 1967, the Togolese Army Chief of Staff, Lieut.-Col. Etienne Eyadema, took control of Togo "to put an end to the confused political situation".⁽⁴⁾ In addition, Captain Micombero had taken over the government of Burundi in November, 1966. March, 1967, saw the Army take control of Sierra Leone.

The net effect of this has been not to strengthen the armies of these countries externally but to weaken them, for now the officers who would otherwise have commanded troops in an expeditionary force in the field are occupied with the day to day running of the countries, and, because of the revolutionary manner in which they took power, these officers cannot think of leaving their posts to civilian politicians or administrators to enable them to take the field, as the consequences to their revolutions of their absence are obvious. Moreover while these officers may be replaced by newly-commissioned officers, the fact remains that the newly-appointed officers do not have the ex-

(3) Soglo was himself deposed by Col. Alley in December, 1967.

(4) *The Star*, Johannesburg, 13 January, 1967.

perience nor the training to command formations in the field and in battle, a task demanding far more talent than the command of single units in peace time.

In addition it will be recalled that in August, 1966, the second Nigerian uprising by Hausa Northerners in the army resulted in the assassination of certainly not less than 50 Ibo army officers, the tribe considered to be the most advanced and best educated in Nigeria, as well as the murder of 500 Ibo sergeants and other ranks who were indiscriminately shot down all over Nigeria where Northern soldiers happened to be stationed.⁽⁵⁾ This was followed in October by retaliation by the Ibo upon the Northerners and there is no telling how many more trained officers and non-commissioned officers were killed at this time.⁽⁶⁾ An expeditionary force moving South would require not only a general staff for the command and control of the force as a whole but would require the subsidiary staffs for the communication zone and the various brigade and division headquarters. If what has been said above presents a picture of the difficulties which may be anticipated in the establishment and organisation of these staffs from the countries with armed services involved deeply in the Government of their States, then consideration should be given to the conclusion drawn by Michael Bell in his paper "Army and Nation in Sub-Saharan Africa" published in August, 1965, by the British Institute for Strategic Studies:

"It is clear that although Africa has remained relatively quiescent after a wave of coups and mutinies in 1963 and early 1964, the probability of further interventions by military means remains high".

This was written before the 1966 interventions and there is little cause to believe that internal dissensions and tensions in the African countries will not result in further military and other revolutions in the near future.

As a result of the Balkanization of Africa numerous political boundaries contain tribes and other cultural and racial groups characterised chiefly by their mutual antagonisms. In Chad Negroid farmers in the south have clashed continually with the Moslem nomads in the Sahara to the north since 1960 when the country became independent. The President, who is a Black African, is himself antagonistic towards the Moslems.⁽⁷⁾ In November, 1965, following the riots between the Negroid populace and Moslems north of Fort Lamy, a Chad Government-in-Exile was set up in Khartoum in 1965. Moslem political leaders were arrested and jailed in 1965 on the grounds that they had planned to assassinate the President and to set up a Federal

(5) Pretoria News, Pretoria, 31 December, 1966.

(6) Since this was written the secession of Biafra has resulted in a considerable expansion of the Nigerian Officers' Corps. Whether this is likely to benefit the Nigerian command is uncertain, but it is doubted that it would. Sudden and rapid expansion of an army does not advance selective promotions.

(7) Natal Daily News, Durban, 26 November, 1965.

State in place of the present unitary Republic. In the seizure of power by Milton Obote in Uganda in 1966, not only was antagonism of the Baganda one of the fruits of the overthrow of the President, but the coup was accompanied by distinct evidence of conflicting trends within the Uganda army. Recent reports are that General Mobutu's policies in the Congo have resulted in the antagonisms of a variety of groups including the peoples of Kasai and Katanga and within the army where he has antagonised the supporters of the dismissed Prime Minister, Colonel Mulumba. It has been suggested that Mobutu is able to place more reliance on the mercenaries in his employ than on the Congolese army itself.

For a considerable time reports from the Sudan have spoken of harsh measures by the northern Arab Government against the Bantu Southern Sudanese. The differences have been continued by the north in spite of attempts in 1965 to resolve the conflict, since the antagonisms have involved the commencement of guerrilla actions by the southerners and violence including large scale killing of southerners by northerners. As a result the Sudanese army is relatively fully involved and is hardly likely to be able to contribute to offensives elsewhere.⁽⁸⁾ Moreover the army has already been involved in the running of the country for a number of years and although the military Government has been thrown out the possibility of its return is also not to be ruled out.

Ethiopia has to contend with the enmity of Moslem nationalists in Eritrea, federated with Ethiopia in 1952, who will not accept subjection to a Coptic-Christian Ethiopia.⁽⁹⁾ The Egyptian army is believed to be training Eritrean nationalists in guerrilla warfare and Egypt is believed to have sent money and some military supplies to northern Eritrea. Until recently the South-Eastern Province of Ogaden was the scene of fighting between the Ethiopian army and many of the Somali inhabitants who would prefer their province to be incorporated in Somalia.

Not least important is the report reaching South Africa in the last weeks of November 1966 that an Ethiopian brigadier who had taken a leading role in suppressing the 1960 revolt by the *Imperial Guard against the Emperor*, had himself participated in an attempted military revolt early in 1966.

Thus there are everywhere signs of further possible military participation in Government which will rob the armed forces of these countries of more and more of their command potential. African Governments therefore not only have the problem of finding sufficient and adequate commanders but many of them also have the problem of deciding which commanders it is safe

(8) *Daily Dispatch*, East London, 13 October, 1965.

(9) *Port Elizabeth Evening Post*, Port Elizabeth, 6 March, 1966.

to retain at home while others take a portion of their military forces abroad.

Command and control of a sub-Saharan army will not be hampered only by the difficulty of finding formation commanders, trained staff officers and experienced officers of all kinds. It is patent that effective command and control requires amongst many other things, standardised operating procedures, standardised and systematic organisations for command and reliable and also flexible communications. In Africa, however, the armed forces have been trained by Belgian army officers, by French, by British, by East German, by Russian, by Czechoslovak, by American and by Israeli instructors, not to mention Red Chinese. Operating procedures and command organisations are, therefore, far from uniform.

Communications, to be reliable, require not only more signals staffs but a uniform language and once again we find French, English, Amharic, probably Italian, and of course Arabic in addition to possible increased use of vernacular languages. For example, in January, 1967, Swahili became the official language of Tanzania and was to be used in all official work.

Since it is unlikely that more than a few countries will be able to contribute entire formations, an African army would largely consist of integrated forces controlled by integrated staffs and these cannot in any circumstances be improvised.

The only possible conclusion is that in the short period command and control of a sub-Saharan army adequate to overcome the existing armies in Southern Africa will be seriously deficient. It cannot be doubted that the necessary resources of personnel for such command and control will become available, but before they do the majority of the obstacles which have been discussed will have to be removed, and the task will not be easy nor will it be rapid.

Unity of Purpose

“Attempts to direct the operations of allies by a committee usually lead to friction and failure”.

Field-Marshal Earl Wavell.

“Until nations in disagreement are on friendlier terms, don't talk to me about unity of government”.

Dr. H. Banda.

The tendency following discussions of the establishment of an African High Command since 1961, has been towards control by a committee of the O.A.U. In fact an outline sketched by the Secretary-General of the O.A.U. Defence Commission indicated that political direction of a Pan-African army would flow from the Council of Ministers of the O.A.U. The Defence Commission, aided by the Defence Department of the Secretariat, is intended only to provide policy guidance on an advisory level for the Council. The entire picture is one of diffuse direction which, with 34 members of the Council, can effectively render impotent a Pan-African Army by multiplying conflicting objectives and national policies. Perhaps only with a powerful Secretary-General, able to influence the Council Members, could there be consistent and decisive action. The lack of progress which has attended the efforts since 1961 to establish an African High Command seems to be evidence enough that neither the present Secretary-General, nor indeed any one else, has been able to exercise the desired influence on the African Governments. It is not merely the problems of aspiration to individual national policies such as have attended the fortunes of the North Atlantic Treaty Organization which have stood in the way of a common political aim which could have resulted in the establishment of machinery for the creation of a Pan-African Army High Command.

There have been numerous external tensions between the members which have not been ended by the termination of Kwame Nkrumah's attempts to subvert his neighbours and fellow members of the O.A.U.

There has been conflict between Ethiopia and the Sudan because of the support given by Sudanese political factions to Eritrean Nationalists plotting revolution from within the Sudan.⁽¹⁾ There has been friction between Ethiopia and Somalia because

(1) Natal Mercury, Durban, 24 March, 1965.

of the apparent aid given to the Somali nomads attempting to wrest the Ogaden Province from Ethiopia.⁽²⁾ Somalia has also disturbed relations with Kenya in the areas of Nanyuki and Laikipia. The Somali shifita forming the nucleus of secessionist movements inspired from Somalia and armed with modern rifles and automatic weapons have repeatedly attacked and murdered Kenyans and have kept the Kenyan army heavily engaged.⁽³⁾

At the same time Kenya, in the course of 1965, found a further threat in the crossing of Western Kenya by a Ugandan convoy of 75 tons of Chinese arms.⁽⁴⁾

Ethiopia, again, has seen a challenge to her independence from the expansion of Egypt's Arab socialism. Apart from Nasser's support of subversion in Ethiopia that country is fearful of the implications for it of the Egyptian invasion of Yemen and Egypt's probable succession to Aden when Britain leaves.⁽⁵⁾ This could enable Egypt to cut the sea routes to Assab and Massawa, the only two sea-ports to which Ethiopia has direct access. And the Ethiopians believe that it is also Nasser's ambition to drive them out of Eritrea to enable him to control the entire Red Sea.

These are only some of the external strains suffered by the members of the O.A.U. So it is that although the objects of the Pan-African Army have been defined as the provision of a force for security and for the liberation of Africa, many continue to believe that its true objects would be the furtherance of political and personal ambitions of the countries they fear most between the Sahara and the Zambezi. Perhaps this is the best expression of the foremost reason why successive O.A.U. Conferences have failed to create an Army. While international differences to the point of armed conflict and subversion continue, even a common dislike of the White South would not easily unite them. Their mutual differences are far more local, of far more immediate and significant importance than the geographical and ideological distant uniting factor presented by the South. Until their local differences can be composed the degree of cohesion must remain far weaker than the unity of purpose required for a multi-national army conducting operations several thousand miles from home. The integration of the forces of some thirty states into one army must perplex planners for a long time.

(2) *The Star*, Johannesburg, 3 August, 1965.

(3) *The Star*, Johannesburg, 30 June, 1965.

(4) *Eastern Province Herald*, Port Elizabeth, 3 June, 1965.

(5) *The Star*, Johannesburg, 3 August, 1966.

The Battle behind the Battle- Maintaining Logistic Support

"It is very necessary to attend to all this detail, and to trace a biscuit from Lisbon into a man's mouth on the frontier, and to provide for its removal from place to place, by land or by water, or no military operations can be carried on."

Arthur Wellesley, Duke of Wellington.

The logistic support of an expeditionary force is a burden no less important than the strategic battle, and the effects of its failure would be as decisive as defeat on the field of battle. Though he did not consider himself an intellectual soldier, Field-Marshal Erwin Rommel was defining a fundamental law of war when he wrote that "the first essential condition for an army to be able to stand the strain of battle is an adequate stock of weapons, petrol and ammunition. In fact, the battle is fought and decided by the Quartermasters before the shooting begins. The bravest men can do nothing without guns, the guns nothing without plenty of ammunition, and neither guns nor ammunition are of much use in mobile warfare unless there are vehicles with sufficient petrol to haul them around. Maintenance must also approximate, both in quantity and quality, to that available to the enemy."⁽¹⁾

To win the game, the sub-Saharan states will have to play to these rules. The penalty for infringement may be extreme.

It has been said that the term logistic belongs to the vocabulary of the staff planner as a convenient symbol for whatever combination of non-combatant activities happens to be under consideration.⁽²⁾ In the 1945 official report of the United States Army Service Forces, logistics was defined as "all the activities not included in strategy and tactics."⁽³⁾ The latter definition is not satisfactory, but it seems to imply that the authors had in mind all the material and quantitative factors which impose limitations upon strategy and tactics. Examples are procurement, storage and distribution of material, transport, communications, maintenance, medical care, feeding, clothing, reinforcing and

(1) *The Rommel Papers*, Ed. B. H. Liddell Hart, Collins, 1953, p. 328.

(2) *Encyclopaedia Britannica*, Vol. 21, 1963, page 580.

(3) *Logistics in World War II*, p. vii, quoted in *The Army Service Forces*, a volume of *The United States Army in World War II*, Office of the Chief of Military History, Dept. of the Army.

replacing personnel. At the end of World War II logistics was understood to mean all administration except training which was recognised as an operations function.

Historically, logistics has come to refer to four broad categories or elements: supply; food, fuel, and forage; ammunition and equipment; transportation.

Supply is the function of providing for the material needs of armed forces, excluding personnel. In the narrow sense it is limited to storage and to distribution. In the broad sense it extends to design, development, manufacture, procurement, storage, distribution, salvage and disposal. It also encompasses planning, the administrative processes of contracting, pricing, allocation and control of raw materials, components, facilities, inspection, stock control, policies and procedures determining supply, and requisitioning.⁽⁴⁾ This list is by no means exclusive. The four broad phases of supply are the production of the finished item, its acquisition from the manufacturers, its distribution through channels of supply and the balancing of supply and demand by determining requirements and assets and by allocating objectives in production and distribution, all of which require a diversified manufacturing economy and trained and experienced staff officers.

The basic aim of supply is to provide to the armed forces the essential material means:

- to live, such as food, water, clothing, shelter, and medical supplies;
- to move, including vehicles, transport animals, rolling stock, shipping, aircraft, fuel and forage;
- to fight, including weapons, defensive armaments and materials, armoured fighting vehicles and other combat equipment, and fire and missile power.

It is important to remember that while some of these materials are used repeatedly, a great many are expended after only being used once and this introduces the critical requirement of re-supply as well as the requirements of replacement of durables lost through combat. Once troops are overseas or out of their home countries in a war theatre they have constantly to be supplied with fresh stocks of replacement equipment and all kinds of expendable items because wear and tear, loss and battle destruction, eat into the supply of guns, tanks, signals, vehicles, and so on. Without new stocks combat efficiency or battle strength decline in direct relation to the length of time spent in the war theatre. There are special needs abroad for supplies to maintain a military operation. Port facilities are needed for unloading supplies sent by sea. If they are not available or are inadequate or have been demolished by the defenders when in

(4) *Encyclopaedia Britannica*, *ibid.*

housed to prevent deterioration and depots may have to be constructed with materials brought from home. As troops move further forward the stocks must be moved to intermediate and advanced depots, which may not only require the construction of new warehouses but also the importation of railway rolling stock and heavy transport. With them must go hospitals, troop accommodation, airfields, roads—which need equipment such as bulldozers, tractors, timber, steel, portable prefabricated buildings, portable bridging, cranes, road-graders, coal, asphalt, cement, and the personnel to use these.⁽⁵⁾

Fuel and food became the bulk of supply requirements with the mechanisation of armies and the coming of air forces. Man can exist without food for five weeks but he cannot fight. He succumbs without water within four days. An army of 50,000 may consume in one month 4,000 tons of food. It should be remembered, however, that what is a necessity for white troops is often more than enough for non-European troops. In Burma Field-Marshal Slim found that “. . . instead of the four hundred tons a day not considered excessive to keep a division fighting in more generous theatres, we could maintain our Indian divisions in action for long periods, without loss of battle efficiency or morale, on one hundred and twenty”.⁽⁶⁾

Ammunition has come to constitute a large proportion of re-supply with the increased modern use of field artillery and automatic or self-loading small arms.

In absolute terms it may be calculated that to keep ten divisions fighting for three months 30,000 tons of ammunition are required for artillery (including anti-aircraft artillery) and for small arms; 3,600 tons of grenades and mines would be needed; 1,500 tons of engineers' explosives for demolitions would be required: the total is easily 35,000 tons.⁽⁷⁾

Without an adequate transport system available to move supplies to the areas where they are needed, the supplies are of little value to an army. Transportation is the dominant element in the distribution phase of supply. Lack of transportation capacity may easily cause an army to abandon what would otherwise be feasible strategic plans. Transport provides the steady fluid flow of supplies from the rear of an army to the front. Transportation requires a high degree of co-ordination and control, not only to avoid bottlenecks but also to make possible flexibility for rapid changes in the strategic situation. In the field transportation is principally by motor vehicle. British infantry divisions require the most at 3,100 to 3,347 wheeled vehicles; the American infantry division has 2,400 and the

(5) The Army Service Forces, Office of the C.M.H., Dept. of the Army.

(6) *Defeat into Victory*, Field-Marshal Viscount Slim, Cassell, 1962.

(7) *PAIFORCE*, Official History of Persia and Iraq Command 1941-46, H.M.S.O.

Russian infantry or rifle division has 1,308 soft-skinned vehicles.⁽⁸⁾ Even North Viet Nam has purchased 15,000 trucks from her allies for a semi-guerrilla war. Each Viet Cong regiment requires two companies of coolies for supply in the field. With a strength of 18,347 and weighing when fully equipped, 12,500 tons apart from food and medical stores, the British armoured division in World War II required for railway transport over 7,000 ten-ton railway wagons, while at sea it needed not less than ten 7,000 ton ships or similar carrying capacity.⁽⁹⁾ The lack of railway links between Tanzania and Zambia, and the inefficiency of the Congo rail link, would make motor transport the mainstay of a move on Southern Africa. But there are distinct disadvantages to total reliance on road transport. It makes military forces depend on hard-surfaced roads for all weather operations and a great deal of energy and equipment and material would have to be expended on the building and maintenance of roads in Central Africa. By January 1967 the Great North Road between Tanzania and Zambia had deteriorated so much that it became necessary for transport of petroleum and other necessities to be cut.⁽¹⁰⁾ Motor vehicles depend heavily on spare parts and fuel—the blood of war—without which operations cannot be conducted. Zambian experience has shown that this requires special land, sea and air transport—pipelines, fuel trucks, railway tankers, seagoing tanker ships, storage tanks, barrels and canisters in keeping an army both supplied and moving.

Recent history has shown that the army unable to supply its troops in the field does not achieve victory. When transportation is insufficient the army outruns its supply: this happened to the British tanks after the initial successes of Cambrai in 1917, and to the Germans after they had swept the Allies back some 70 miles in March 1918. The United States Third Army was halted in France in the summer of 1944 after four weeks because armour outran its supply. Again, in Korea the Chinese could use coolie labour to mount an offensive, but the technically primitive transport system could not sustain supply for protracted offensive action and after three days offensives petered out.

It is clear that the support of a complex army involves the manpower and resources of the entire nation, more especially when it is a small, underdeveloped country which has embarked on war. The more skilled workers must enter the armed forces to do the skilled technical work necessitated by modern arms

- (8) *A Hundred Years of War*, Cyril Falls, Duckworth, 1953.
British, American and Soviet Field Armies, Capt. J. A. Horner M.C., Commando, May, 1951.
The Battle of Normandy, Belfield and Essame, Batsford, 1965.
Time, 8 July, 1966.
- (9) *The British Army Today*, Brig.-Genl. J. Charteris, H.M.S.O., 1945.
- (10) *The Star*, Johannesburg, 7 January, 1967.

and equipment, to be officers and to serve on the staff. Even a country as developed as Germany could not in World War I provide for her armies and for the economy and at the same time keep level with America and France logistically. It is not only the organisation of economic resources and manpower which is needed: it is a sub-structure of a sound and developed economy capable of continuing its routine development side by side with the support of the war which is essential. Yet figures published in December 1966 by the Africa Institute show that real per capita growth rates in Africa have been lower than anywhere else: 1.1% annually for the years 1957-1958 and 1963-1964, despite foreign aid.⁽¹¹⁾ Elsewhere in this study the economic potential for war of the Black African states south of the Sahara has been examined. The conclusions are that the states cannot supply either their present or future needs for war over a protracted period within the foreseeable future. Without developed manufacturing industries a belligerent is in no position to ensure the unhampered flow of essential material means to its armed forces. It cannot produce arms nor find the foreign exchange with which to buy armaments.

Logistic support for a campaign against the Southern African states is limited by the long distances, absence of rail links to the objective, poor roads, insufficient means of transport by air, land or sea, undeveloped economies and educational levels of the states under study and the inadequacy of foreign exchange to sustain a prolonged war. These limitations to sustained logistic support of a conventional army moving south are great enough to persuade one that such an army would not only suffer from critical deficiencies but would have great difficulty in reaching its objective.

(11) *Aid to Africa*, C.M.E. Leistner, Africa Institute, Pretoria, 1966.

Movement into Southern Africa

"There is not much difficulty in posting a British army for general action, or getting the officers and men to do their duty in action. The difficulty consists in bringing them to the point where the action can be fought . . ."

Arthur Wellesley, Duke of Wellington.

The direction of movement into Southern Africa by a Black African force would be determined, firstly, by the situation of the staging area or areas from which the force, once organised into an amalgam of national forces, would be able to advance onto its objective. The initial problem of movement is that of reaching the staging areas.

Movement by Railway

To the north, the railways built during the colonial period were intended to serve the local needs of the colonies—the carrying from the interior to the coast of raw materials for shipment to the metropolitan countries in Europe, and the carriage back of imports from the metropolitan countries, not for inter-colony commerce. Consequently Africa proliferates in railways which run from the coastal towns and ports to the sources of agricultural and mineral raw materials that were being exploited when the countries were colonies, but in general, the railways do not join up with the railway systems of neighbouring states, especially where these states were in the hands of competing colonial powers. Consequently before the Black African states can move armies overland by the most economical means, railways, to concentration areas close to South Africa, these railways would have to be extended to join into a southern-leading system. This might not always be in the economic interests of the various northern countries which might be better served by the building of these expensive railways in the direction of their best trade outlets and not in the direction of unproductive and uncertain battlefields. Taking into consideration the costs in terms of capital outlay, the resources uneconomically diverted from more profitable use, and the lengthy delays which accompany the building of railways, it is more than likely that the Black African states would decide to resort to the transport of their troops by means other than the railways.

Movement by Sea

The sub-Saharan states cannot be classified as naval powers of any significance. Naval vessels, where they are found at all, are limited to vessels used for harbour patrol, river patrol or minor escort purposes. Moreover, their numbers are even more limited than the aircraft available. All transport by sea would therefore have to be by merchant vessels, and since none of the African states has a merchant navy—despite the high number of convenience-registered Liberian vessels—the necessary merchant vessels would have to be hired or chartered from foreign countries. The first problem to be encountered in the chartering of merchant vessels would be that of cost: ships would have to be diverted from normal revenue-earning activities to military transport. In order to compensate the shipowners adequately very high fees would have to be paid, and these would be additional to the financing of the Black African army, itself a heavy drain on the economies of the sub-Saharan states. Moreover, the owners of chartered shipping would be faced with the prospect of having their vessels attacked *en route* should the object of the move by sea become known to the country to be attacked. Whether this would be politically advisable would be something to be determined by the strategic circumstances of the time, but it is a sufficiently feasible threat to give the shipowners food for thought. Again, while shipping may be insured, it is questionable whether seamen would be prepared to serve in vessels which would be liable to be attacked in a war in which they would be receiving nothing but their pay packets. Some would no doubt be prepared to serve if they were to be paid danger money: enough might refuse to cause attempts to move by sea to founder without the ships having left harbour.

Movement by Air

As to aircraft, the air forces in Africa are poor indeed. No sub-Saharan country has the capacity to move its own entire army simultaneously by air. Most of the countries have some transport aircraft, but only four, between Southern Rhodesia and the Sahara, have more than ten transport aircraft each. The total for the area is 97⁽¹⁾, including both medium and heavy transport. These would probably serve to transport little more than 2,000 men, and movement by air would therefore require an almost non-stop shuttle service from the various countries contributing forces until the joint force was built up. It would also mean that there would be no reserves of aircraft, and the maintenance would have to be kept at non-stop peak level. A number of these aircraft are old surplus aircraft passed on in the

(1) *Armed Forces of African States*, D. Wood, ISS, London, April, 1966.

form of "aid" by previous owners and it is difficult to imagine their being able to withstand extensive use over a long period. Moreover the condition of the aircraft after the concentration of forces would be such as to require a thorough overhaul and rejuvenation before they could be turned to their next task, that of conveying troops forward from the concentration areas: even for this task they would be too few. The limited number of airmen would hamper their employment unless supplemented by foreigners. Then there is the possibility of interception either while they are carrying forces to the concentration areas or when they commence to move into the operational area. It seems to be a reasonable conclusion therefore, that without a considerable increase in the number of aircraft and flying crews—or foreign aid in considerable quantity—the sub-Saharan states would not be able to move their forces by air to any appreciable extent. In the short-run, and in the intermediate period, the requisite multiplication of aircraft is possible, given sufficient foreign aid, but the increase in aircrews and of course, well-trained and reasonably experienced ground crews is not feasible. It takes at least a year to train a pilot satisfactorily for military and transport flying and then he has to acquire a leavening of experience to enable him to cope not only with natural difficulties and hazards, but also with operational hazards in war. This does not mean that he cannot be used, nor that he would not be used, but it does mean that his potential is poor, and the fewer the aircraft the greater the threat of the inexperienced pilot — and ground crew — to the operational potential of the air arm. No country in sub-Saharan Africa, not even South Africa, could stand attrition like that which Germany has recently sustained in her loss of eighty-five Starfighters in six years—asccribed by some to inexperienced flying crews.

Movement by Motor Transport

The movement of forces from their home countries by motor vehicles is conditioned by the availability of vehicles, the condition of the roads, the quality of maintenance staff and the need to use the same vehicles operationally from the concentration areas forward into Southern Africa. Vehicle movement would require that the vehicles initially be in good condition, virtually newly run-in vehicles would be the ideal. No figures are available on the quantities which are possessed by the sub-Saharan states, but it is doubtful that their forces are fully motorised or that what is available is in a suitable condition for the long journey south. There is an overall lack of service personnel in the sub-Saharan states, and while in most armies there are rudimentary services integral to units at battalion level, there are no highly organised technical services. Bearing in mind that the majority of roads which these vehicles would have to

traverse are unmetalled and anything but all-weather roads, the absence of adequately stocked and manned workshops at all formation and unit levels would be a serious shortcoming to movement south. The stocking up of spares and the like through foreign aid could ensure the supply of material but would not alleviate the shortage of mechanics who could only be conscripted from their civilian occupations at great cost to the economies which would in turn have to sustain the forces in the field.

It is dangerous to assume that a rational assessment of capabilities would necessarily determine policy where nationalism prevails. The impracticability of an action does not mean that it would not be tried. Nonetheless, *prima facie* the potential for moving forces from Central Africa toward the southern sub-continent cannot but be regarded as limited. Table No. 10.12, which shows the figures for employment in mining and manufacturing in certain states for which the figures are available, nowhere shows any one country with figures larger than one-quarter of those employed in mining and manufacturing in South Africa. Naturally, these countries do not have South Africa's population, nor do they have comparable Gross National Products, but, proportionately, neither their figures for mining and manufacturing employment, nor their G.N.P.'s, show that they could afford to deprive their economies. It should be remembered that technicians would be no less vulnerable to firepower than the combatant troops. Indeed the conduct of modern warfare makes specific targets of the technicians for both armour and aircraft.

The Movement from the Concentration Areas

In spite of the difficulties likely to be encountered in moving by sea to the concentration or assembly areas, this would therefore be likely to be the most favoured means of concentrating the forces of the Black African states. For this reason the concentration areas would have to be situated in the neighbourhood of ports from which troops and supplies could be embarked. It goes without saying that the landing areas would also have to be as far forward, that is as close to the prospective battle area, as might be practicable, not only to ensure that lines of communication were relatively short but also to minimise the amount of movement that would be required before making contact with the forces of the defender. The concentration of forces and stores in the neighbourhood of the objective would ease the subsequent movement by sea of stores, supplies and facilities forward once the objective, or at least a port on the coast of the objective, had been captured.

Assuming that South Africa will retain her hold on South West Africa, and that Portugal retains Mozambique and Angola,

the closest countries with substantial harbours are the Congo (Kinshasa) and Tanzania.

The Congo

The port of Matadi is close to the mouth of the Congo River, but the usefulness of Matadi is limited by the fact that the railway to and from it runs only as far as nearby Kinshasa (Leopoldville). More useful perhaps would be Port Franqui, situated on the Kasai River, at the terminus of a railway which runs through Luluabourg, and then on to Kamina, the military base built up by Belgium, after which it meets the Benguela railway which runs from Lobito to Lubumbashi (Elisabethville). From there there is a connection via Zambia to Rhodesia and thence via the Botswana-South Africa line. While this railway has everything to commend it, present day conditions in the Congo count heavily against the use of the Congo as a concentration area.

The sorry state of affairs in the Congo goes back to the 1960 mutiny of the Armée Nationale Congolaise (then called the Force Publique) which succeeded in throwing the entire administrative machine of the Congo into chaos, largely as a result of the flight of white officials, technicians and the like. The secession of Katanga, the use of force to compel its return, the Mulelist rebellion and the subsequent unsettled political situation, the coups, the changes of one inexperienced government for another and the absence of trained and experienced officials, administrators and technicians of every kind have all contributed to a steady decline of all governmental and public facilities, not the least of which has been the railway system. One result has been that it has become impossible to operate the entire length of the fairly extensive Congo railway system. The Zambian Government, in spite of an arrangement to ship copper via the Congo to Lobito, has had to seek other outlets, such as road transport to Dar es Salaam.⁽²⁾

While the Congo railway system continues to deteriorate it cannot be regarded as a reliable mode of transport for military purposes, tied as military communications are to time-tables and the strategic factors of time and space. No co-ordinated movements could be relied upon while the means of delivery of forces are subject to delays, faulty routing and similar dislocation. The present operating problems would be made increasingly hazardous by the addition to the Congo's normal requirements of the very large requirements in rolling stock which the transportation of immense numbers of troops, equipment, vehicles, stores and weapons would demand. The value of Port Franqui and the Congo's railway as an infrastructure for a base for military

(2) Bulletin of the Africa Institute, Vol. 4, No. 7, Pretoria, July, 1966.

operations against Southern Africa would therefore seem to be extremely limited without a long-term re-organisation and re-equipment of the system—which could take very much more than 5 years.

Tanzania:

There are several factors which tend to make Tanzania a more feasible area for the concentration of an army to sweep southwards. Equally, there is a telling factor which would hamper the rapid movement of forces.

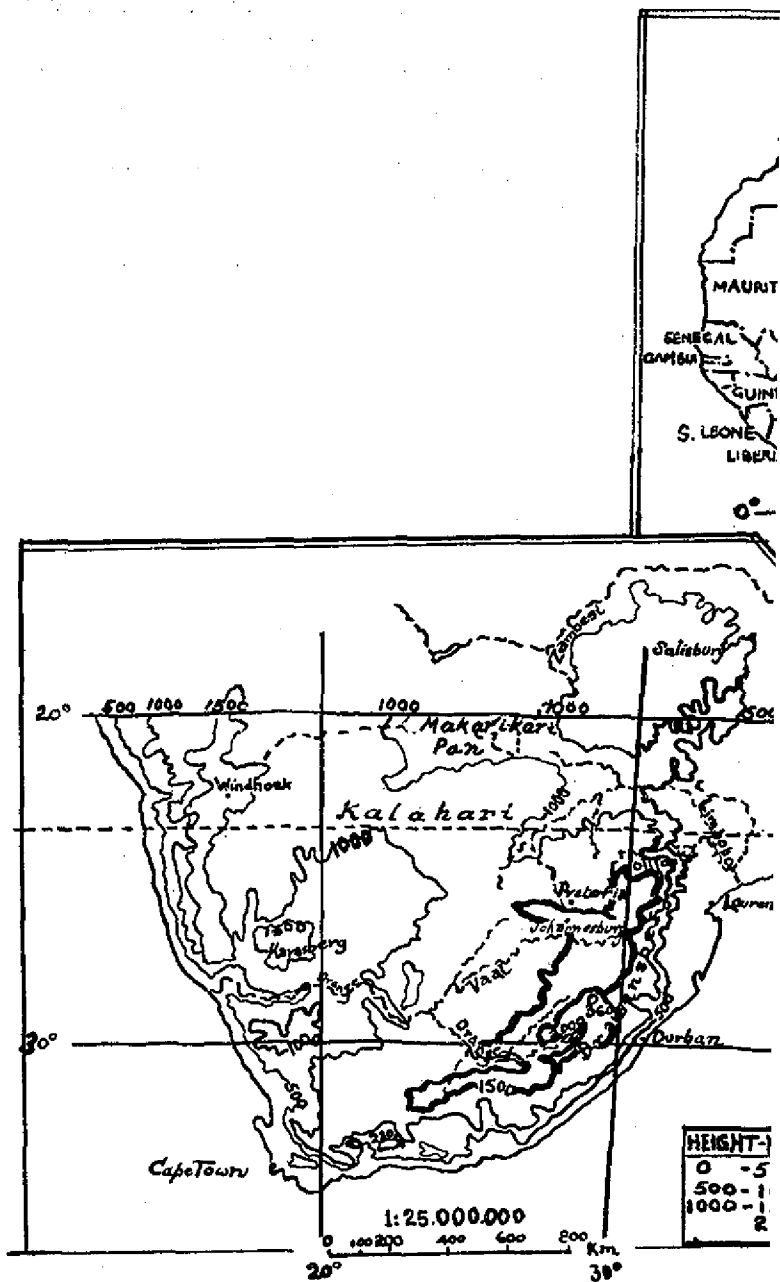
In the course of the "summit" meeting of African heads of state in 1963, a proposal by Odinga, (since dismissed from KANU for his dallying with Red China), was accepted for the establishment of a Liberation Bureau to direct the struggle for the independence of all dependent territories in Africa.⁽³⁾ The Bureau, having been established, is directed by what has come to be known as the Committee of Nine, with headquarters in Dar es Salaam. The nine are Algeria, the Congo (Kinshasa), Ethiopia, Guinea, Nigeria, Senegal, Tanganyika, Uganda and the United Arab Republic. The Committee's first report to the Council of Ministers of the O.A.U. in August, 1963, asked for the establishment of seven training centres for 300 recruits in each, as well as for military bases for those movements with a "common action front". Reliable information is hard to come by but in May, 1966, it was reported that in Tanzania training camps had been set up at Bagamoyo and Kongwa, at Songea and around the border towns of Mtwara and Lindi. At Kunduchi near Dar es Salaam an ordnance depot houses the arms for distribution to the liberation recruits.⁽⁴⁾ The recruits are trained as guerrillas and this is their intended employment. They are not directly linked with the conventional threat. The Committee has been berated, even by its host, President Nyerere, for its lack of success⁽⁵⁾ and it is not inconceivable that either the Committee or its critics may be stimulated to follow up the criticism with action, and because it is already a centre of action, Tanzania may be selected as the concentration area for a conventional army. Nyerere's bitter opposition to Rhodesia may be a further reason.

Tanzania is much more stable than the Congo: administration continues relatively efficiently, public utilities and governmental facilities function and generally the country would be more attractive to military authorities wishing to set up the headquarters for a large scale operation. There has not yet been the atmosphere of intrigue and coups that has characterised the Congo. The mutinies in the Tanzanian army, while serious, did

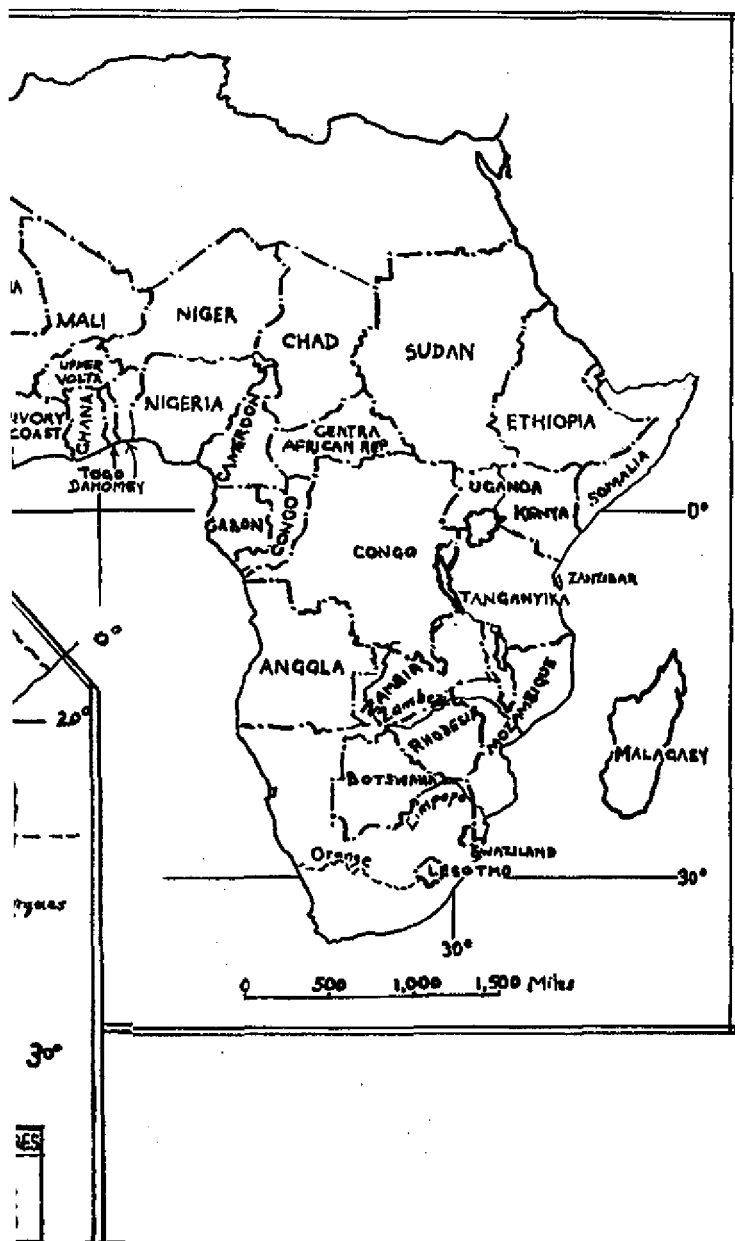
(3) Africa Institute Bulletin, Vol. IV, No. 1, January, 1964, Pretoria.

(4) Target South Africa, Sunday Tribune, Durban, 1 May, 1966.

(5) Star, Johannesburg, 5 October, 1965.



SOUTH AFRICA: MILITARY GEO



APHICAL CHARACTERISTICS.

not result in any nation-wide disruption of commerce and industry, or of everyday life, although there were two within a short time.

The geographical advantages of Tanzania are also many. In the neighbourhood of the military centre of Mtwara there is an international airport, while Mtwara and Lindi are either close to or on the sea. At Nachingwea, where the regular army has a garrison, which joins in training with the guerrillas, there is an airfield, and there is another further inland at Songea, another guerrilla camp. North of Lake Malawi there are also airfields at Njombe, Sao Hill, Iringa and Morogoro. At Dar es Salaam itself there is an international airport. So without taking account of airfields north of Dar es Salaam there are in southern Tanzania a fair number of airfields within a reasonable distance of both South Africa and Rhodesia. From Dar es Salaam the Great North Road runs almost straight into Zambia, while secondary roads link up further north-west at Abercorn, going by way of Kasama, Fort Roseberry, and Mufulira, through the Congo spur. Dar es Salaam offers a staging post for troops and supplies arriving by sea for transshipment to the south by road.

The movement of troops and supplies by rail in Tanganyika scarcely provides an answer to the problem. The only railway line from Dar es Salaam which can be applied to the task runs, not to the south but to the north, through Tabora to Kigoma on Lake Tanganyika. Movement from there must be across the lake to Albertville, which is the nearest railhead. But the Africa News Service of The Star reported in August, 1965, that in the docks of Albertville ships rest on the bottom and the giant cranes had been idle for a year.⁽⁶⁾ This alone would demand the re-organisation of the Albertville facilities as well as the recruitment and training of new personnel—itsself a task which could not be undertaken short of two to three years at the least.

Once across the lake and in the Congo resort would have to be had to the Congo railway system by way of Kamina to Lubumbashi *en route* to Zambia. This places the fate of the expeditionary force back in the hands of the dilapidated Congo railway administration for a distance not much different from that from Port Franqui, (1,830 miles from Dar es Salaam), with the attendant hazards to a time-table and to supply.

To avoid the Congo railway and the hazards of passing through that unhappy country, an alternative route could be by road along the 1,400 mile (from Lusaka to Dar) Great North Road. But this road of curves, mountains and bounces is largely unmetalled. The use on it of heavy trucks to carry Zambian copper out and petrol in, following U.D.I., has made it so

(6) The Star, Johannesburg, 25 August, 1965, photo-article.

hazardous even in the dry season as to leave more than fifty trucks derelict or destroyed along it by August, 1966.⁽⁷⁾ Because of the number of serious or fatal accidents due to the condition of the road as well as the pressure of use, the route has become known as "Hell's Run" and it was expected that with the December rains convoys would lose a driver each ten day round trip, of which six are scheduled per month.⁽⁸⁾ Reports in January, 1967, were of 60 deaths on the potholed, rutted and slippery road in the preceding year.⁽⁹⁾ It was expected that with the high rate of heavy vehicle traffic, (for example 35 ton Fiat trucks are used), which has broken the road in dry weather, the untarred surface would become a morass in wet weather.

Surfacing of the road has been planned and in August, 1966, a German firm commenced with the tarring of seventy miles in Zambia. At the same time the International Bank for Reconstruction and Development has promised R12 million for the metalling of this road and the Zambian Great Eastern Road to Malawi. Tanzania hoped to spend R2 million on the main Dar road and R1 million on a road through Mtwara.⁽¹⁰⁾

Not only will these schemes take time and probably require a lot more money than that mentioned, but their continued use for the Zambian economy is likely to cause such deterioration as to require the rebuilding of the road. Moreover, while Zambia needs the road for its economy which would have to take priority after the military needs, its use as a military artery is likely to cause even more damage to the Zambian economy.

In addition a British consulting engineering firm has proposed to Zambia the building of two new roads totalling 210 miles and the reconstruction of one of 120 miles to the Malawi trunk road to link with a railhead to Mozambique. At an estimated cost of R19 million, the building would be completed in two years.⁽¹¹⁾ Were Portuguese East Africa to fall into Black African hands these roads would be of considerable military value.

At the present time there is another alternative exercising the minds of the Zambian and Tanzanian leaders. It is the building of a railway 1,320 miles long between Kapiri Mposhi in Zambia, south of Ndola, to Mikumi in Tanzania where the Dar es Salaam railway branches south for a short distance on the Great North Road. The idea is not new. In 1963 the East African Railways and Harbours Authority estimated that it would cost R74 million. In 1964 the International Bank estimated that, costing R116 million, the railway would carry only 200,000 tons by 1975, that it would take seven years to build and would not

(7) Newscheck, Johannesburg, 12 August, 1966.

(8) Ibid.

(9) The Star, Johannesburg, 17 January, 1967.

(10) Newscheck, Johannesburg, 12 August, 1966.

(11) Africa Institute Bulletin, No. 7, Vol. IV, July 1966, Pretoria.

pay its way for twenty years, and rejected the scheme.⁽¹²⁾ Although an offer of aid in July, 1965, by Chou en Lai seemed to stampede Britain and Canada into offering R300,000 for a preliminary engineering and economic survey, and a Chinese survey team was reported in Tanzania by August, 1965, Communist China has a poor record in the construction field both at home and abroad. In addition, the Tanzanian railways have a gauge three inches less than the Zambian system which would require switching machinery on the rolling stock, although a line to Mtwara could use the Zambian gauge as a compromise. Moreover, Tanzania must also find R72 million for new rolling stock and for outstanding loans due by 1971.⁽¹³⁾

From what has been said it is clear that considerable practical difficulties face the movement of a conventional Black African army overland toward Rhodesia and South Africa. The absence of roads in sub-Saharan Africa north of the Zambezi of a quality sufficient to sustain ceaseless use by numerous heavily laden military vehicles would tell against any movement. Movement over long distance from the coast to the concentration areas and from the concentration areas against the objective would soon cause deterioration of the roads. Once the rainy season arrived the broken condition of the roads would quickly turn them into quagmires and the lines of communication would break down completely. Even the provision of strong and well-equipped engineering units for road building and repair could not ensure the indefinite maintenance of communications. Circumstances in which the invading force could be deprived of its replenishments of food, ammunition and fuel because of the breakdown of its communications would lend themselves to the piecemeal destruction of a force unable to concentrate for combined action or to move its forces tactically.

Moreover the steady deterioration of the roads south would be accompanied by the deterioration of the condition of the vehicles. Without the certain continued supply of spares the breakdown of vehicles would multiply and interrupt the lines of communication as much as the poor roads may be expected to do.

Not until the force reaches Zambia will it be assured of adequate roads, and then only in limited number. Not far south of Kamina a so-called transcontinental road begins at Kolwezi, whence it passes through Lubumbashi to the road Kitwe-Ndola-Broken Hill-Lusaka-Livingstone. Until south of Lusaka there is the decided disadvantage of the fact that there is only one main surfaced road south, open to air interdiction and relatively simple blocking, forcing the invader onto easily churned up

(12) *Ibid.* and Newscheck, 27 August, 1965.

(13) Africa Institute Bulletin, No. 7, Vol. IV.

alternative pathways around the damage. The branch south of Lusaka, crossing the Zambezi at Chirundu and going on to Sinoia—Salisbury is equally vulnerable. Both can be simply broken at the river crossings apart from elsewhere along the length of the route.

The Livingstone route would no doubt have some appeal for the opportunity it offers to outflank Rhodesia and the Transvaal by way of Botswana. This would involve movement down the length of Botswana between the Okavango and the Makarikari, if not over the open Kalahari flats then via Maun-Ghanzi-Lobatsi over existing tracks to meet the highway from the west to Pretoria. A shorter track goes from Maun to Serowe where it meets the Francistown-Mafeking road which in turn connects with five or six better roads over a broad front into the Transvaal.

The Kalahari route does not commend itself however. There is the fact that roads are in a parlous condition and would crumble into dust very easily and quickly. In fact they are at present better described as tracks for the most part. Moreover, the Kalahari access is severely limited as to breadth of movement and strategic flexibility by the funnelling between the Okavango and Makarikari Lakes and between Makarikari and Rhodesia's Matoppos. This narrow entrance to Botswana would expose the force to any defender waiting for it to emerge from either funnel so as to destroy it from the air and from the ground, using armour and artillery positioned around the mouth of the exit.

Conclusion

What appears reasonably clear is that a move towards South Africa and Rhodesia would be severely hampered until the force has had the opportunity to build extensive and well-surfaced all-weather roads from the possible concentration areas in Tanzania or the Congo. Taking into consideration the distances involved, it would not seem to be unreasonable to say that the more satisfactory form of approach would be by rail. This would help to overcome the hazards of the rains as well as being more substantial for continuous use than would be earth roads. Moreover the maintenance of rolling stock, though high, is not quite so trying a problem as the maintenance of thousands of motor vehicles.

From the point of view of a strategic move that keeps the defender off balance by threatening alternative objectives through wide movement on a number of routes, the invader would be better favoured when the number of roads approaching the objectives has grown. At present the defender has all the ad-

vantage and the attacker none, since his moves are determined for him by the fact that all-weather roads are so few as to limit him to virtually one route where he can easily be found and stopped or destroyed. Only an invader well supplied not only with tracked fighting vehicles, but also with tracked infantry troop-carriers and supply vehicles could overcome this disadvantage and take the strategic initiative for surprise.

Economic Factors

Introduction

Since this is a study of what the potential for military action of the sub-Saharan states is in the short term, it is not proposed to predict their potential as it may develop in decades to come.

In considering their economic potential, the approach is first to consider the economic factors at present at their disposal for the creation of the munitions of war. By comparison with the level of development in South Africa in 1940 and the capacity then developed, an attempt will be made to determine whether a similar potential is now present in or within the reach of the sub-Saharan states.

This approach is chosen because South Africa, as a state on the African continent, shares many common features with the sub-Saharan states. It is also a country which, from having no specifically war industries in 1940, built up industries which served not only the South African forces, but also the armies of some Allied nations during World War II. The basis upon which this capacity was established should provide an indication of what the sub-Saharan states may be able to produce from their economies at present and in the predictable future. Whatever military action the sub-Saharan states may wish to take against the states in Southern Africa must rest upon a power base strong enough to fight a prolonged war if this should be necessary. Failure to provide for this might result, not only in their being unable to complete their chosen task, but also in the decisive defeat of any expeditionary army by Southern African forces. The blow to their prestige resulting from either of these consequences could cause a set-back to their political and diplomatic aims which would take many many years to repair. The power base is the economic capacity of a country or of an alliance. Military power must be mobilised from the resources of the nation in population, raw materials, manufacturing industries and the like.

How much of these resources may be diverted from peacetime employment can only be determined by the extent to which the country needs its peace-time economic activities in order to carry on. It is therefore quite clear that the kind of resources available to a nation, and the quantities in which they are available, will determine what the nation and the alliance to which it belongs, can allocate to the conduct of war and

what reserves it will have to add to these allocations if necessary. This is the power-base on which the nation must rely and this determines the nation's economic capacity to conduct war.

Because war-potential is a relative term the power-base of the sub-Saharan African states cannot be considered in isolation but must be related to the power-base which exists in the Southern African states, and particularly Rhodesia and South Africa. It is after all the ability of the Southern African states to resist which would determine the adequacy of the power-base in the African states south of the Sahara and north of the Limpopo.

Since the first World War it has been generally accepted that limits are set to a nation's capacity for war by the availability of real resources. Provided the real resources are available within the geographical reach of the belligerent the financial problems may be relatively secondary. The real resources which contribute to the capacity to wage war are broadly those which a country requires in time of peace: but, because the end-products which are wrought from the resources are different in war from what they are in peace, there is naturally a greater emphasis on certain specific products than there would be in peace.

The resources with greater military utility in warfare can be described as the economic war potential, the availability of which would determine the belligerent's capacity to engage upon and sustain a war. A reasonable picture of war capacity can be drawn by an examination of them in potentially belligerent countries and by the comparison with the corresponding resources in the country on which they might propose to make war. From this may be derived the capacity to initiate war, to carry the war far beyond the borders of the belligerents, to maintain forces abroad, to make good losses from reserves, to reinforce, to extend the war and to sustain it for a considerable length of time.

The Economic Resources

Raw materials for Industry

The duration of a war mainly determines whether the natural resources and the extractive, fishing and farming industries are to play a role in it. A short war, of the duration, for example, of the Indo-Pakistan war of 1965, could be fought on the strength of existing stocks of ammunition, weapons, clothing and probably food. Almost all these stocks may have been drawn from external military assistance and from purchases not directly or specifically related to the requirements of the war and acquired a fairly long time before. In a war of a few weeks the stocks may suffice, even in the face of all but the severest losses in material, without placing any demands on the country's invent-

ory and its natural resources of raw materials.

When a war becomes protracted and can no longer be fought with existing stocks of munition, the capacity for war is no longer a function of inventory. Unless a reincarnation of Sir Basil Zaharoff can be found simultaneously with the financial resources for foreign purchases of military stores and equipment, a belligerent must have access to such raw materials as are needed for munitions industries. If the major raw materials for war are not within the geographical bounds of the belligerent, considerable resources of foreign exchange and credits will be required to superimpose upon the normal import requirements of the economy in peace, the extraordinary additional import burden of the natural resources needed for war. Consumption in war is not merely changed to military commodities; these are added to what is required to maintain the normal daily existence of a belligerent state, although what is accepted as necessary in war-time may be severely austere by peace-time standards. Although in war-time many peace-time industries are converted to the production of war material, at the same time, newly-created and specialised war industries are likely to have to be added. There will also be increased demands upon the resources of raw materials when these have to serve civilian as well as war purposes.

A key to estimate industrial capacity for war is the availability of, or the ability to procure, raw materials such as metals, non-metallic minerals, rubber, textile fibres and vegetable oil. Aircraft, tanks, motorisation, mechanisation, changes in artillery, and electronic means of signalling have all contributed to raise the requirements in modern war for metals. During the period 1939 to 1944 in the United States, supplies of copper, steel, aluminium and magnesium were increased by 70, 82, 429 and 3,358 per cent respectively: the output of metals as a whole increased in the United States by 68.5%. In Germany where steel output was an annual average of 20 million tons in 1940 it was 36 million tons by 1943. In 1943 the U.S.S.R. was allocating to munitions 76% of its steel production, while Britain allocated 70% and the United States 66%. Since iron ore is the foundation of the manufacture of munitions, no nation among the major arms producers is without relatively large supplies of iron, steel and energy, no matter how dependent they may be on imports in war or peace for particular raw materials. In no other way could they have developed a war potential. The role of metals is fundamental to war—iron and steel for tanks, artillery pieces, shells and vehicles; copper in the electrical and electronic industry, for driving bands on shells; brass for use in cartridge cases, shell cases, shipbuilding and technical instruments; lead for storage batteries, cable casings and paint for the core of bullets; tin for tinplate to use in packing foodstuffs; aluminium

for aircraft construction; and manganese, nickel, chromium and tungsten for the manufacture of special steel. In the production of these commodities energy derived principally from coal is required. And to pay for imports of manufactured goods and of raw materials, gold and diamonds may round off the stock of raw materials very nicely.

What are the available raw materials in Africa? Virtually every raw material which is required. The vast majority of resources are untapped and until complete geological surveys have been undertaken they are also very largely undiscovered. While many of the undeveloped African states are beginning to appreciate the value of geological surveys and are planning these or actually undertaking them, the exploitation of what they reveal is something not within the bounds of the immediate future.

It is those raw materials which are already being exploited in Africa which matter in an assessment of the capacity for war of the African states. The output of coal, copper, diamonds, gold, iron ore, manganese and tin, the principal mineral products of Africa, are set out in Table No. 10.1.⁽¹⁾

Apart from South Africa, Sierra Leone, Liberia and Mauritania which are active exporters, there are considerable iron ore deposits in the Upper Volta, Ghana, Guinea, Cameroun, Gabon, Angola and Swaziland. In 1965 Liberia produced 410,000 metric tons of natural rubber and Nigeria 569,000 metric tons. It is interesting that whereas South Africa is able to produce, in greater or lesser degree, all of the raw materials mentioned except natural rubber, the output of them by the sub-Saharan African states is sporadic and uneven and only the Congo (Kinshasa) has resources equal to those of South Africa. And in the Congo disorganisation in communications and the Government is such as to dissipate much of the value of her natural resources.

Manufacturing Industries

Without the capacity to manufacture, no amount of raw materials can be of much direct value to a state or alliance which has to maintain in the field a large army for an indefinite period of time, unless it finds immense resources of foreign exchange with which to purchase the arms and equipment which are needed.

In the very short run, general economic strength is almost irrelevant. It is then that immediately available supplies of arms and ammunition, and of men trained to use them are important. From the point of view of manufacturing industries it is not the long run nor the short run, but the intermediate period

(1) Adapted from the book "Economic Transition in Africa" edited by M. J. Herskovits, Routledge, London, 1961.

of from a few months to three to five years that is important. It is in this period that it should be possible with adjustments and sacrifices to transfer a major portion of the resources to certain specially relevant industries for the production of war munitions. Not all manufacturing industries are relevant to production of war materials. The demands of war are for signalling equipment, small arms, infantry heavy weapons, artillery pieces, armoured and soft-skinned vehicles, ammunition and explosives, tyres, tents, boots, clothing and all the accompanying accessories such as webbing, electronic parts, vehicle and machinery spares, girders and corrugated iron, timber and cement for installations and bridges. The greatest contribution to ability to conduct war comes from the steel and chemical industries without which there can be no guns and no ammunition. By 1943 80% of durable goods production in the United States was of munitions. This constituted 66% of all manufactures. At the same time 72.1% of production in metal industries in Germany was for military equipment and this was 61% of all production in Germany.

Bearing in mind that a country producing chiefly or only non-durable goods may convert some of its industry to heavy industry, and also considering that even heavy industry must suffer a degree of production lag while being converted to war production, the significance of a country's war potential may be determined by the extent of its pre-war durable goods and chemical industries. While in 1937 American production of metal goods, optical, engineering, shipbuilding, vehicle, chemical and part of the pig iron and crude steel industry made up only 48% of the total against 51% of the total manufacture in Germany, the absolute manufacturing output in the United States was three times that of Germany. The effect was to give America boundless equipment not only for its own forces but for those of Britain and Russia as well.

It is therefore possible to evaluate the economic potential of belligerents by an enumeration and comparison of actual production of items of capital goods such as ships, aircraft, motor vehicles, tractors, railway rolling stock, turbines, machine tools, optical instruments, electronic goods and radios and important chemicals. Once industries for the production of these goods exist then they can be relatively easily converted to war production and can expand to greater productive capacity.

In addition, although no more than a crude indicator, energy consumption, especially when the differences are large, may be relied upon as a means of relating the war potentials of belligerents. The existence of large, developed industrial output may be deduced from the fact that a country is consuming large quantities of energy. It will be found that countries or areas

having a large industrial output are also characterised by a high rate of consumption of energy and, conversely, low production is paired with low consumption. This is because of the growth of electrochemical and electro-metallurgical industries. Modern war materials require increased production of electrical energy, for the production of light metals, nitrogen and other chemicals and also because electricity cannot be stored for future consumption.

Analysing the economic characteristics of Africa south of the Sahara, Green and Fair found economic activity to be distributed in "Islands" or clusters around various population centres in Africa. These islands are by far the main earners of wealth in the territories in which they occur and the remaining areas are the poor, sparsely populated and economically backward parts of Africa. Within this distinguishing feature, Green and Fair have found the basic pattern to vary considerably. In some cases agriculture, mining and manufacturing all play significant roles; in others mining is a chief activity; in others agriculture predominates. The third category includes areas which have substantial subsidiary mining or manufacturing activities and areas which are almost entirely agricultural.

From Table No. 10.2, the wealth of the representative territory in which economic Islands occur, areas in which agriculture, mining and manufacturing play large and significant roles can be seen as South Africa and Southern Rhodesia. The predominantly mining areas, with or without subsidiary agriculture or manufacturing, are Zambia and Katanga, having produced in 1959 minerals to the value of R224 million and R116 million respectively; agriculture being poorly developed, the accent is on manufacture which is primarily concerned in both countries with copper-smelting and associated metal industries. Agriculture is particularly poor in Katanga in which only 9% of the total African male working population is concerned with agriculture whereas 34% work in mining and industry. Potential for development was great in this area, gifted with copper, manganese, diamonds and tin. Although the Congo and Zambia were credited with the use annually of 3,157 million kilowatt hours of electricity, it is the opinion of Green and Fair that their character as an area of permanent, mature and stable settlement is not yet assured.

Further north we find the predominantly agricultural areas with subsidiary mining or manufacturing. This includes Kenya, Uganda and Tanganyika, Ghana, Nigeria, the Ivory Coast, Guinea, Sierra Leone, Liberia, Senegal and Gambia, Malawi, Angola, Mozambique and the area around Kinshasa (formerly Leopoldville). All these areas depend heavily upon the production for export of a relatively few agricultural and forest products. Sub-

sidary mining has added to their limited economic wealth and manufacturing, although mainly limited to processing local raw material, has commenced to advance to the fields of consumer goods and a widening range of finished products. While the economic character of these agricultural Islands is slowly changing they still lag well behind the more industrialised areas of Southern Africa. The population of East Africa, where cotton and coffee represented 83% of the total exports in 1958 and minerals represented only 5½% of exports in Kenya and Uganda combined, is gradually taking to manufacturing. Although this is chiefly processing of raw materials such as cotton, sugar, tea, sisal, coffee and cereals, it is expanding into the manufacture of tin containers, paints, insecticides, spares for agricultural and mining machinery, and so on. In 1958 employees in Kenya engaged in manufacturing represented only 9.5% of the total employed population, and the total output of the electricity industry in Kenya, Tanganyika and Uganda combined stood at 470 million kilowatt hours for the period 1955 to 1957.

Southern Ghana is the economic core of West Africa. The *per capita* wealth of Ghana as a whole was twice that of Nigeria in 1956-57 but Ghana has suffered considerably in recent years from the inflationary policies of Nkrumah's regime and no doubt it will take considerable time for her economy to recover. 80% of Ghana's overseas income is derived from raw materials such as cocoa, timber and minerals and the expansion of industry and the diversification of the economy planned by Nkrumah seem to have turned into an idle enumeration of boastful promises: many have been abandoned by the Ankrh Government. The £1.65 million Nkrumah Steel Mills which would have resmelted scrap iron at the rate of 2,000 tons per year when established in 1964 were idle by August, 1966, for want of both iron ore and scrap iron. The result was that little or no steel has been produced from the mills. The Tema Dry Dock, which was to have increased Ghanaian manufacturing and engineering activities by providing a dock for ships of up to one hundred thousand ton, lies idle as shipping of this tonnage never calls at Ghana. The planned expansion of industries for the production of metal and rubber products and the assembling of radios and motor cars has also apparently died in embryo, for the United Nations *Monthly Bulletin of Statistics* of June, 1966, shows only South Africa, Algeria and Egypt as manufacturers within Africa of tyres and radio receivers and as assemblers of motor vehicles.

Whereas in Nigeria the 1960/65 Development Plan envisaged major projects including the manufacture of aluminium products and plastics goods, and a motor vehicle assembly plant, production has either not yet commenced or has not justified its mention in the United Nations *Statistical Year Book* or *Monthly*

Bulletin of Statistics. Nor is any mention made of the proposed manufacture of tyres at Kano. Although an Act setting up a Defence Industries Corporation to manufacture ammunition and small arms with German help, was passed by Parliament in 1964, advertising for personnel continued in 1965 and it may scarcely have begun to operate. In Nigeria 80% of all workers are employed in agriculture and not more than £2.5 million was contributed by factory production to the national income of £812 million in 1957-58.

In the show piece of French colonialism, the Ivory Coast, food and beverage factories, cellulose and aluminium sheet rolling plants, a match factory and a motor car assembling factory are projected as well as the investment of over £5 million in four major and three minor industrial projects. Guinea, Sierra Leone, Liberia and Senegal rely heavily on the export of raw materials such as palm oil, cocoa, rubber, iron ore, phosphates and bauxite. In November, 1964, it was reported that a joint American-Canadian consortium would be established to manufacture explosives at Robertsfield near Monrovia in Liberia under the ownership of West African Explosives and Chemicals Limited. How far this project has developed is unknown. But its capacity in the absence of other chemical industries is likely to be limited by the import of its production materials. The Central African territories of Gabon, Chad, Congo and the Central African Republic remain principally agricultural with small reliance on minerals except in Gabon where iron ore, manganese and oil deposits are being linked to the economy.

An examination of Table No. 10.3 which indicates the industrial origin of the gross domestic product of certain selected countries in 1955 clearly shows the tremendous lag in manufacturing production in countries such as the old Belgian Congo, Kenya, Nigeria, Tanganyika, Uganda and even the old Federation of Rhodesia and Nyasaland, by comparison with South Africa.

If any further evidence of the profound differences in industrial capacity between that of the sub-Saharan states and that of the Southern African States is needed, one may examine Table 10.4 in which the industrial capacities of most may be judged from their small capacity to generate and use electricity. Table No. 10.5 also shows the small consumption of steel in the African states, even including the North African countries. Although next after South Africa, Algeria's per capita consumption of 402,000 metric tons is negligible against South Africa's 2,380,000 metric tons in 1961. Quite apart from the relationship to South African industrial potential, these figures can be seen to express a considerable lag behind what should be considered adequate to establish a stable manufacturing industry. Their present stage of comparative industrial development can perhaps

be roughly gauged from the following figures which show the increasing gross value of manufactures in South Africa.⁽⁴⁾

Table No. 10.5—Gross value of Manufactures

1904	.....	£19,530,487	R39,060,974
1915-16	.....	£40,434,882	R80,869,764
1918-19	.....	£70,934,098	R141,868,196
1920	.....	£98,307,910	R196,615,820

If the development from 1915-16 to 1920-21 is calculated at 1910 prices the increase in five years was 57%. In 1922-23 the manufacturing industries in South Africa included the following components:

Table No. 10.6—

	GROSS VALUE 000	No. of Establish- ments	Employees
Metals, Engineering	R26,476	856	37,000
Chemicals & Explosives	11,068	123	9,000
Heat, Light, Power	10,928	250	11,000
	R48,472	1,229	57,000

The increase in the contribution of manufacturing to the Geographical National Income was steady and clearly discernible, as the following comparative table shows. The decrease shown in 1960-1 is due merely to the increased percentage contribution of other spheres of activity.

*Table No. 10.7—Value of Output of Three Main Sectors
as % of Geographical National Income*

Sector	1911-12	1932-3	1938-9	1951-2	1960-1
Agriculture	17.4	12.2	12.6	13.8	10.8
Mining	27.1	24.3	20.7	13.0	13.9
Manufacturing	6.7	13.6	17.7	25.0	23.8
All other	48.8	49.9	49.0	49.6	51.5

(“Union Statistics for 50 Years” S.A. Reserve
Bank *Quarterly Bulletin*, March, 1962).

A comparison with Table No. 10.3 confirms that no individual country or group of countries in sub-Saharan Africa derives the same quantity of income from manufactures as South Africa did by 1938-9, on the threshold of the Second World War, when she was able to develop a considerable war potential. Not only is there not any comparable contribution by the metals and chemical industries, but Table No. 10.8 compiled

(4) Quoted by M. H. De Kock, *Economic History of South Africa*, (Juta, 1924). See also Footnotes Table No. 10.3.

from the U.N. *Monthly Bulletin of Statistics* and the U.N. *Statistical Year Book, 1965*, shows that only three countries on the continent produce tyres, radio receivers and assemble motor vehicles in a quantity warranting inclusion. Only South Africa is shown as producing steel and synthetic rubber.

The pronounced absence in the sub-Saharan countries of manufacturing industries suitable for the production of war material such as metal and engineering industries, means that before these countries can commence the manufacture of war materials the industries must be founded and developed. In the short run, the lack of suitable industries is of little consequence since arms would be bought abroad. This is because in the short run, which is a period too short for the conversion of industries to take place, no manufacture would be attempted. In the very long run, there may be little in the way of manufacturing development. Foreign assistance for the management, skilled labour and the training of black Africans to take over such as there is may be expected to be a matter of natural development over a long period of time as the economies naturally develop. In the intermediate period, if manufacture of weapons and other war material were to be attempted, the shift in demand would lead to an abnormal shift in the distribution of productive resources throughout the various industries. Not only would the raw materials need to be channelled into the converted industries, but in order to find sufficient skilled labour for the newly-created metal and engineering industries, labour would have to be transferred from existing limited processing and manufacturing of non-durable goods in those countries where this existed. There would then be abnormal demand in the non-durable industries for the less efficient or skilled workers remaining in them. In France in July, 1917, employment rose by 67% over pre-war levels in the metal-working industries, and by 20% over pre-war levels in the chemical industries. At the same time employment had fallen in France by 15% in the leather goods, food and beverage industries and by 45% in the building materials industries.⁽⁵⁾ During the second World War, between the years 1939 and 1944, employment in metal industries rose in Britain from 2,759,000 to 4,466,000, in the United States from 2,673,000 to 7,529,000, and in Germany from 5,778,000 to 6,863,000 in the metal and chemical industries. A better comparison for the African states is perhaps Australia where, between June 1939 and June 1944, the employment in metal industries rose from 184,000 to 328,000, and in the chemical industry from 24,000 to 54,000. In Japan the labour force in machinery, tools, vehicles and ordnance rose by 105% and in the metal industries generally by 17%. At the same time in the

(5) *The War Potential of Nations*, Knorr, K., Princeton, 1956, p. 185; this book is the basis for this chapter.

food products, and in the textile and apparel industries the labour force decreased by 33% and by 52% respectively. Such changes do not mean that the industries in which employment declines, or perhaps remains stationary, during war-time are any less essential to the country in war than in peace. But it does mean that there is a change in emphasis and a change in demand. For the diminutive and limited economies of the sub-Saharan African countries to attempt to meet the demands of war from their own resources is in their present circumstances self-destructive. It would deal the developing secondary industries a blow from which it would take them a decade to recover.

Which country indeed, between Rhodesia and the Sahara, could contemplate the establishment of war industries today? Ghana, once the most aggressive, and with the advantage of having commenced with a £200 million reserve nest-egg in 1956 had only some £45 million left by 1964 and a balance of payments deficit for the year of the same amount. But she is in the red for imports, for development schemes that never reached the production stage, while the modest prospective aluminium exports from the recently established Volta dam scheme are very much in the future. In the last months of the Nkrumah regime the United States, Britain, five other countries and the International Monetary Fund refused loans to Ghana for a variety of reasons which included the enormous defence expenditure including R25 million in 1963 on the 8,000 man force. There is little reason to believe that the revolutionary Government in Nigeria has not appreciated the significance of this. The Chairman of the Economic Committee of the National Liberation Council reported to a press conference in June that the Government had already abandoned a number of industrial projects including military ones. In Nigeria much is lost in the fog of the present constitutional and political crises but it is without doubt that the enormous migration, especially of Ibos, the intellectual elite of that country, cannot but result in an economic set-back for Nigeria. The same is true, perhaps to an even greater extent, of the Congo where years of dislocation, rebellion, murder of the intellectually-trained and the like has probably taken the Congo from the highest position among the states between the Republic of South Africa and the Sahara to one of the lower or intermediate positions from which it too must take a considerable time to recover. No other state in Africa between the Zambezi and the Sahara has shown the same economic potential as have these three states. The history of economic development provides ample evidence of the great obstacles to rapid industrialisation which confront an economically backward country. It is true that history also shows that progress in industrialisation can be swift, once the early phases are passed and that established goals and preferences in the

community may be effective in generating a high and steady rate of saving and investment and in tolerating the numerous dislocations which may accompany rapid change.

This is true to a certain extent of South Africa in which economic development was negligible until the opening up of the Witwatersrand goldfields in the late 1880's. Thereafter the development of the country commenced to move apace. From the period 1919 to 1959 South Africa was able to develop at an average annual increase of between 5 and 6%.

Table No. 10.9

South Africa's Nett National Income

Date	Total at 1948 prices (R million)	Average Annual Increase %
1919	514	
1929	750	5.0
1939	1,080	5.8
1949	1,602	5.8
1959	2,392	5.0

During the period mentioned above the following increases were seen in the production of iron ore and coal:

Table No. 10.10

Year	Iron Ore ooo/Tons	Coal ooo/Tons
1926	52	14,275
1936	402	16,360
1946	1,011	26,017
1959	3,185	40,182

It can be seen therefore, that it should not be too readily assumed that countries in Africa such as Ghana, Nigeria or even the Congo should not experience an economic upswing akin to that which South Africa has had which would enable them within a reasonably short period to develop a war potential adequate to enable them to conduct and maintain a conventional war against South Africa, Rhodesia or both. But it is believed that, taking into consideration the rate of development in South Africa, these countries would not be able to develop the industrial potential within the intermediate period and that it would take at least 10 years before their economy could reach that stage of development which would give them the industrial potential to arm themselves for conventional war. At the same time it should be borne in mind that it is not merely the comparison of facts and figures relating to industrial capacity and output which determines the industrial war potential of a nation. The Table No. 10.11 taken from Knorr, page 197,

illustrates very well how industrially backward countries were able to produce more munitions per thousand tons of steel than the United States during the second World War. Apart from differences in weight and design of the units of war material produced, the United States laboured under compulsion to allocate steel to the production of ships and of items for civilian consumption to maintain the high standard of living in the United States. While this could mean that South Africa's production in war could be increased greatly by the neglect of the items for civilian consumption, it could also mean that where South Africa may desire to maintain her high standard of living in war-time while her opponents may be prepared, as were the Russians, to devote all their energies to the war effort, they could perhaps reach a standard of production and one which would be sufficient for the achievement of their military objective. But then again this would not only depend on the domestic motivation for the war which would have to be large in the absence of a dictatorship, but would also mean that there would have to be a very high degree of administrative competence in order to make the optimum use of resources. Whatever the long run may hold it is doubted that this is available in the short or in the intermediate periods.

Gross National Products, National Income and Foreign Trade

The preceding section was focused on the principal industries concerned with the manufacture of materials for war but it did not cover the entire economic capacity of the various countries and was particularly selective. It is necessary therefore to supplement the analysis by studying the total capacity to produce and by consideration of the gross national product and the national income. The national foreign trade also gives an indication of the capacities of a country, taking the economy as a whole rather than selectively.

The Gross National Product can be defined as the current production of goods and services in a country expressed in terms of the current market prices. The figures used to express the G.N.P. are derived from expenditure on all products and services by consumers, investors and the Government.

National Income equals the G.N.P. with the depreciation charges and indirect business taxes subtracted. Depreciation charges are deducted because part of the total flow of goods and services manufactured or produced goes towards maintaining existing stocks of capital resources. The taxes are deducted because, although they are included in market prices, they do not represent compensation to the owners of productive factors. National Income, the expenditure by some people on what other people have produced, equals a sum of money incomes received

by the owners of productive resources in the form of wages, salaries, profit, interest and rent.

Because nations may in war-time not be able to maintain all their capital resources, both the concept of National Product and the concept of National Income are useful in the study of war potential. If a nation uses more than its National Income for private and public consumption, neglecting to maintain the previous stock of capital resources, it would be consuming part of its producers' capital. To the degree that the value of exports by the local manufacturers is offset by the value of imports by local consumers, foreign trade may be ignored. On the other hand if a nation has an export surplus, that is, if its payments to foreign producers are less than the payments it receives from exporting to other countries, it accumulates claims on foreigners in the form of foreign currency i.e. it has a favourable balance of trade. These claims are what we know as net foreign investment and are included in the Gross National Product or in the National Income. On the other hand if a nation owes more to foreigners than it has sold to them this will have to be deducted from the gross or net private investment.

As a measure of the goods and services produced in a country during a particular year the G.N.P. or the National Income is a pointer to the productive resources which were in employment in that country during the year. For a variety of reasons comparison of National Incomes of Gross Products, especially when considered in the light of other known factors of economic strength, is a useful way of comparing the war potentials of belligerent countries.

A serious limitation is that the G.N.P. or the National Income values only the goods and services produced by productive factors actually in use during the year. In war-time a nation can draw upon productive reserves and in that way increase its G.N.P. In "Strategy in the Missile Age", Bernard Brodie of the RAND Corporation commented: ".....until mid-1942 the German war economy contained a large amount of slack. Contrary to general opinion, that economy was far from mobilised for war either in the kind of commodities produced or in the rate of production. The labour force was essentially on a single shift basis and included relatively few women. The increase in German war production over the next two years, despite our bombing, resulted mostly from the taking up of this slack. Even so, judged by the standard of British industrial mobilisation, the German economy never attained anything like its full war potential."⁽⁶⁾

Moreover since the G.N.P. or the National Income is given

(6) Chapter IV "Strategic Bombing in World War II"—Page 110. From USSBS, "The effects of strategic bombing on the German War Economy", quoted by Brodie, op. cit.

at market prices it is clear that it is established on the basis of the preferences in peace-time of consumers, of private investors and of the Government. A productive factor is a resource because it has value to these groups. The fact that value is tempered by peace-time preferences means that the National Income approach to war potential can only be a rough approximation. It is rough also because it will be expressed in the currencies of the various countries converted to a common denominator and the exchange rates which are used to convert local currencies to the common denominator are imperfect means for ascertaining the true value of commodities in a particular country. Thus the value expressed in the common denominator may not express exactly equal quantities of the commodity for different countries. Also, exchange rates are an indicator of the relevant purchasing power of currencies only for those goods and services which are the subject of international trade. For countries such as the sub-Saharan countries which do not participate very fully or widely in international trade there must be considerable discrepancies.

Other discrepancies which can be expected arise from the differing definitions of the contents of G.N.P. or National Income in the different countries and more particularly, from the absence in the economically underdeveloped countries of skilled statistical experts and the absence of sources of information upon which statisticians could make accurate computations. Perhaps the main problem of calculating incomes in African economies can be found in the prevalence of subsistence production which does not enter into commercial transactions and this is difficult to convert into monetary values.

The fact is that the G.N.P. or the National Income approach with its short-comings, covers almost all the factors of production actively employed in the particular countries in Africa, and it is perhaps not unreasonable to assume that the margins of error arising over the entire continent probably do have the effect of largely cancelling each other out. Certainly, inaccurate as these figures have to be they do permit a degree of generalisation which is useful for our purposes.

The size of the National Product is not only determined by factors of production such as capital resources, technology and natural resources, but very largely by the numbers of the working population employed and by their productivity. The total net value of the National Product alone does not tell us whether the National Product is as large as it is because of a large working population or because of high productivity. But whether a G.N.P. of the given size was produced by a smaller or larger labour force is important when we wish to compare the war potential of belligerent nations. An approximate average labour productivity can be gauged by comparisons of the Nation-

al Income per head of the population or better still per head of employed persons. The higher the average productivity of the labour force the less labour is required to produce the necessities of life and therefore the more labour may be released to the fighting forces or to war production. In countries where the standard of living is low it is easier to run down subsistence industries and services for war purposes and the economic strength of such countries need not bear the same relationship to per capita income or product as in the more industrialised countries having higher standards of living. But what is important to developing countries is that allocations for large scale conventional war must cost them the advancement which they strive for at present as under-developed countries. Nevertheless, in a country with a low income per head, the amount of goods and services which can be diverted without reaching the danger point at which the health standards and efficiency of the population would be affected, is relatively small. Moreover, a country which contemplates reducing the standard of living must bear in mind that the greater the distance from the field of military operations the less prepared will be the people voluntarily to reduce their standard of living to any considerable extent. It is one thing to be induced to reduce a standard of living by the threat of hostile forces but it is another when one's own country is carrying a war to another several thousand miles away in the interests of a cause which is relatively meaningless to the bulk of one's population. Once a population has been set on the road to advancement it is doubtful whether it would be easy to induce them to accept a turn-back to far lower standards unless the cause for which they must sacrifice is indeed demanding.

The situation in Britain in 1942 illustrates the demands which are made on the National Income in the course of the conduct of war. At 1938 prices, the cost of the war in 1942, as indicated only by Government expenditure, was almost half the Gross National Income of 1938. That is, Britain devoted to the war a sum of goods and services equal to half its total gross output before the war. This total cost was met, up to 2/5ths, by increased production; almost 1/4 was met by reduced consumption; 1/5th of the cost was met by neglecting to maintain the domestic capital of Britain, and the balance was paid for by drawing on the accumulations of overseas capital or by going into debt to foreign countries. At least 1/3 of this can be regarded as the measure of the permanent economic effects that the war left behind in Britain. The productive equipment of the nation was not maintained and its income from abroad was curtailed and mortgaged. When one realises that the actual sum involved, after three years of war, was approximately £2,000 million at 1938 prices, or rather less than 1/2 of one year's net output, the severity of the effects on economies far less developed than

that of Britain at that time can well be imagined. In South Africa, for the year 1942-43 defence expenditure was £160 million. With an approximate National Income at that time of R1,050 million, her expenditure on the war was thus approximately 18% of the National Income. Canada was spending 40%, Australia 40% and New Zealand 28%.

Most African countries are today in an early pre-industrial stage of development. By any standard their productivity and thus their income per capita are very low. A major problem facing them is that of economic development. The magnitude of this problem poses formidable difficulties. Not only is capital in extremely short supply, both economic overhead and manpower capital, but a large number of the economies are diminutive in terms of population and purchasing power. Even with foreign aid the degree of saving that is required cannot be reached in these economies where subsistence farming still is the major feature. Even the export of agricultural produce cannot be regarded as a factor making for stabilised earning adequate for accelerated and sustained capital formation and economic development. Most of the African countries which are exporters, export primary agricultural and mineral products which experience wide and erratic fluctuations of price in the international markets.

When the per capita income in the highly developed industrial countries is considered in relation to those found in Africa, one is struck forcibly by the low level on this continent. Not only is it low in most countries, but more than half of the G.N.P. in Africa is to be found concentrated in South Africa, Algeria, Nigeria and Egypt. One quarter of the whole G.N.P. for the continent is to be found concentrated in South Africa alone. For 35 countries on the continent of Africa the average G.N.P. per head is R88 and if South Africa is subtracted from this total the average falls to R72 per head. Of the 35 countries 23 have a per capita income of less than R72. The United Nations study, "Industrial Growth in Africa", expresses⁽⁷⁾ the opinion that the average income per head in Africa, with the exclusion of South Africa, is less than 1/12th of that in the industrialised countries taken as a whole. The same study believes that it will take 40 to 50 years for the per capita output of the African economies to reach the 1960 level of output of the industrial countries of today. This is subject to the condition that an annual growth rate of 5% per head is maintained for 40-50 years. The possibility of this happening must be judged in the light of the fact that during the period 1916/17 to 1956/57 the overall real growth rate of South African gross domestic product per head was 2.3%. To be more explicit, the composition of the

(7) Page 4.

sources of income generated in African states is principally primary production, with subsistence output occupying the major portion of production in a large number of territories. The share of subsistence production in the gross domestic product as a percentage is shown in Table 10.12. In this table too, it is possible to compare the share of subsistence production with the minute per capita production in some countries alongside the figures for those employed in manufacture and agriculture. It can be seen, for example, that while in South Africa about 2% of the total product is consumed by the producers themselves and 5% is consumed in Egypt, 50% of the total product is consumed by the producers in Ethiopia, a country classed by the U.N. Economic Commission for Africa as the least developed of the countries mentioned. In spite of the fact that Ethiopia has one of the larger armies in Africa the structure of her gross domestic product must place severe limitations on her capacity to fight a war against other than Shifta tribesmen.

With the exception of South Africa and South West Africa, agriculture is the principal sector of the commodities produced by African countries. Nevertheless some of these countries are at a stage of a greater advance in economic development than others. The more developed include countries whose production of primary commodities is less than 50% of the G.N.P., i.e. South Africa, Congo D.R., Kenya, Rhodesia, Zambia, Morocco, Tunisia and Egypt. In these countries the share of manufacturing, low as it is, is considerably higher than it is in those of the African countries where manufacturing is no more than 5% of the G.N.P. Only four countries feature mining as a prominent sector of the G.N.P. It exceeds 10% of G.N.P. in South Africa, South West Africa, Rhodesia, Zambia and the Congo Democratic Republic.

Because the structure of African economies is overwhelmingly restricted to primary products, machinery, transport equipment and other equipment needed for raising the productive potential, as well as many consumer goods such as textiles, clothing and shoes, have, to a great extent, to be imported from abroad. With the exception of countries like South Africa, the former Federation of Rhodesia and Nyasaland and Tanganyika, the total value of goods and services sold in their domestic economies generally exceeds the value of locally produced goods and services, leaving a balance to be covered by funds from abroad such as private investment or economic aid or by depleting the countries' reserve of foreign exchange. This is what has been happening in Ghana. If there is a large discrepancy in the total amount of national expenditure on goods and services supplied by their economy, the less will be the amount of capital being formed out of the economy's own resources. In Ghana, where the difference was 4.6% in the years 1960-62, the imports were

ultimately paid for by the rapid depletion of the foreign exchange reserves. Although not the sole condition for economic growth, an increase in the stock of capital and in the level of investment is essential to economic development and increase in per capita income. Before independence the former Belgian Congo had the highest fixed capital formation: 23% of the G.D.P. By 1962 South Africa had the highest figure at 18.1%, followed by Ghana at 17.9%, whereas Ethiopia could show fixed investment amounting to only 6% of her G.D.P. in 1959. It is clear from this that a high rate of investment may indicate potential future economic growth. However, since funds may be mis-allocated, a high rate of investment does not necessarily guarantee future economic growth. A much more detailed breakdown of figures would be required to enable a proper assessment to be made of the real significance of investment in various countries. The lack of data makes it difficult to be explicit about actual development, but certain trends may be detected from the figures that are available. What is clear about Africa is that while population increased at a higher rate between the years 1950 to 1960 than in the years before World War II to 1950, both agricultural and industrial output increased at a slower rate between 1950 and 1960 than in the years before 1950. The effect was that the annual compound percentage change of commodity output per capita fell in the years 1950 to 1960 to 0.2 from their pre-1950 figure of 0.6. This means that instead of a higher standard of living being attained by the peoples of Africa as a whole, they are being met by a falling standard of living. The serious situation in which these African economies find themselves may be judged by contrasting the annual growth rate of per capita commodity output during 1950-1960 of 0.2% with the 5.0% rate laid down as a minimum to be achieved if Africa is to reach the 1960 level of output of industrial countries within the next 40 to 50 years. Clearly, for a very long time African economies will need substantial and long-term assistance from outside countries. It is this which prompted Mr. Eugene Black, formerly President of the International Bank for Reconstruction and Development to say, "..... I question whether real economic progress in some of these countries is possible in this generation as long as so much of the development effort must be diverted simply to maintaining standards for a greatly increased population."⁽⁸⁾

What this analysis has attempted to show is that in the African economy the Gross National Product or National Income does not allow much surplus for a war to be conducted over a length of time with the enormously expensive weapons and other munitions which are a feature of the industrialisation of warfare. If

(8) "Can the under-developed countries catch up?" *Journal of International Affairs*, Vol. 16, No. 2, 1962, p. 191.

the proportion of the National Product allocated to war is high, it may not only be impossible for nations to maintain it in a long struggle, but it may bring about a fall in the Gross National Product and a contraction of the economic war potential. In the limited National Products to be found in Africa a very small figure allocated to war will be found to be relatively high.

The prospects for economic growth in Africa are heavily dependent upon export trade. The continent depends more heavily on foreign trade than most other areas of the world. Approximately 1/4 of Africa's net annual output is exported and it has to supplement its output to the extent of about 1/3 by imports. These proportions are higher than for most regions elsewhere in the world. Even a country with a high dependence on foreign trade, such as the United Kingdom, exports 18% and imports up to 22% of net output. This has been illustrated by the example that for each inhabitant Africa (excluding South Africa) exports annually goods worth \$22 and imports goods worth \$29 annually. On the other hand India exports goods worth \$3 and imports goods worth \$4.5 per head annually.⁽⁹⁾

But in 1961 only 10 territories in Africa imported more than £50 million worth of goods. Only 7 territories in that year exported more than £50 million worth. Of 31 selected territories in 1961, only 8 exported more in value than they imported. Clearly Africa's trade is extremely small: her exports amount to only 4.9% of the total world exports and 5.4% of total world imports. (1963). Exclude South Africa and these figures are reduced to 4.1% and 4.3% respectively for the remaining countries of Africa for 1963. The leading trading country in Africa is South Africa which exports approximately 1/4 of Africa's total export trade and imports slightly less than 1/5 of all imports.

The composition of trade shows that unprocessed agricultural products are by far the largest proportion of exports in as many as 31 of the 35 territories independent in Africa in 1961. Mining leads in only four countries, South Africa, Congo D.R., Guinea and Sierre Leone. In not one country does the export of manufactured and processed goods account for more than 50% of the total. In South Africa it amounts to 15%. Except for South Africa, Rhodesia and Egypt, manufacture in most countries is confined to the processing activities relating to peanuts, sugar, hides and so on. So it is that Senegal's high manufacturing percentage of 46.4% for export is almost entirely due to ground-nut oil.

What is most striking about African exports is that domestic markets can absorb so little of the total output of commodities produced. Bearing in mind that this is largely primary products, this means that there are insufficient manufacturing

(9) U.N. Industrial Growth In Africa—Page 50.

industries to make use of raw materials and to produce manufactured goods and processed goods for the populations of the countries in Africa. Generally it can be said that with the exception of Rhodesia and South Africa, the total mineral output of the economies with mining industries is destined for export. Only in South Africa does the total mineral production form a basis for rapidly growing manufacturing activity, including the chemical industry, and on a significant scale.

The low levels of development in most African countries can be seen by the fact that their imports are characterised by a high degree of processed food products, beverages and tobacco, while industrial materials and fuels remain at a low level and machines and equipment at a moderately low level. Consumer goods are still at an excessively high level. During the period 1956-7 to 1958-9 Ethiopia and Ghana imported consumer goods amounting to 63% of all manufactured imports, while Cameroun and Tunisia imported 74% and 70% respectively. The percentage of machinery and equipment and transport equipment was less than 30% in Tanganyika, Uganda and Cameroun but above 50% in the old Federation of Rhodesia and Nyasaland and, strange to say, Guinea, with the remaining territories grouped between 30% and 50%.

Although the composition of the imports is changing to a more favourable structure from the point of view of economic development, so that with consumer goods amounting to 70% of total African imports in 1950 the proportion had dropped to 52% in 1960 and machinery and transport equipment rose from 13% to 21% in the same time, yet the U.N. Economic Commission for Africa has warned against the excessive importation, especially of goods of no use to strengthen production, since it is feared that this would frustrate the objective of economic development. (*Economic Bulletin for Africa*, Volume I, No. 1, January 1961, p. 20).

Conclusion

South Africa went to war in 1939 and in 1940 was called upon to rely almost completely on her own resources for most of the equipment for her army after the invasion of Holland and the fall of France, for the accompanying loss of equipment meant the almost complete withdrawal of British undertakings to supply the Union. But there remained foundations on which to build a new structure of war production. The most important were:⁽¹⁰⁾

- (a) the iron and steel industry, whose raw material resources included a vast reservoir of iron ore of the purest grade,
- (b) great resources of coal and electrical power,
- (c) the existence in the Union of two of the world's largest

(10) A Record of the Organisation of the Director-General of War Supplies (1939-1943) and Director-General of Supplies (1943-1945), published by authority.

- single units of explosives production, which proved capable of rapid expansion to meet trebled requirements,
- (d) the great engineering resources of the State railway workshops, the mines workshops, and the many private engineering workshops that had grown up around the great primary industries, and
 - (e) South Africa's structure of secondary industries—boots, textiles, food packing and canning which had been built up progressively since the first World War.

So soundly were these foundations established that the industries were able to respond to demands for expansion and equip not only South Africa's own forces but also those of other Allied countries and, most important, to undertake the difficult task of producing machine tools which could not be imported to supplement the £1,000,000 worth of machine tools that were brought into the country during the war and which materially changed the complexion of the engineering industry in South Africa from a repair and maintenance industry to a mass production industry. The industry was able to equip the First South African Division with its mechanical transport for its campaign in Ethiopia and this involved the production of thousands of vehicles of different types by a conversion of existing vehicles or by the building of new bodies suited to warfare. From 1940 to 1945 South Africa was able to produce shells ranging from the 13-pounder through the 25-pounder to the 6-inch Howitzer, fuses, mortar bombs, grenades, land mines, mortars, mortar sights, aircraft bombs, armoured cars, Howitzers and anti-tank guns, small arms and ammunition, dial sights and telescope for guns, optical instruments for the British Admiralty, wireless transmitters and receivers and land-mine detectors, aircraft tyres and more than 40 types of motor vehicle totalling 32,000 vehicles.

To sum up, although there are raw materials in abundance in Africa, they are to a great extent either unexploited or exported for manufacture abroad. No country in Africa south of the Sahara potentially hostile to South Africa has the manufacturing capacity which South Africa possessed in 1940. The majority have not reached the capacity which South Africa had in 1915. It is clear, therefore, that the capacity to manufacture arms in the sub-Saharan African states is of necessity limited to small arms and these only in countries such as Nigeria and Ghana. Moreover the quantities produced must remain small. The types of weapons and the quantities are limited by the absence in these countries of developed iron and steel industries, engineering industries and explosive industries as well as by their generally low level of productivity so that they are unable to spare equipment or manpower from the other infant industries so sorely

needed to develop broadly based economies. Their capacity to buy arms and equipment is limited by the already unhealthy level of imports over exports, or the drain on foreign exchange which should be used for capital investment and development. Even small purchases of arms therefore create a serious loss of foreign exchange and the rate of Government spending is already seriously unsound in the already tenuous sub-Saharan economies.

It is obvious that these economies are unable in the short term, or the intermediate term, to provide the sinews of war, either by manufacture or purchase. Then it should be borne in mind that were these countries to engage upon a war against the South, they would expose their industries to attack from the air. This would be the final disaster for the diminutive manufacturing industries. Were they to be destroyed or seriously damaged by aerial attack, these economies would be reduced to a condition far worse than today.

Foreign Aid

The alternative to domestic resources is foreign aid. This is a difficult aspect to assess. Britain, with a recently appointed Head of Defence Sales, is less concerned with grant-in-aid than with sales. While the Minister of Defence conceded in a report to the Select Committee on Estimates in 1959 that political ties could be strengthened⁽¹⁾, the principal object is the earning of foreign exchange. Today Britain is unlikely to give away any but the most obsolete arms, which would certainly be inadequate to sustain a long campaign.

The United States is more easily influenced by political advantage, being extremely sensitive to indications of real or imagined Soviet inroads into the political goodwill of the emergent states. But the U.S. Foreign Assistance Act limits the extent of annual grants-in-aid to Africa to \$25,000,000. Of this figure, the Act limits, unless certain circumstances prevail, the furnishing on a grant basis to any country of defence articles in excess of \$3,000,000 in any year. Assuming that the maximum grants are made up to \$25,000,000, only eight or nine countries can benefit from a total grant of \$3,000,000. Whether this amount would be granted depends on the resolution of the conflicting views that foreign aid should be reduced and that the states in Southern Africa present a threat to peace. If the latter view prevails maximum grants-in-aid could possibly be expected. At the same time it should be borne in mind that \$3,000,000 is less than the present annual military expenditure of 19 of the 30 states under consideration; it is approximately equal to the budgets of 11 of them. It is less than one-third of the budgets of two countries; less than half of four. It is an eighteenth of the Nigerian, a fourteenth of the Ghanaian and Sudanese, a tenth of the Ethiopian budgets. While it is one-fifth of the Rhodesian defence expenditure, it is 107th of the South African budget.⁽²⁾ South African expenditure on capital works for defence, including factories, was R363,000 in 1963, and was expected to rise to R2,000,000, approximately \$3,000,000.⁽³⁾ It has been calculated that for undeveloped and under-developed countries, the approximate share of defence budgets spent on equipment ranges from 10% (Latin America) to 25% in the Middle Eastern countries.⁽⁴⁾

(1) Second Report, Select Committee on Estimates, 1958-9.

(2) D. Wood *The Armed Forces of African States*, ISS, April, 1966.

(3) D. Fourie. *The Republic Flexes its Military Muscles*, Pretoria News Republic Supplement, 25 May, 1966.

(4) J. L. Sutton and Kemp. *Arms to Developing Countries 1945-65*.

Nevertheless, taken as a whole, a grant of \$3,000,000 aid would not improve armaments so significantly as to enable the sub-Saharan states to undertake a prolonged war which would necessitate not only greater expenditure on arms but at a higher rate in order to compensate for battle attrition and wear and tear during training and strategic movement. Excluding South Africa and Rhodesia, the total sub-Saharan annual defence expenditures in 1963-4 approximated \$230,000,000. Not only is this less than South Africa's now, it should be compared with South Africa's expenditure in the years 1940 to 1946 of £156,403,879, approximately \$782,019,405 at the value of the dollar before 1948, solely on arms and equipment manufactured in South Africa.⁽⁵⁾ It seems therefore, that for United States aid to contribute significantly to the capacity for maintaining logistic support in war, it will have to rise above the present limits fixed for it. The likelihood of this is small while the Viet Nam war continues, not only because of the needs of the United States armed services, but also because of the present balance of payments difficulties in America.⁽⁶⁾ The 6% tax increase for 1967 to pay for Viet Nam is also likely to cut back aid considerably.⁽⁷⁾ American grants of aid during the years 1956 to 1964 averaged from \$500,000,000 to \$600,000,000 annually to *all* countries, the lion's share going to those countries of immediate strategic interest to America, principally in Europe, Asia and Latin America. Sales during that period were about the same, only 10% going to the developing countries. The sub-Saharan countries have little to spare for arms purchases to the extent demanded by prolonged war. It is also unlikely that while Congress believes itself to be endangered by "White backlash" it will easily give arms in large quantities to African states for use against White states.

As to the USSR, this is the most apparent source of military aid: but Russia has seldom given away armaments. In almost every case Russia has exacted payment by way of long-term loans to be paid if not in foreign exchange, then in raw materials or other goods. Though she may be willing to give away small quantities of arms for insurrection, it is perhaps unlikely that she would maintain a prolonged war in Africa. Not only is this because of the difficulties involved in carrying arms to Africa, it is also because of the Africans' apparent growing dislike of Soviet and Chinese involvement on the continent. Ghana, for example, has shown scant gratitude for aid given to Nkrumah. Aid given to Egypt did not soften Nasser's attitude to Communist activities in the United Arab Republic. Khrushchev may have been prepared to gamble on future success; his successors are perhaps more cautious and less inclined to distress the West.

(5) *A Record of the Organisation of the Director-General of War Supplies 1939-1943 and Director-General of Supplies 1943-45.*

(6) Paul Barea, *Sunday Times*, Johannesburg, 8 January, 1967.

(7) State of the Union Message by President Johnson, 10 January, 1967.

Russia may require arms stocks in case of trouble with China. Moreover, not only has Russia the Warsaw Pact countries to supply but also the North Vietnamese. The recent rejuvenation of the European satellite armies may make items such as tanks available, but their condition is unlikely to be equal to a prolonged campaign, especially one in Africa. Aid is likely to be forthcoming from a number of sources, but the principal qualification is that it is nowhere likely to be enough for prolonged war. Moreover, since it will have to be used by a combined force its distribution will present problems. If it is given to one country or to particular countries, the political consequences in others to the donor may largely nullify the advantages of giving. The arming of Pakistan by America was the source of considerable diplomatic heartburn, aggravated in no small way by India's subsequent turning to the USSR for aid. With 30 countries from which to choose south of the Sahara, there is much leeway for antagonism open to the donors. On the other hand, if aid is distributed equally among the sub-Saharan states, there is the possibility of its value being lost if some of these states either refuse or are unable to participate in joint action. Therefore, aid may not only create political embarrassment for its donors, its value may be dissipated by wide distribution among receivers whose participation in a campaign cannot be assured.

CONCLUSION

12

Sub-Saharan Potentials

General d'Armée André Beaufre has written that there are two constant principles of strategy, freedom of action and economy of force.⁽¹⁾ To have freedom of action it is necessary to allocate resources between protection against the enemy and action against the enemy. The judicious allocation of resources between these tasks is known as economy of force. Only when economy of force has gained freedom of action is it possible as a general rule to achieve a decision.

This study of the capabilities of the sub-Saharan countries casts doubt on their capacity to achieve freedom of action in a prolonged campaign against Southern Africa. The geography and topography of the expected area of operations would tend to favour the Southern countries unless the attackers were able to acquire highly mobile balanced forces. As these forces are now constituted they are unequal to the task. They do not have the aircraft, armour and artillery which could give them freedom of action. They lack the means of moving against the South. The situation is unlikely to change for a long time. The economies of the sub-Saharan states would not be able to sustain conventional war, especially if it is prolonged. Foreign aid, to be effective, would have to be very large. While Vietnam occupies their attention, the possible donors may not grant aid easily. Russia is believed to supply 75% of the North Vietnam's war material. The very serious lack of educated personnel is also a hindrance to conventional war. Sophisticated modern military equipment could only be used very inefficiently by rapidly expanded forces. Also, not only are there insufficient officers educated and trained for command and staff appointments, but in a large number of states many officers are governing their countries, adding to the shortage. Internal and external political, religious and tribal differences also stand in the way both of international and national unity for the combination of the forces of Africa. There is hardly any reason to think that a military force could be raised by the sub-Saharan countries to operate successfully against Southern Africa in the coming five

(1) *Introduction to Strategy*, A. Beaufre, London, Faber & Faber, 1965.

years. The Deputy-Chairman of Ghana's civilian committee which assists the National Liberation Committee, Dr. Kofi Busia, has said it would be "stupid and childish" to attempt to use an African army against the South.⁽²⁾ When force against Rhodesia was planned by Ethiopia, Ghana and Nigeria early in 1966 there were military uprisings in all three countries. A senior Nigerian officer said, "Certain army officers knew of the plan to attack Rhodesia and they did not like it. They knew we would be wiped out in three days"⁽³⁾

In the decade following 1972 conditions will not be radically different. While armies may get bigger, the economic power base will still be absent. Only when this has developed should a protracted conventional campaign by the sub-Saharan states become a possibility.

The best the sub-Saharan countries can do now and in the foreseeable future, is to train guerrillas. But equipping guerrillas is not easy. A critical shortage of small-arms hampered the 1964 Tanzanian programme.⁽⁴⁾ The situation was not improved when subscriptions to the O.A.U. fell in arrears in 1965 to the extent of R1,750,000, out of a total of R3,515,600, i.e. 50%.

At the meeting of OAU Heads of State in November, 1966, the budget of R98,000 for the Liberation Committee of Nine was rejected. The best promised, after President Nyerere had walked out of the budget debate, was a quarterly budget, to depend on results. This may have produced activity in 1967. Anticipation of this may have prompted earlier infiltration of Rhodesia and South Africa. But the seriousness of the threat must be considered in the light of the ability to establish in the South a political subversive organisation on which to base irregular action and to pursue a successful psychological operation in the world at large—what Beaufre calls the exterior manoeuvre. Until a subversive political organisation is established and functioning in the South together with secure lines of communication, a guerrilla campaign will not be capable of being sustained in Southern Africa.⁽⁵⁾ So far there has only been failure. Guerrilla war, moreover, is never of itself decisive. In the end it must rely on conventional intervention while the defending government and its forces remain strong. The sub-Saharan states are not yet ready for this task. They must rely for many years on foreign intervention to fill their power vacuum. In this power vacuum in Africa it is not inconceivable that aid may come in the form of pre-emptive invasion by one of the great power blocs to forestall action by another.

(2) *The Star*, Johannesburg, 1 September, 1966.

(3) *The Star*, Johannesburg, 29 July, 1966.

(4) *The East African Liberation Movement*, Col. D. H. Humphries, ISS, London, 1965.

(5) *Defeating Communist Insurgency*, R. Thompson, Chatto & Windus, 1966.

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Table No. 3.1—NUMERICAL STRENGTHS—ALL FORCES

COUNTRY	TOTAL 000	ARMY 000	AIR FORCE 00	NAVY 00	POLICE (& Gendarmes) 000	Additional 8,000 TA Workers Bde 7,500 (5,000 IS Militia) (3 Bns. TA) (4,000 Res. plan) (Young Malawi Pioneers) (700 Rep. Guard)
1. Ethiopia	35.	32.	20.	9.3	29.2	
2. Congo (Kinshasa)	32.	30.	2.	0	21. *	
3. Sudan	18.5	17.5	4.	5.	10.	
4. Ghana	17.	15.	10.	10.	9.	
5. Nigeria	11.5	9.	10.	1.5	24.	
6. Somalia	9.5	8.	12.5+	1.8	5.	
7. Uganda	5.96	5.7	2.6	0	5.5	
8. Senegal	5.5	5.	3.	2.	4.5*	
9. Guinea	5.	4.8	?	?	1.9*	
10. Kenya	4.8	4.2	4.5	1.5	11.5	
11. Ivory Coast	4.	3.5	3.	2.	2.3*	
12. Malagasy	4.	3.5	4.	1.	1.6*	
13. Mali	3.5	3.5	0	0	—	
14. Liberia	3.2	3.	0	2.	7.	
15. Cameroun	3.5	3.	3.	3.	5.9	
16. Zambia	3.	3.	3.	0	4.8*	
17. Tanzania	1.8	1.7	1.	?	6.0	
18. Dahomey	1.8	1.7	1.	0	1.35	
19. Congo (Brazza.)	1.8	1.4	2.	2.	2.2*	
20. Upper Volta	1.5	1.2	.5	0	1.9*	
21. Togo	1.45	1.2	0	2.5	1.8*	
22. Rwanda	1.5	1.5	0	0	1.3	
23. Sierra Leone	1.3	1.3	0	.6	.75	
24. Niger	1.2	1.1	1.	0	2.05	
25. Mauritania	1.	.9	1.	0	1.7*	
26. Burundi	.95	.95	0	0	.8	
27. Chad	.9	.7	2.	0	1.85*	
28. Malawi	.85	.85	0	0	2.5*	
29. Gabon	.75	.6	.5	1.	3.	
30. CAR	.6	.5	1.	0	1.5	
	183,420	157,200	10,760	5,770	.83	

(The Armed Forces of African States, ISS, London 1966)

Table No. 3.2—ORDER OF BATTLE: ARMIES

COUNTRY	Total 000	Infantry Bns	Air/Borne or Para. Bn.	Armour A/c Sqd	Artillery	Engineers	Signals
1. Ethiopia	32	27 (8Trg)	1	1	Some	—	—
2. Congo (K)	30	20	2	(Ferrets)	—	—	—
3. Sudan	17.5	5 KatGen 13	—	1 Regt. (12 Tk. 6 Saladin. 30 Fer)	1 Fd Reg (8 guns) 1 LAA Reg	—	—
4. Ghana	15	6 (2 Bdes)	Some	1 Recce (Saladin)	—	Some	—
5. Nigeria	9	5	—	2 (Fer)	1 Fd Bty	1 Sqdn	1 Sqdn
6. Somalia	8	8	1 Mob Scouts	Tks ?	Guns USSR	—	—
7. Uganda	5.7	4	—	—	—	—	—
8. Senegal	5	4 (20 Coy)	—	1 (AMM8)	—	1 Sqdn	1 Sqdn
9. Guinea	4.8	?	—	USSR APC	USSR 105 mm 122 mm	—	—
10. Kenya	4.2	3	1 Coy	—	—	—	—
11. Ivory Coast	3.5	3	—	—	—	—	—
12. Malagasy	3.5	3	—	1	1 Bty	SP Coys	—
13. Mali	3.5	3	1 Coy	—	—	—	—
14. Liberia	3	3	—	—	1 Hy Wpn Coy	1 Bn	—
15. Cameroun	3	3	—	1	—	1 Coy	—
16. Zambia	3	3	—	1 (Fer)	1 Bty (105 mm)	—	—
17. Tanzania	1.7	4 (i.f.)	—	—	—	—	—
18. Dahomey	1.7	3	—	—	—	—	—
19. Congo (B)	1.4	1	—	1 Recce	—	1 Coy	—
20. Upper Volta	1.2	1	1 Coy	—	—	—	—
21. Togo	1.2	1	—	—	—	—	1 Sqdn
22. Rwanda	1.5	1	—	—	—	—	—
23. Sierra Leone	1.3	1	—	1	—	—	—
24. Niger	1.1	1 (5 Coy)	1 Cmdo. Pl.	—	—	—	—
25. Mauritania	.9	? (MotSq)	1 Cmdo. Coy.	—	—	—	—
26. Burundi	.95	1	—	—	—	—	—
27. Chad	.7	1 (4 Coy)	—	—	—	—	—
28. Malawi	.85	1	—	—	—	—	—
29. Gabon	.6	1 (2 Coy)	—	—	—	—	—
30. CAR	.5	1	—	—	—	—	—
	157,200	135	5	12 A/C 2 Tk	9 Bty Fd 1 LAA Regt	2 Bns	3 Sqdns

(The Armed Forces of African States, ISS, London, 1966)

Table No. 3.3—ORDER OF BATTLE: SOUTHERN AFRICA

	Total	Army	Commandos	Police	Navy	Air Force	Military Budget \$ 000	Army	EQUIPMENT	
									Navy	Air Force
R.S.A.	171,200	71,200	51,500	43,000	2,500	3,000	322,000	Tanks; Sherman; Centurion; Panhard Armoured Cars	20 Mine- sweepers Frigates, Destroyers	2 Sqdns: Sabres, Mirages. 2 Bomber Sqdns. 8 Sqdns Fighter bombers. Transport
Rhodesia	39,200	38,300	0	Not known	0	900	16,900	Ferret Cars	0	2 Sqdns Fighter/ Ground Attack; 1 Sqdn Bombe 1 Sqdn Armed Reconnaissance Transport
	210,400	109,500	51,500	+43,000	2,500	3,900	338,900	—	—	—

(The Armed Forces of African States, ISS, London, 1966)

Table No. 4.1—ORDER OF BATTLE: AIR FORCE

	Numbers 00	Combat	AIR CRAFT Medium & Heavy Transport	Helicopters, Light, Training, etc.
Ethiopia	20.	30	12	25
Congo (K)	20.	5	18	
Sudan	4.	10	6	10
Ghana	10.	—	17	52
Nigeria	10.	—	10	56
Somalia	12.5	18	6	—
Uganda	2.6	—	1	10
Senegal	3.	—	2	8
Kenya	4.5	—	4	17
Ivory Coast	3.	—	1	6
Malagasy	4.	—	3	9
Cameroun	3.	—	3	—
Zambia	3.	—	8	10
Dahomey	1.	—	1	2
Congo (B)	2.	—	1	4
Niger	1.	—	1	3
Mauritania	1.	—	1	2
Chad	2.	—	1	4
C.A.R.	1.	—	1	4
	10,760	63	97	222
South Africa	3,000	14 Squadrons	Several Squadrons	40 helicopters plus various other
Rhodesia	900	4 Squadrons	Some Transport	1 helicopter squadron

(The Armed Forces of African States, ISS, London, 1966)

Table No. 5.1—ORDER OF BATTLE: NAVAL FORCES

	Numbers 00	Frigates	Corvettes	Minesweepers	Patrol	M.T.B.	L.C.	Others
Ethiopia	9.3				5	2	4	1 Tender
Congo (K)					Some —manned by ANC and Gendarmes			
Sudan	5.				4			
Ghana	10.		2	3				2 SDV
Nigeria	15.	1	1 sub. ch.	2 ML	3		1 LCT	2 SDV
Somalia	1.8				Some			
Senegal	2.				3			
Kenya	1.5				3			1 SDV
Ivory Coast	2.				2			
Malagasy	1.				1			1 escort
Cameroun	2.				2			1 RGB
Congo (B)	2.				5			1 ML
Togo	2.5				3			1 RGB
Gabon	1.				2			1 ML
Sierra Leone	.6							Some HDV
Liberia	2.				2			1 MGB
	3,770	1	3	5	+35	2	5	12+

ML—Motor Launch
MTB—Motor Torpedo Boat
LC—Landing Craft

LCT—LC, Tank
SDV—Seaward Defence Vessel

RGB—River Gunboat
MGB—Motor Gunboat

(The Armed Forces of African States, ISS, London, 1966)

Table No. 10.1—PRINCIPAL MINERAL OUTPUT OF AFRICA

	Year	Thousands/Tons
Coal		
Nigeria	1955/56	761.0
Rhodesia	1956	3,544.0
South Africa	1957	34,769.0
Copper		
Congo (Kinshasa)	1956	250.0
Zambia	1957	389.0
South Africa	1957	43.0
Diamonds (Metric Carats)		
Congo (Kinshasa)	1956	14,010.0
Ghana	1957/58	3,152.1
South Africa	1957	2,578.9
Gold (Tons)		
Congo (Kinshasa)	1956	11.6
Ghana	1957/58	24.6
Rhodesia	1956	16.7
South Africa	1957	529.7
Iron Ore		
Sierra Leone ⁽¹⁾	1956	823.0
South Africa	1957	1,316.0
Swaziland ⁽²⁾	1965	1,200.0
Manganese		
Congo (Kinshasa)	1956	164.8
Ghana	1957/58	309.0
South Africa	1957	252.8
Tin		
Congo (Kinshasa)	1956	15.1
Nigeria		9.3
South Africa		1.5

(1) Calculated capacity for Sierra Leone, Liberia, Mauritania 30 mil. tons, *Optima*, June, 1966.(2) Approximate annual rate for Swaziland, *Optima*, June, 1966.

TableNo.10.2 — SUB-SAHARAN AFRICA WEALTH OF STATES WITH
MAJOR ECONOMIC ISLANDS IN SPECIFIED
CATEGORIES

CATEGORY	STATE	Gross Domestic Product per Head 1956-7
A. Agricultural, Mining and Manufacturing	South Africa	R300
	Southern Rhodesia	170
B. Predominantly Mining with or without subsidiary Agriculture or Manufacturing	Zambia	146
C. Predominantly Agricultural with or without subsidiary mining or manufacturing	Ghana	110
	Kenya	62
	Uganda	52
	Sierra Leone	50
	Nigeria	50
	Gambia	40-50
	Malawi	34
Agriculture and Mining with subsidiary manufacturing	Congo DR	70
	Tanganyika	32

"Development in Africa" (Johannesburg, 1962) p. 23)

Table No. 10.3—INDUSTRIAL ORIGIN OF GROSS DOMESTIC
PRODUCT, 1955

		TOTAL	AGRICULTURE, FORESTRY & FISHING	MINING	MANUFACTURE
Belgian Congo	Billion Belgian Francs	56.1	15.6	13.4	6.7
Kenya	£ Million	159.3	62.8	1.7	20.6 ⁽¹⁾
Nigeria	"	806.9 ⁽³⁾	506.9	9.7	19.5 ⁽¹⁾
Rhodesia and Nyasaland	"	335.3	53.8	116.2	165.3 (and other sources)
Tanganyika	"	130.2	84.5	5.1	4.1
Uganda	"	118.0	76.2	—	—
South Africa	"	1,796.6	253.7	237.2	428.5 (and con- struction)

(Herskovits)

- (1) Equal to South Africa's gross manufactures 1904.
 (2) Uganda mining and manufactures equals South Africa's Gross
 Manufactures 1915-16.
 (3) Only Nigeria GDP exceeds South African N.I. 1942-3 £525. m.

Table No. 10.4—ELECTRICITY CAPACITY AND PRODUCTION, 1963 and 1965

Country	CAPACITY ooo KW	PRODUCTION—MILLION KWH	
		1963 Year	Monthly Averages 1964 or 1965
Cameroun	162	1,073	*
Centrafica	8.3	17.3	1.69 (1964)
Chad	4.9	13	1.24 (1964)
Congo DR	659	2,403	*
Dahomey	e	e	1.29 (1963)
Ethiopia	111.1	177	*
Gabon	10.3	32.1	*
Ghana	143.4	470	42.8 (1964)
Ivory Coast	e	e	15.2 (1964)
Kenya	102.2	263	27.3 (1965)
Liberia	19.0	84	—
Malagasy	74.4	128	8.00 (1965)
Malawi	13.3	39.2	3.5 (1964)
Niger	e	e	1.24 (1964)
Nigeria	256	929	98.0 (1965)
Rhodesia	—	—	343
Senegal	70	175	17.00 (1965)
Republic of South Africa	5,135 (1960)	27,828	2,731 (95% only)
Sudan	59	163	—
Tanzania	48.7	186	17.8 (1965)
Togo	e	e	0.83 (1965)
Uganda	e	e	43.4 (1964)
U. Volta	e	e	1.71
Zambia	263	748	53.
Switzerland	7,690	22,013	2,036

*—Not quoted by UN Bulletin.

e—Not quoted by Britannica.

(Encyclopaedia Britannica Year Book 1966 and UN Monthly Bulletin of Statistics, June, 1966)

Table No. 10.8—RESOURCES AND MANUFACTURES RARELY
PRODUCED 1964

COUNTRY	RUBBER (Metric Tons)	TYRES 000	RADIO RECEIVERS 000		1963 MOTOR ASSEMBLY 000	1965 STEEL Metric Tons/Month 000
South Africa	6,200 (synthetic)	2,447	164	A	110.5 (9,206/Month)	300
				B	37.5 (3,123/Month)	
Algeria	—	193	—	A	3.2 (266/Month)	
				B	1.6 (137/Month)	
Egypt	—	320	232 TV 82	A	5.5 (459/Month)	
				B	2.0 (169/Month)	

(UN Statistical Year Book, 1965; UN Monthly Bulletin of Stats. June, 1966)

A=Motor Cars B=Commercial Vehicles

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Table No. 10.11—UNITED STATES AND USSR MILITARY OUTPUT

	Average No. of Units per Year		Output per 1,000 tons of Steel Production	
	U.S.A. (1942-4)	USSR (3 years)	U.S.A. (1942-4)	USSR (1942-4)
Tanks, armoured cars, self-propelled guns	33,600	30,000	.4	2.3
Artillery	57,500	120,000	.7	9.0
Mortars	20,300	100,900	.2	7.7
Machine guns and sub-machine guns	1,650,000	450,000	18.7	34.6
Aircraft	76,000	40,000	.9	3.1

(The War Potential of Nations, Knorr, Princeton, 1956, p. 197)

Table No. 10.12

Country	Year	Males Million	Age Group: Million			Occupations Mnfg. and Mining-000	Agr. culture	GNP per Cap.	1962 Subsistence Production % GDP
			0-15	16-45	46—				
Centrafrica	1959/0	.57	.42	.66	.08	52.	461.	78	—
Congo DR	1955/7	6.	5.0	5.8	1.8	236.8	336.9	100	12
Gabon	1960/1	.21	.13	.21	.97	40.	151.8	203	—
Gambia	1963	.16	.11	.15	.41	2.5	135.	65	—
Ghana	1960	3.4	2.9	2.8	.83	282.	1,581.3	193	33
Kenya	1962	4.2	4.4	—	4.2	—	—	79	25
Niger	1959/0	—	—	—	—	4.5	703.6	67	—
Senegal	1960/1	1.5	1.3	1.6	.14	73.8	1,087.0	165	—
Sierra Leons	1963	1.0	.8	1.0	.36	88.8	682.5	70	—
Tanganyika	1957	4.2	3.7	3.9	1.06	—	—	60	41
Togo	1958/60	.68	.69	.55	.18	—	452.8	70	—
Uganda	1959	3.2	2.8	2.7	.89	—	—	62	27
Zambia	1961/3	1.7	1.4	3.0	.40	72.	220.	—	*
R.S.A.	1960	8.0	6.4	6.9	2.6	1,285.1	1,700.9	554	—
Rhodesia	1961/2	1.9	1.8	—	1.9	147.7	247.0	178	9*

(Sources: Encyclopaedia Britannica Year Book, 1966
Africa Maps and Statistics, Africa Institute, Pretoria).

*Federation of Rhodesia and Nyasaland.

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