AIR UNIVERSITY
REVIEW

1867

CANADIAN CONFEDERATION CENTENNIAL

1967
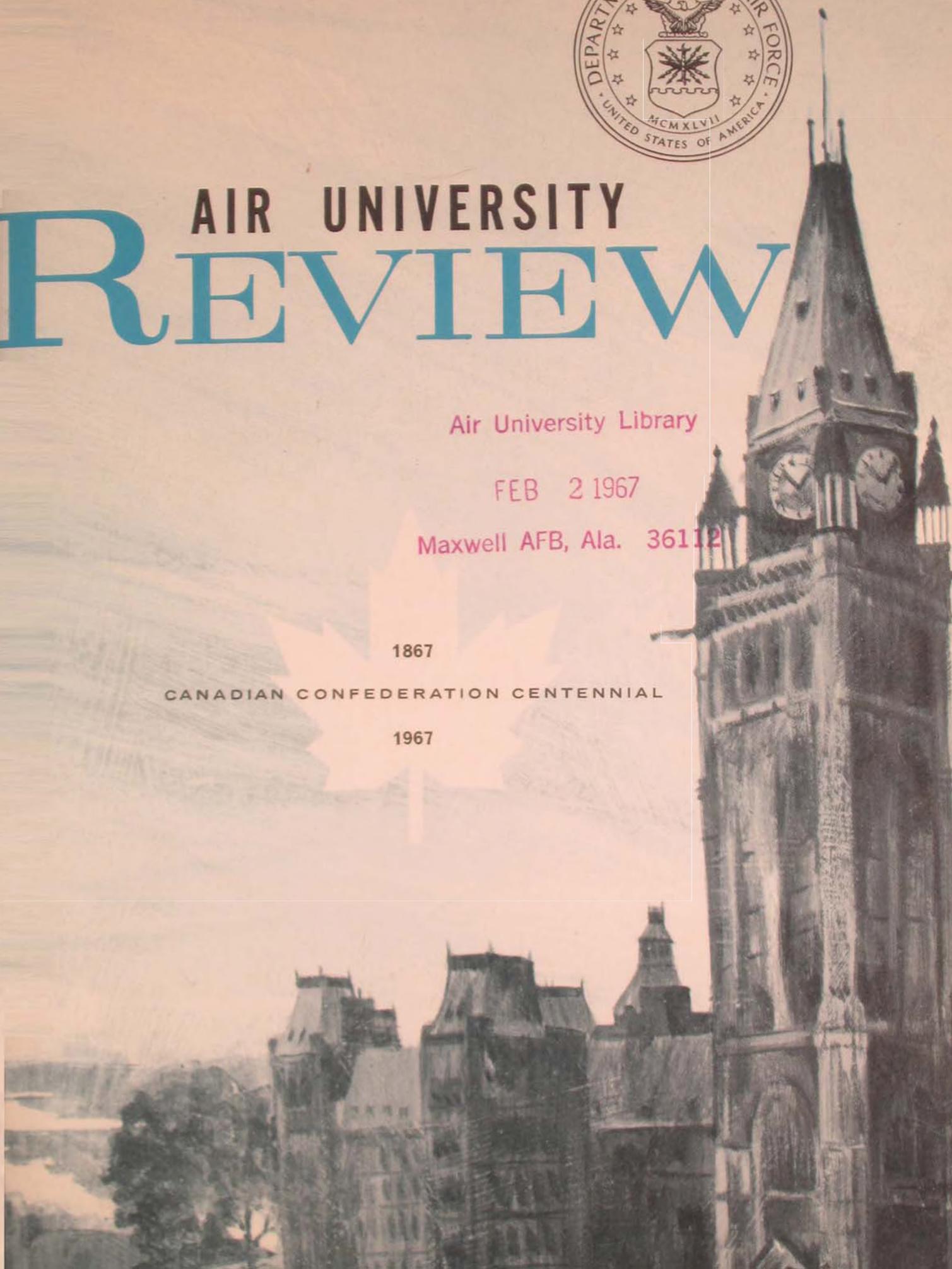
UNITED
STATES
AIR FORCE
AIR UNIVERSITY
REVIEW

AIR UNIVERSITY REVIEW

THE PROFESSIONAL JOURNAL OF THE UNITED STATES AIR FORCE

the cover

Just as the dome of the Capitol at Washington and the clock tower of the Houses of Parliament at London are emblematic of the governments of the United States and Great Britain, so the graceful Gothic tower and spires of the Parliament Buildings at Ottawa bespeak the government of Canada. *Air University Review* recognizes Canada's centennial year with articles by Air Force Secretary Harold Brown, Dr. W. L. Morton, and Dr. Stanley W. Dziuban, the first of a continuing series.

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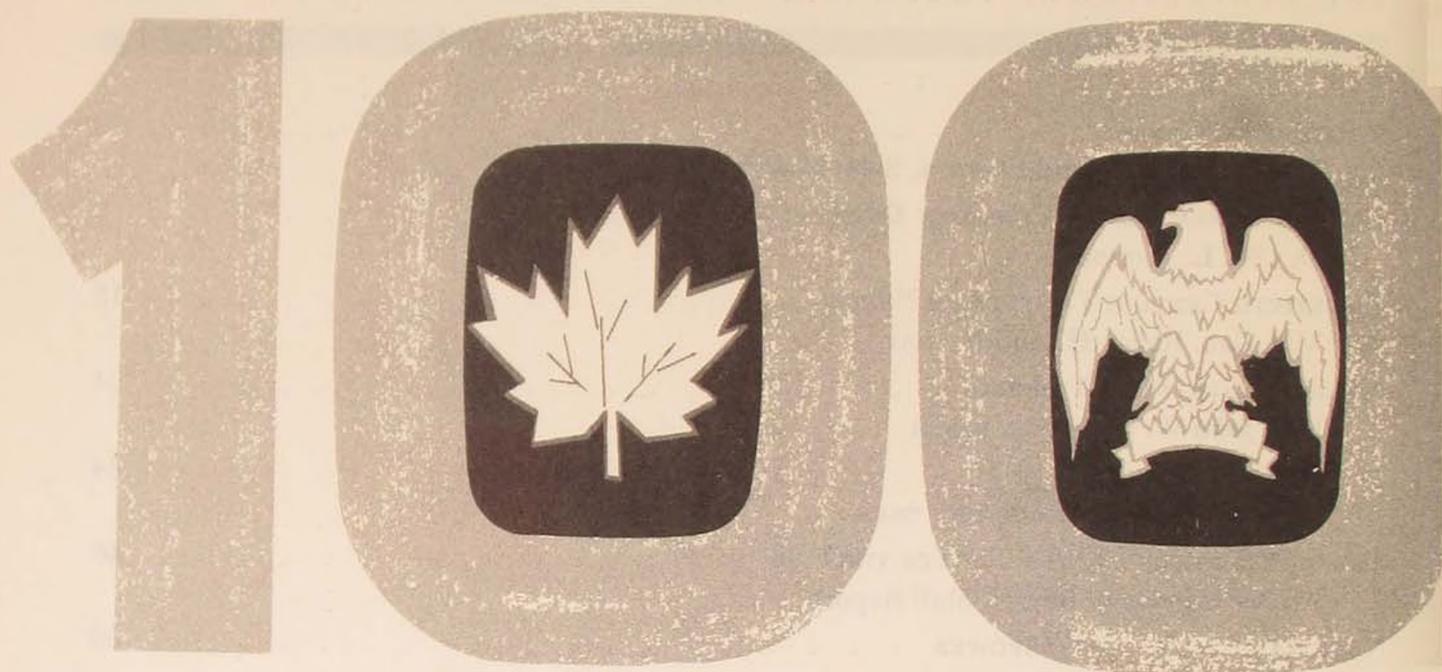
In 1967, as Canada celebrates its centenary of Confederation,
Air University Review presents a series of articles honoring our great neighboring nation and vital partner in
the defense of North America. At the same time it is hoped that the series will enhance American
understanding of and respect for the Canadian identity, apprise us of her new defense
structure and its programs, and emphasize the significance of her role in world affairs. ««
Secretary of the Air Force Harold Brown introduces the series, and Dr. W. L. Morton of Trent University,
Peterborough, Canada, continues with "The Fundamentals of Canadian Defense and Foreign Policy."
Dr. Stanley W. Dziuban of Institute for Defense Analyses, Arlington, Virginia, reviews
a recent book, Neighbors Taken for Granted, edited by Livingston T. Merchant, former U.S.
Ambassador to Canada. Subsequent issues of the Review will present other aspects of Canadian defense
and international involvement. «« A number of individuals have been most gracious in assisting
with this series. We extend particular thanks to Colonel John L. Frisbee of the
Research and Analysis Division, Office of the Secretary of the Air Force, who suggested it;
to Lieutenant Colonel Jean S. Wilson, Aerospace Studies Institute, Air University, who assisted in
the planning of articles and coordinating with authors; and to Colonel L. A. Bourgeois, Information Services,
Department of National Defence, Ottawa, Canada, and Major General E. B. LeBailly and Colonel
Bishop M. Kilgore, SAF Office of Information, who coordinated in the procurement of articles.

The Editor

A SALUTE TO CANADA

The Honorable HAROLD BROWN,
SECRETARY OF THE AIR FORCE

THIS YEAR marks the Hundredth Anniversary of Canada's existence as a federation. On 1 July 1867 the British North America Act created a union of four provinces forming the nucleus for Canada's transcontinental expansion.

The United States Air Force is proud to join Canadians everywhere in celebrating their Centennial. It has been a century of unparalleled progress in economic, social, and political development. Today Canada stands as one of the world's great trading nations, with a superb reservoir of natural resources and a growing industrial base. Her influence in international affairs is probably unequaled by any other nation of comparable population.

For many years Canada and the United States have been valued and trusted friends. Our common border has been undefended for generations, and we have formed arrangements for mutual defense that are more extensive than either country has with any other. Military people of both nations are accustomed to working together, sharing their experiences, knowledge, and ideas.

Relations between Canada and the United States have not always been as cordial as during the last half century. We remember the War of 1812, though perhaps recollections of certain actions in that war—the Battle of Lundy's Lane, for example—evoke less enthusiasm on this side of the border than on the other. But a Canadian historian has observed that, in retrospect, the War of 1812 was for all participants one of the most satisfying in history: Canada knew she won it on land, the United States knew she won it at sea, and the British have forgotten it ever happened.

Even during that war and the various boundary disputes that extended over much of the nineteenth century, our relations, though sometimes rather turbulent, rested on a foundation of shared ideals and mutual respect. An incident that took place during the War of 1812 is symbolic. The town of Calais, Maine, found itself short of gunpowder for a Fourth of July celebration. The people of Saint Stephen, New Brunswick, obligingly supplied powder to their Down East "enemies."

One of our great achievements is this: for more than 150 years we have lived side by side in peace which has ripened into a deep and abiding friendship. Each has retained its unique national characteristics and separate points of view. Each has felt free at times to disagree with the other on questions of economics, use of natural resources, or international commitments, usually without rancor but always without fear of any untoward consequences. Nearly a century ago the Canadian-American International Joint Commission replaced early nineteenth century martello towers and limestone ramparts bristling with 24-pounders as a means of defending our respective interests.

It is inevitable, and in many cases desirable, that differences between Canada and the United States will continue. These differences are the product of similar but not identical histories, governmental systems, cultural influences, economic resources, and views of our respective national interests and responsibilities toward the world community. The diversity that exists between us enriches both.

Geography and a heritage of shared basic ideas make it equally inevitable that the scope of interests which unite us will remain the broadest that either shares with another country, while the range of issues on which we are not in complete agreement probably will remain the narrowest. Our common interests include trade, defense production sharing, research and development cooperation (both military and nonmilitary), technical and economic assistance to less developed nations, unilateral and multilateral work to maintain peace, and membership in such organizations as NORAD, NATO, and the United Nations.

I do not propose to comment on those issues which Canada and the United States view in somewhat different perspective. Our professional interest in defense and foreign affairs will have acquainted most of us with the American assessment of these issues. I hope that the Canadian authors of the articles in this series will explain some Canadian points of view with which we may be less familiar and perhaps comment on American policies and practices which are not fully shared by their country.

In both our countries the character of armed forces is set by popularly determined national policies and objectives. It is important that Canadian and American military people understand not only each other's defense structure, policies, and procedures but also the specific purposes which they are designed to serve and the rationale behind those purposes. In this light, we shall be observing the reorganization and restructuring of the Canadian armed forces with great interest, just as Canadians have watched our organizational evolution during the past six years.

Our two countries have set up elaborate machinery for consultation and coordination in many fields. The formal machinery is most effective as it is backed by the widest possible official and public appreciation of our similarities and differences. I think we must admit that Canadians generally are better informed about our affairs and objectives than are we about theirs. One of the purposes of this series of articles is to achieve a more equitable balance of understanding.

As Canada begins her second century of federation, we look forward to the continued stimulus of the unique association shared by our countries. Both nations are at once independent and interdependent, similar yet different in culture, economic goals, and political objectives. We live under different flags, but neither people regards the other as foreign.

On both sides of the border there is much reason for pride in the maturity and benevolence of our relationship. These qualities have grown out of mutual understanding and good will, but most of all from mutual respect.

Washington, D.C.

THE FUNDAMENTALS OF
CANADIAN DEFENSE
AND FOREIGN POLICY
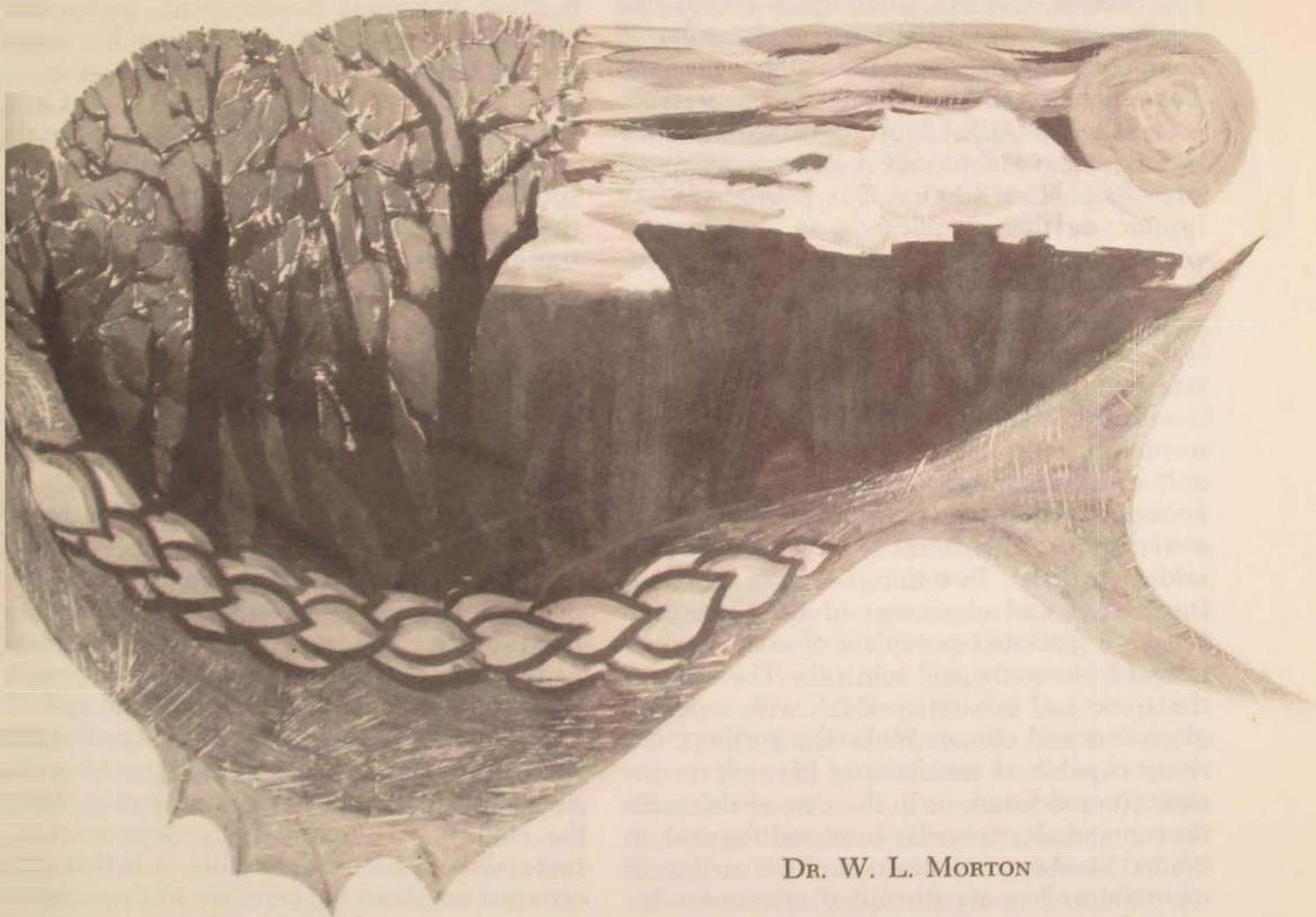
Dr. W. L. Morton

FOREIGN and defense policies are an expression of the characteristics of the country following them. This fact is perhaps more true of Canada than is generally so. The characteristics of Canada, though little understood even by Canadians, are especially marked.

The first of these is its territorial size. Canada is, in territory, the third largest country in the world, greater in extent than the United States. Much of this extent is not inhabited and is occupied only in the strictly legal sense of being under Canadian jurisdiction. But by one of the many ironies of the new age, even mere space is significant, and Canada has to shape its policies to take account of its spaces, however empty, and however undesired by others. The reason is simple: space may now be traversed by intercontinental planes and missiles.

Second, Canada, although a continental country, is curiously riverine and insular in character. Its great rivers, particularly the Saint Lawrence, and their great oceanic indentations, especially the Gulf of Saint Lawrence and Hudson Bay, have determined its economic and even its political history. One province is half insular, another significantly so, and a great portion of Canada's territory consists of the Arctic Archipelago. These attributes modify its continental character and help explain its partly maritime nature and the importance of its ties with the rest of the world.

Third, Canada is not only vast and fragmented, it is in the greater part waste—waste only occupied here and there at ports or mineral areas, or waste never likely to be occupied by modern man. The extent to which this is so is seldom realized. Two things explain it. One is the extent and character of the Canadian Shield, a glaciated peneplain of archaic rocks, rich only in water and minerals. The other is the arctic and subarctic, which with repeated glaciation and climate make the northern territory capable of maintaining life only in the most stunted forms, or in the case of the maritime mammals, the polar bear and the seal, in limited numbers, or in the case of the caribou in marginal and easily disrupted circumstances. Most of Canada is therefore permanent waste.

The result of this enormous central fact is that there are narrow and severe limits on habitable land and on population growth. Even with the growth of industry and the provision of vast amounts of power, as will happen in Canada, checks on the growth of population will continue to operate. It is the Sweden, not the Germany, of North America.

From these characteristics arises the central paradox of Canada: that it has a vast territory and a relatively small population (20,-000,000), that it is a great trading community and a small power.

The character of the Canadian economy derives from the nature of its territory. It is still, as it always has been, primarily a trader of primary products. The great economic staples of fish, timber, and wheat are the Canadian equivalents of American cotton, tobacco, and wheat. But there is this difference, that despite a great industrial development, particularly since 1940, secondary production has never submerged the earlier staples to the degree that has occurred in the United States. And Canadian secondary industry, if it is to acquire the major markets that make the economics of mass production possible, must to a great extent find them abroad. Thus the emphasis on export trade remains, even with industrialization.

The present century has, of course, seen some changes in the nature of the export staples. Pulp and paper have been added to lumber in the forest industry. Minerals, oil, gas, and power have been added to wheat (still and for the foreseeable future a major staple), and there is even talk of exporting water.

It follows that much of Canadian external policy has to do with trade. Canada is indeed firmly set in the British tradition that the policy of the state must be to help create conditions favorable to trade, to win and protect markets, and to make trade, not ideology or other preference, the principal guide of foreign policy. Even military policy must be subordinated, both in its costs and in its objects, to this overriding consideration. For the economic life of the country is almost wholly dependent on trade abroad, not as drastically as is that of a commercial island but certainly in the sense of maintaining an achieved level of prosperity.

Since the 1920's, and particularly since

1945, the continuing and growing deficit in Canadian trade with the United States makes this emphasis on external trade even more important. For it is only by dividends earned by American firms and the sale of raw materials and manufactured goods to the United States, and by borrowings in the American money market, that that deficit is financed. It is also by the earnings of foreign trade that the deficit is in part met.

The enormous American investment in Canada and American ownership of the larger part of Canadian industry as well as of many of its developed natural resources raise some question of Canadian economic independence. This is a matter of serious concern to many Canadians today. It does little, however, to alter the character of the Canadian economy. Occasionally, friction has occurred because some American-owned and -managed firms have declined to take advantage of Canada's trading with Cuba and Communist China. The matter is one of a certain delicacy. Foreign-owned companies, of course, come under the law of the country in which they operate. They are under no obligation to follow its policies, but have no right to thwart them by positive action.

It was the same spirit, born of the same necessity, that led Canada, after years of trouble with heavy annual carry-overs of wheat, to seize the chance to make very large sales of wheat to the U.S.S.R. and Communist China, as well as to Cuba and Poland. By 1966 these sales quite overshadowed the traditional export markets for wheat in Britain and western Europe and replaced the worry of carry-overs with that of failure to meet commitments. Nothing could better illustrate the nonideological character of Canadian economic policy, a character sprung from the necessity to export as extensively as opportunity offers.

The military side of Canadian external policy is of much the same kind. Canada has never been able to stand alone, or even think of doing so, in any war in which it was engaged. And rarely, if ever, has it been able to avoid being drawn into a war in which its political, economic, and neighboring associates were engaged. This is because Canada has always been, one might say has always had to be, dependent on some form of association in military matters as it is dependent on foreign trade in economic matters. As it lacks the population to create a major internal market, it equally lacks the manpower and the industry to be a major military power. Yet because of the nature of its economic ties, Canada has always found it difficult, in fact impossible, to practice isolation.

This military dependence has always, of course, been political and sentimental as well as economic. It began in the French Empire and continued through the British. In one way or another the colonies that became the Dominion of Canada in 1867 were involved in all the major wars of France and England, from King William's War to those against Napoleon. The last they might largely have avoided, of course, had it not been for the War of 1812 with the United States, but that conflict is another example of how Canada has tended to be a pawn in conflicts not of its own making. For a century thereafter Canada had little part in England's wars, neither in the Crimea nor in the colonial wars of England. It knew a century of practical isolation based on the settlement of 1817-18 between Great Britain and the United States.

In that century the British North American colonies advanced to self-government and union (Newfoundland excepted). In managing their own affairs they were encouraged, and after 1871 left, to look after their local defense under the general protection of British naval power and British prestige. When therefore their participation was sought in the Boer War in 1899, Canadians were surprised and divided. A compromise in which actual participation by volunteers was allowed, without further commitment by the government, met the issue for the moment but did not settle it. A decade of debate revealed that Canada was still part of one undivided diplomatic and military state, the British Empire. When that Empire was at war as a result of decisions made in London, Canada was at war. To what extent Canada would participate, only enemy attack (most unlikely) or the Parliament of Canada would decide. Actually in 1914 events and emotion decided, and Canada was fully committed to the war, even to the extent of gravely impairing its

national unity in order to impose conscription (the draft) in 1917.

Thus for two and a half years North America saw the spectacle of Canada at war and the United States at peace. Clearly Canadian participation was considered no immediate business of the United States. Yet that participation could have been, as the events of 1940 were to reveal, of great importance, even danger, to the United States. What had been the military relations of the two countries since 1815?

It seems fair to say that the United States from 1775, when congressional armies invaded the province of Quebec, would have welcomed the inclusion of the British Canadian colonies into the Union, for which indeed the Articles of Confederation provided. It was not Canadian territory that was desired, but possession of Canada would have given complete control of the fisheries and the fur trade. Even more important, it would have removed the military menace from the north, first French and then British, and it would have deprived the Indian tribes of the old Northwest of support and a refuge.

The British, for reasons never fully stated, thought it worthwhile in 1775–83 and in 1812–14 to preserve Canada, perhaps for prestige, certainly as a loyalist refuge, and after 1815 as a timber reserve for the Royal Navy. But it had to convince the United States that Canada would not be a military menace, and the disarmament of the Great Lakes was the symbol of this. Yet war threatened three times: in the aftermath of the Canadian rebellions (1837–38),

in the Oregon affair (1844–46), and the Trent incident (1861–62). As long as British troops garrisoned Canada and the boundaries between Canada and the United States were not fully settled, war was not unthinkable. It really became so when by the Treaty of Washington of 1871 outstanding difficulties were settled, including the San Juan Island border dispute. At the same time, and in the same spirit, the British troops were withdrawn from Quebec, as they already had been from Montreal and farther inland. Only the garrison at Halifax was left, and it was the garrison of a naval base, not of a border. The defense of Canada from the Atlantic to the Pacific was left to the Canadian militia, not by training or armament a military menace to anyone except disturbers of the peace.

In effect, as may now be seen, warfare between Canada and the United States was most unlikely and could be ruled out of serious consideration. This is the justification for the generation of American and Canadian oratory about the "undefended border." In fact, there were repeated thoughts on the unthinkable subject—in the Venezuelan crisis (1895–96), during the Alaskan boundary dispute (1898–1903), and in the thinking of some Canadian military men down to 1914 and even, *mirabile dictu,* in the 1920's. This last was unrepresentative but reflected the engrained fears of the weaker power and the continued possibility, as it seemed, of a British and American conflict down to the Washington agreement on naval disarmament in 1921–22.

None of this thinking became policy. Canada turned rather to legal-diplomatic relations with Washington and finally assumed in 1927 the burden and delicacies of direct diplomatic representation. Such relations did not of themselves preclude military action, but the spirit in which they were conducted did. The border, long in fact defended, became actually as undefended as it had become undefendable.

MILITARY conflict between Canada and the United States had then become impossible. The events of the 1930's and the

Second World War, however, made military cooperation necessary. President Franklin D. Roosevelt had pledged this in his speech at Kingston, Ontario, in 1938. With the distinct possibility of German domination of Europe after May 1940, the two countries had to take common action for the defense of North America. British naval officers were surveying Sept Isles in the Gulf of Saint Lawrence as a possible base for the Royal Navy. Canada might have become, in Britain's place, the country from which resistance to the Nazis would be continued. Against this background the Permanent Joint Defense Board was created for the exchange of ideas on North American defense. It was a rather strange instrument, more symbolic perhaps than useful, and in any case American entry into a vastly expanded war in 1941 overshadowed it. It did, however, mark the continuing commitment of the two countries to continental defense and reflected the fact that henceforth Canada shared the protection of American naval and military power and must seek its armaments from American industry and condition its military policy by the fundamental need for joint action with the United States in defense of North America.

Neither the further course of the war nor events afterward, including the Korean War, altered this fact. What did alter it was the new threat of intercontinental bombing, first by planes and then by missiles, with nuclear weapons. Out of this need came the building of the early-warning lines in Canada, as well as Alaska, and in 1958 the agreement for organization of the North American Air Defense Command (NORAD). More desired in Canada by the military than by the politicians, NORAD was an inescapable necessity, for only by continuous cooperation, daily joint action, and the most intimate sharing of tactical and strategical thought in the strange new world of radar, computers, and missiles, of overkill and second strike, could there be any effective cooperation.

The difficulties that caused the civilian doubts are obvious. How could there be any real national sovereignty when integration had to be so close and action so sudden? How could there be civilian control? (Canada, unlike the States, has no effective civilian commander in chief, the cabinet playing that role.) How could a country so committed to joint action with another country appear before the world with a policy and a character of its own?

Military necessity in the second half of the twentieth century had thus committed Canada to a military obligation in which it was much the weaker ally. But economic necessity required that it propose policies often at variance with those of the United States. So, often, did the sentiments of its public. So did the general character of its diplomacy, its foreign policy in the narrower sense.

Canadian external policy (so called because so much of it is with the British, who are not foreigners, and Americans, whom Canadians do not think of as foreigners) has always, for the general reasons given earlier, had to operate in a complex of political, legal, and sentimental atmospheres more intricate than is usual. The chief elements in this complex were, of course, Canada's relations with the British Empire. By 1871 Canada had become fully self-governing and self-defending except in foreign relations and constitutional amendment and in the event of a major war. Efforts after 1885 to have Canada committed by British

foreign policy to military action in Britain's wars when needed were, however, steadily resisted. This resistance was based on the constitutional fact that the Canadian Parliament controlled all taxation in Canada and the Canadian militia, and not a dollar could be raised for war or a man enlisted without its consent. Behind the constitutional objection was the fact that important elements of the Canadian electorate, notably the French Canadians and Irish Catholics but also many others, were no admirers of British imperialism and could see no reason whatever why Canada should take part in Britain's imperial wars. Canadian governments of both parties therefore insisted that they could undertake no commitments beforehand and that Parliament alone could decide what, if any, action Canada would take on the Empire going to war. This would be as true of a general war in which Britain itself was threatened as of a local colonial war. Canadian nationalism therefore led to the practice of a

Canadian isolationism. How politically dangerous any departure from this policy was, was shown when Prime Minister Wilfrid Laurier's candidate suffered defeat in a by-election in Quebec in which his Nationalist opponent attacked, as a measure leading to conscription, Laurier's Naval Act creating a Canadian navy to cooperate with the Royal Navy in time of war.

A national policy, then, justified in the last analysis on the absorption of Canada's energies in peopling and governing half a continent, was Canada's reaction to its membership in the British Empire. Towards the United States its policy had been since Confederation to play the part of the "good neighbor," a phrase launched by the Canadian statesman George Brown in 1874. Brown, significantly enough, used the term while attempting to persuade the United States to turn again to the policy of reciprocity in tariffs, which Canada had valued so highly in the period of its operation from 1855 to 1866. That is, Canada wanted to develop a continental relationship with the nation with which it shared the continent along a boundary that united rather than divided. It sought to do this in all ways that left its national character distinct; indeed, there were Canadians, particularly in the late 1880's and early 1890's, who were prepared to risk some blurring of the distinction in what was called "commercial union."

As not infrequently happens, Canadians discovered then that in fact the United States had accepted the existence of Canada as a nation but was not prepared automatically to welcome any Canadian suggestion for closer relations short of union. Canadian overtures for reciprocity were steadily rejected from 1874 to 1910 because certain American interests feared they would be harmed.

The ready assumption of American friendship was still further shaken by the outcome of the Alaskan boundary dispute (1898–1903). The Canadian case was extremely weak in law, but Canadian desire for a corridor through the Alaskan panhandle to the Yukon goldfields was very strong. They hoped, with British assistance and some American good nature, at least to arrive at a deal that would give Canada the

minimum of what it wanted, a sea corridor through the panhandle. But the American government chose to stand on its really unchallengeable legal grounds, and the British had in fact nothing with which to bargain. By the Hay-Pauncefote Treaty of 1901 Britain had surrendered interest in the Panama Canal. The form of judicial award adopted was merely an attempt to let Canada down easily, but national anger drove Canadians to two conclusions: one was that it must get control of its foreign policy away from Britain; the other was that the Americans are hard bargainers even with their friends. Three consequences followed: The first was the establishment of the Department of External Affairs in 1909, a very modest beginning in fact. The second was the establishment of the Permanent Joint Committee on Boundary Waters in 1910, an attempt to ensure that most disputes with the United States might be handled legally and judicially rather than diplomatically with power taking precedence over law. The third was the rejection by Canada in 1911, when the United States had reversed its stand of half a century, of an agreement for reciprocity in raw materials and some manufactured goods. Canadian nationalism was operating both within the Empire and in North America.

The outbreak of the First World War seemed indeed to contradict this growing nationalism. When Great Britain declared war, its act put Canada also at war, and the Canadian Parliament, backed by a united public opinion, quickly voted for full participation. But the length and ferocity of the war did cause division between French and English Canadians, and the imposition of conscription created a soreness in Anglo-French relations that was to color Canadian politics for the next two decades. Moreover, the experience of military and diplomatic cooperation in war caused national sentiment to grow more quickly than before. By the end of the war the British Empire was well on its way to dissolution into the Commonwealth. In the League of Nations Canadians found an alternative way of asserting their nationhood and of participating in world affairs free of imperial apron strings. The declaration of the national autonomy of
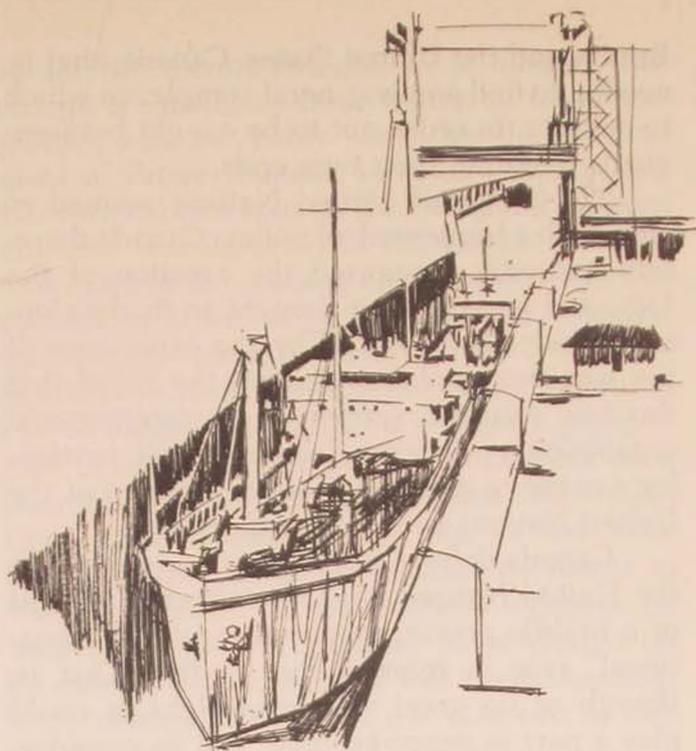
the Dominion of Canada in the Commonwealth in 1926, the opening of Canadian embassies in Washington, Paris, and Tokyo in 1927–28, and the Statute of Westminster in 1931 saw the formal recognition of national autonomy in the members of the Commonwealth. Actually, their assumption of the functions of independence, even through participation in the League of Nations, was almost wholly negative. Canada's opinion and policy in the 1920's were persistently and self-righteously isolationist, and in the 1930's its Liberal government after 1935 was to pursue the policy of appeasement of Germany and Italy even further than Neville Chamberlain cared to do.

The Second World War was for Canada a rerun of the First, not in the nature of its participation—that materially was greater even than in 1914–18—but in the sense that it gave Canada a chance to amend the errors of 1918–19 and the postwar period. Canadian nationhood had been established. The country had therefore no purpose but to do what it might to prevent a recurrence of such a world contest. Its one particular interest was unobtrusive, and its realization could be sought in general terms: that was not to be caught, as it had been with respect to Greenland and Saint Pierre and Miquelon, between opposite policies of Great

Britain and the United States. Canada, that is, needed to find a new general complex in which to operate, in order not to be caught between giants pursuing their own ends.

The proposed United Nations seemed to offer such a framework of policy. Canada therefore earnestly supported the creation of the U.N. and gave its best thought to its development. Indeed, converted by the experience of the war from isolationism and the belief that the sole function proper to an international organization was conciliation, it was particularly eager to give the Security Council of the United Nations peace-keeping powers.

Canada defined its role in a world in which the United Nations might be effective as that of a middle power, prepared to play a "functional" role in international bodies. That is, though of no great military weight, it could play a part in peace-keeping, and its considerable economic power, especially its foreign trade, would enable it to be helpful in the other organs of the U.N.—the economic and social agencies in which it was to function to try to prevent the conditions out of which wars were thought to arise.

Canada found a similar role in the North Atlantic Treaty Organization. That body in fact covered the area of the world of primary interest to Canada, and since it included the United States, the United Kingdom, and France, it seemed especially likely to prevent the sort of conflicts in which Canada was caught between the differences of its associates. So keen was Canada on the development of NATO that it had included in the treaty Article 2 which called for—in vain as it has proved—the development not only of military cooperation but also of economic and social ties.

Matters did not go in the next fifteen years as Canada had wished. Russian vetoes paralyzed the Council of the U.N. The Korean War, in which Canada took part when it was made a U.N. war, further illustrated the fact that if peace-keeping rested with the great powers, peace could only be kept by agreement among them. When the Suez adventure occurred, Canada not only intervened through the Commonwealth to restrain the British but also proposed the idea of a peace-keeping force

supplied by the smaller powers. If the great powers could not cooperate, perhaps the small ones might be used to soothe sore spots from which war might spread. Canadian troops in consequence have been stationed in the Gaza Strip since 1956. Others, following the same line of thought and the same procedures, are in Cyprus. Canadian military personnel help maintain the truce between India and Pakistan.

CANADA has thus created for itself the role of the trusted, neutral, and disinterested pacifier. However useful and realistic this role may or may not prove to be, it is one extremely popular with Canadian public opinion. It is a flattering one, and it seems to be useful. Canadian policy is therefore concerned to preserve this character and to develop the peace-keeping capacities of the U.N. whenever and however it may be possible. The present policy of integrating the armed services of Canada is aimed at increasing Canada's effectiveness as a peace-keeper.

At the same time, the development of intercontinental warfare made it necessary to reconsider Canada's part in North American defense. This obligation was met, as noted earlier, in NORAD. But as also pointed out, the Canadian military had been more keen for the actual structure of NORAD than had the Canadian public or government. The reason was quite simple. So definite a commitment to North American defense, with and under U.S. leadership, could only bring into question the genuineness of the independence of Canada's role in world politics. A secondary reason was that official Canadians at least had not forgotten the readiness with which local American commanders had seemed to treat Canada as an occupied country during the war and the heavy-handed dealing of Cordell Hull with the Saint Pierre–Miquelon affair. The Armed Forces (Visiting) Act of 1947 dealt with the former matter, so far as law could, by insisting on the usual rule that troops of a friendly power must come under the laws of any state in which they are placed. But the second could always recur, given the authority and the preoccupations of the United States.

The difficulties of cooperation were in fact to be illustrated during the 1962 Cuban missile crisis. The Canadian government delayed taking action when under pressure from the NORAD command and the government of the United States to do so. When thirty-six hours later Canada did place its forces on the alert and open Canadian skies to American planes, the action was belated in terms of intercontinental warfare. There was now no question of Parliament deciding, but the Canadian cabinet had to do it, and the cabinet, a nationally representative body, lacked the unity and decisiveness of a civilian commander in chief. One may suppose the cabinet was divided over the very issue already stated: What *was* Canada, the "Ready, aye, ready" ally of the United States, or the detached peace-maker?

The issue rolled on and was renewed over the question whether the Bomarc missiles sited in Canada and the Canadian Air Division in Europe should be equipped with nuclear warheads. Again, what was Canada, the military satellite of the United States or an autonomous country pursuing peace? When the leader of the opposition, Lester B. Pearson, proposed that nuclear warheads be adopted, the issue became a political one. When the American Department of State intervened in the debate, to set the record straight, as it alleged, the charge of American intervention in Canadian politics was inevitably made by the government of Prime Minister John G. Diefenbaker. His own cabinet split on the issue, and his government was defeated in the House of Commons and in the ensuing election, although the opposition failed to gain a majority. Clearly, Canada was seriously divided between its obligations to North American defense—even its role in NATO—and the role it was attempting to play in the world. No public solution has been attempted by seeking to diminish the obligations or by changing the role. It has been officially announced that Canadian forces in NATO will revert to conventional weapons by stages. It is clearly a matter to be dealt with by careful diplomacy and full understanding, since neither obligations nor role can in fact be changed.

In economic policy, Canadian trade with Cuba in nonstrategic materials and, above all, the sales of wheat to Communist China raised the same issue in other forms. Canada believes, and necessarily, in the widest possible trade, with as little ideological consideration as possible. That in this matter it must differ with American policy and sentiment is perhaps unfortunate; but it must be so, Canada being
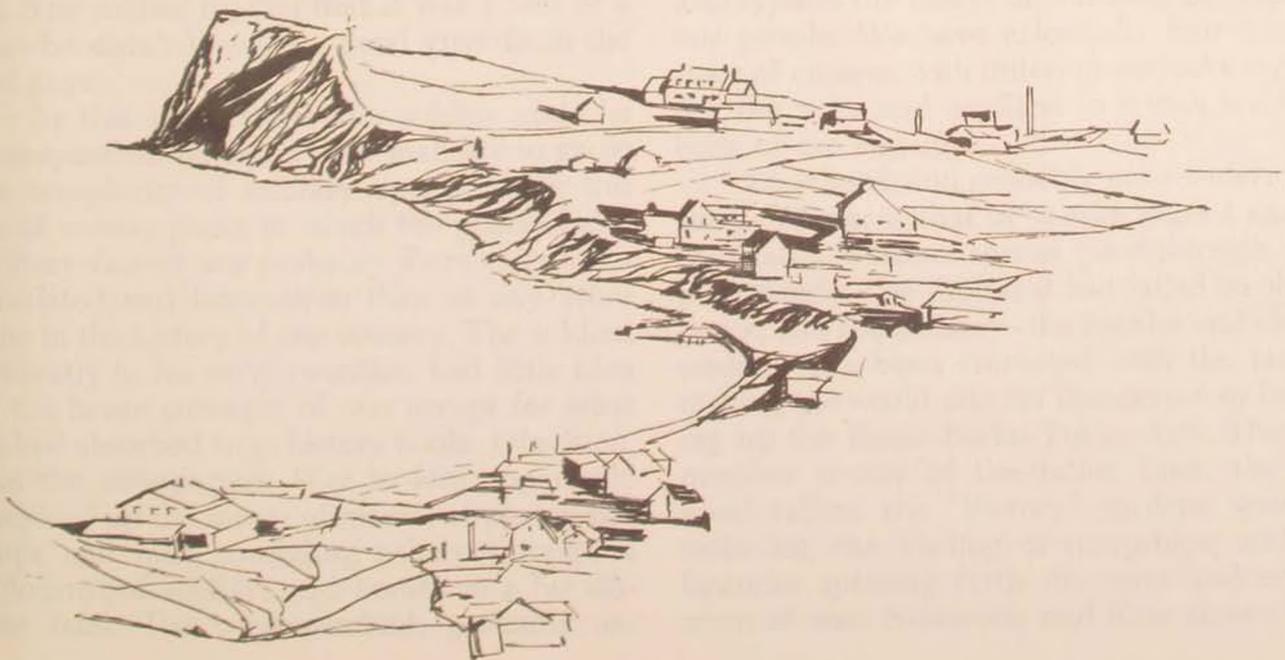
what it is. The same issue underlies Canada's caution about joining the Organization of American States. Many of its interests and sentiments lead it to join; but if it did so, would it have to become the subordinate or, worse, the challenger of American policy? Perhaps at the point of joining, it set the matter aside after American action in Santo Domingo.

IN SUMMARY, then, the fundamental questions of Canadian policy are these:

• How to meet its North American commitments while retaining independence in fact and in appearance

• How to preserve good relations with the United States while trading as freely as possible

• How to preserve economic independence while continuing to share in American capital, industrial skill, and enterprise

• How to be a good neighbor to the United States without ceasing to be a good citizen of the world.

Peterborough, Ontario

TWENTIETH CENTURY CENTURIONS NEEDED

MAJOR GENERAL ROLLEN H. ANTHIS

IN A NEWS story filed during the midst of the fighting in the Dominican Republic, a news correspondent reported his encounter with an American soldier. The correspondent asked the soldier his view of the situation as he was taking cover behind the corner of a building, warily watching for snipers. The soldier replied that it was a hell of a war—he didn't know the good guys from the bad guys.

In this news story, the soldier and the correspondent reflected their inability to grasp the complexity of military operations in this era of uneasy peace in which the political and military factors are probably more closely interrelated and interwoven than at any other time in the history of our country. The soldier, evidently in his early twenties, had little idea of the broad concepts of war except for what he had absorbed from history books, television, and the newspapers. War to him apparently conjured up the image of masses of planes and ships and men struggling ashore through a holocaust of shellfire and bombs in a far distant land. The correspondent, probably an-

other young man, had a similar image of war, otherwise he would not have thought the soldier's observation sufficiently significant to report it and thus attempt to typify the extremely fluid and delicate politico-military situation in that island republic.

Understandably, to a degree, this account also typifies the image of war held by many of our people. We have essentially four generations of citizens with different outlooks regarding the wars and conflicts in which we have been or are engaged.

The classic and probably most widely held image of war is that of World Wars I and II. Inevitably, various scenes pass through people's minds. The diplomat has failed to obtain peace, and the military—the regular and citizen soldiers—has been entrusted with the task of making the world safe for democracy or breaking up the Rome-Berlin-Tokyo Axis. They remember scenes of the ration lines, the war bond rallies, the "Victory" gardens, gasoline rationing, the loading of troopships, and the factories spewing forth the arms and equipment of war. Newsreels and films showed the

devastation to factories, towns, and cities abroad from aerial bombardment and land warfare and the flight of civilians from their homes to escape rapid enemy advances. Only a relatively small number of our population saw at first hand the noncombatants who became the sad victims of war and involuntarily became a close part of it. Those few of our combatants who actually engaged the enemy probably had little impact in convincing the mass of our people, as they advanced in years, of the changing nature of war. War has not been the most delightful of subjects in any forum.

Within a few years the Korean War took place, and to many it was a small war in an obscure part of the world. True, there were the same scenes that one found in the other wars—the troopships, the draft, and some inconveniences. Yet there was no nationwide mobilization of the civilian sector or the manifestations of total war. The returning veterans probably said little of the new form of war that ended in a stalemate, for some were still thinking in terms of a lost military victory and little of the political nature of the conflict. Certainly they shared experiences similar to those of their fathers and older brothers. But a new term had emerged from this type of conflict: limited war. It was a mutant of the two previous conflicts, for both sides—the Free World and Communist—desired that it be limited. It was limited in political and military objectives, in geographic area of operations, in weapons, and in tactics.

This type of war required a shift in military and civilian thinking, but this fact did not emerge with considerable clarity until long after the truce had been agreed upon. This war had not been the black or white generally associated with total war; it was a shade of gray, involving in historical perspective a conflict that was neither war nor peace.

During the course of the debate on the Korean episode, when the "balance of [nuclear] terror" became more pronounced and when many mental gears had not shifted to face this problem, we became engaged in assisting South Vietnam and other less developed nations to defeat Communist aggression involving politi-

cal subversion, terror, and guerrilla warfare. In 1954 we were hopeful that aid—economic and military—could be employed effectively by the Vietnamese "to make a greater contribution to the welfare and stability of Vietnam."[1] As Vietminh terror and guerrilla war efforts increased, it was obvious that more help was needed. People began to think about this new form of war while still debating the previous conflict in Korea.

This thinking was best synthesized in the defense budget speech of President Kennedy when he said:

> The Free World's security can be endangered not only by a nuclear attack, but also by being slowly nibbled away at the periphery, regardless of our strategic power, by forces of subversion, infiltration . . . guerrilla warfare . . .

While this statement was a response to Premier Khrushchev's speech in January 1961 regarding the role of the Communists' "wars of national liberation," it also asserted that action was required to develop a United States and a Free World capability to meet such wars:

> We need a greater ability to deal with guerrilla forces, insurrections, and subversion.

As the tempo of war increased in Vietnam and United States effort increased accordingly, it became more and more evident that the struggle was becoming a more serious and more complex war than before.

> This is a different kind of war. There are no marching armies or solemn declarations. Some citizens of South Vietnam, at times with understandable grievances, have joined in the attack on their own government. But we must not let this mask the central fact that this is really war. It is guided by North Vietnam and spurred by Communist China. Its goal is to conquer the South, to defeat American power and to extend the Asiatic dominion of Communism.[2]

This different kind of war has caused casualties, destruction, and untold suffering. The Vietnamese armed forces "are absorbing fatalities today at a rate greater than we have ever absorbed in our history, twice that of

World War I, twice that of World War II, 10 or 15 times that of the Korean War. . . ."³ The Viet Cong have killed or kidnaped 1500 civic officials in the past year. If this happened in the United States in the same proportion, it would approximate the loss of thousands of mayors, members of boards of education, and city managers. The economic and social structure of Vietnam is under attack. Bridges, railroads, and highways are being destroyed. Agricultural products fail to reach the cities of South Vietnam. Entire villages are set to the torch, and the population is driven away to join thousands of other refugees. The Viet Cong have sabotaged communication lines and power plants. Teachers, malaria control personnel, and agricultural specialists have been victims of assassination or kidnap. In the actions of the Viet Cong, there has been no distinction between military and civilian activities. In previous wars, civilians have generally been separated from the conflict and sustained attack, leaving the military to operate with freedom of action mostly in cleared areas. Today, there is the ebb and flow of combatants and noncombatants in which the civilians suffer as much if not more than the military. Freedom of military action is limited.

So there is a new human dimension added to warfare about which a domestic debate rages in an effort to understand our national purpose, strategy, and tactics. This new dimension changes the conventional solutions and images of the past. Too often the generals have been accused of using the tactics of the last war in fighting a new war. Today this may well be applied to many of the American people who have failed to grasp one of the basic tenets of Mao Tse-tung: "Political power grows out of the barrel of a gun."

In his explanation to the nation about this war, President Johnson stated:

There is the face of armed conflict—of terror and gunfire—of bomb-heavy planes and campaign-weary soldiers. . . .

The second face of war in Vietnam is the quest for a political solution—the face of diplomacy and politics—of the ambitions and the interest of other nations . . .

The third face of war in Vietnam is, at once, the most tragic and most hopeful. It is the face of human need. It is the untended sick, the hungry family, and the illiterate child. It is men and women, many without shelter, with rags for clothing, struggling for survival in a very rich and very fertile land.⁴

It is this third face of war that captures our attention as well as that of the enemy. It is the struggle for the population—their hearts and minds—in the heat of the Congo, the highlands of Peru, and the delta and other guerrilla-controlled areas of South Vietnam. The Communists go to great lengths to win the support of the population. Initially, they may do it by persuasion, to obtain food, medicine, and information. When the thing sought is not forthcoming, terror is introduced. Terror is a word that cannot be in our lexicon of experience, and we are only slowly learning the advantages that we and other Free World military forces can gain from civic action, psychological operations, and other techniques to forge a strong bond between the military and civilian sectors in areas of insurgency. The paramount goal of winning friends is contrary to the previous images that we have had about war. For centuries military objectives—key terrain, ports, and communication centers—have been the objectives of conventional wars. These have been replaced in importance today by the creation of human satisfactions, the quotient of accomplishments divided by the aspirations of the people. As these satisfactions increase or subside, our success in combating insurgency shows a corresponding change on the scale leading to victory.

To the military man, be he soldier, airman, sailor, or marine, the one face of war is that of armed conflict and terror. This form of conflict involves a vicious, highly motivated, and often highly disciplined enemy who moves in and out of the shadows, blending at one moment with the population of a village or a fleet of sampans, striking quickly and savagely a short time later from a well-prepared ambush. Terror also appears from the shadows. A sniper's fire from an impenetrable green screen suddenly causes a soldier on outpost duty to collapse slowly to the ground, the victim of a well-aimed shot. Or it may be the quick
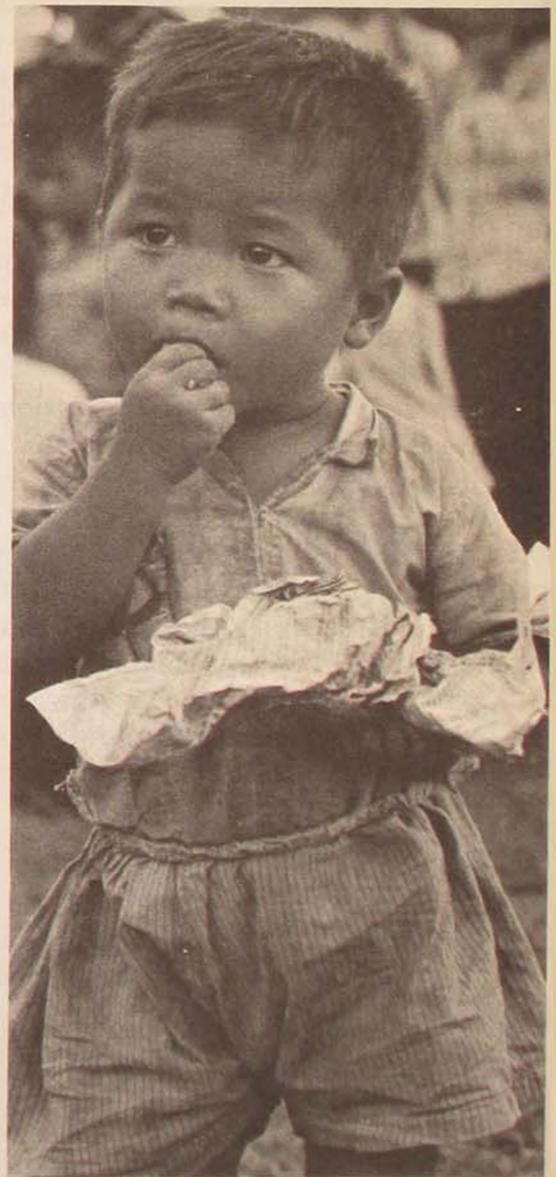
throw of a fragmentation grenade from a youngster as he rides by on his bicycle.

This face of war is also a war of movement: the pursuers and the pursued. Both may be sparring on foot with slow and agonizing progress, and then suddenly the pursuer is rapidly moved by air to blocking positions. It is a contrast in mobility that we have not seen in previous wars. It is a war in which we still employ basic military techniques and a balance of old and new weapon systems. Indian stealth, a talent now buried with our previous generations, must be revived. It is a war in which the Free World military man contributes to the psychological well-being of the terrorized by affording them security and by evincing a sincere consideration of their desire for peace, prosperity, and progress.

It is a war in which civilian policy-makers and military commanders grapple with the problems and frustrations of the same microcosm. At times, and at all levels, from Washington to the field of battle, they become one in devising intricate politico-military solutions and carefully integrating their efforts. In fact it seems that each sometimes forgets that he has a distinctive and separate role. Managing and commanding are not synonymous in a war requiring the utmost in flexibility and initiative at the scene of action.

To the experts in economic assistance—the economists, the agronomists, and the advisers on public safety, agriculture, and medicine—it is another face of war for them and their native counterparts to eliminate human deprivation and suffering. The Agency for International Development (AID) representative supports others to care for the victims of Viet Cong bombings, to foster the education of the next generation of leaders, to introduce new and more productive farming techniques, and to strengthen the undernourished and debilitated. At the village and province levels particularly, these economic warriors, like the soldiers, are in danger. In South Vietnam the Viet Cong are lashing out at any attempts of the Vietnamese and their United States and other Free World counterparts to promote economic and social progress. The bearers of this progress, both U.S. and Vietnamese, have be-

come priority Viet Cong targets. Agricultural stations have been destroyed and medical clinics have been burned. Over 100 Vietnamese malaria-prevention workers have been killed. A number of U.S. AID officials have been wounded or kidnaped.

To the diplomat, the junior political officer, and the public administrator, it is a war to establish and build a cohesive political framework that will provide stability, independence, and freedom for a beleaguered people. It is a war of patience to achieve political consciousness that would have challenged even the leaders of our own revolution; it is a war of counseling, not only horizontally between governments but also vertically from the ministers of government down to the smallest hamlet; and it is a war that requires the application of expertise at all levels of public administration. While victory begins to bud at the national level, the seeds must be planted at the "rice roots," where village chiefs, long the object of Viet Cong and guerrilla terror, have shown the courage and determination to stay at their posts and not accede to VC demands.

To the American people, it is a war in a period of continued domestic prosperity and progress. Yet it is a war calling for the use of our private resources, industrial know-how and ingenuity, and *moral support* for a people fighting for freedom from totalitarian control. No rationing, no "Victory" gardens, no massive war-bond drives are required; but the same vision, the same energy, and the same enthusiasm found during World Wars I and II are needed. We need Americans with an awareness of this changing world and a sense of duty to country. We do not need the ultra sophisticates who are willing to accept the benefits of citizenship but who include the burning of draft cards and prostrations before troop trains as manifestations of their intellectual nihilism. We need sons and daughters for the increasing demands of the Peace Corps in the less developed areas, who by their altruism and demeanor portray the fiber of their people, still in the midst of revolutionary and progressive change in their society. We need industry to be alert for new breakthroughs to assist in winning the guerrilla war on all fronts, eco-

nomic, social, and military. We need a coalescence of industrial effort in the less developed areas, aimed at developing greater popular support while denying to the Communist propagandists the utility of their clichés of "imperialism" and "economic intervention." We need more alert editors and writers who are sufficiently discerning and sophisticated to recognize the broad thrust of the conflict and our objectives and who do not succumb to the repetitious claims of Communist propaganda concerning "germ warfare . . . civil war . . . and American brutality and excesses."

In essence, the war involving Communist subversion and guerrilla warfare requires the participation and effort of everyone. It is not confined to the soldier and civilian in the combat area. It is not confined to one branch or agency of government or to one military service. *It is a job for everyone.*

THE EFFORTS at home and abroad are showing results. We and our allies have achieved and are achieving success in Vietnam and in other areas of the world. In Vietnam, for example, a VC takeover by military force alone is no longer possible. By aerial bombings, the Viet Cong are being kept on the run. The air strikes in North Vietnam are affecting the daily activities of the Hanoi regime and its people. The morale of the Viet Cong is deteriorating. They are alienating the people that they proposed to "help." Many are defecting, and some are defecting with their weapons and grenades. It is reasonable to expect that the Viet Cong may commit one of the greatest miscalculations in their tactical handbook—continued indiscriminate terror and coercion in the south. Lately they directed their effort toward disrupting the national election of the constituent assembly. Here too their actions backfired.

In Vietnam, successes are being achieved in other endeavors also. In agriculture, corn output in 1966 should quadruple the 25,000-ton yield of 1962. Pig production has doubled since 1955. A new variety of sweet potato has been introduced that may provide a sixfold increase in yield. In medicine, over 7,000,000 have been vaccinated against cholera. More than 12,000 hamlet health stations, built and stocked by the United States, are providing treatment to hundreds of thousands of Vietnamese. New clinics are being established throughout the country. In education, the future leaders of South Vietnam have not been neglected. More than 4000 classrooms have been built, and another 2000 will be completed within the next year. Enrollment in vocational schools has increased fivefold since 1955. In industry, the barren industrial south of the past contains more than 700 new or rehabilitated textile mills, cement plants, and electronics and plastics factories. A new industrial base is being created.

We cannot, however, rest on these successes in what may be a long and difficult period of war and reconstruction. The challenge is clear to all sectors of our population. It applies not only to the threat in Vietnam because Communist subversion, terror, and guerrilla warfare are being applied in other areas of the world against democratic governments and their peoples. Let me use the challenge to the military as an example.

Not long ago, I met a young American major who had just returned from a tour as an adviser with the Royal Thai Army. Previously he had served within the past four years as an adviser in Laos and in Vietnam. In the course of this duty he had made the effort to study the language and customs of the people and to understand their hopes and aspirations. He enjoyed his duty in Southeast Asia and wanted to return to South Vietnam, although he would be leaving a Thai bride of a few months. In explaining his reason for desiring to go directly to Vietnam and not return home he said: "We need a new type of Centurion, a man who is imbued with a zeal to help these people facing Communist terror while they are trying to progress. We must have military people who are willing to understand them and stay with them until the job is done."

Since this encounter, I have met many of his breed. Their sympathy for the plight of the Communist-oppressed in South Vietnam and in other areas of the world has caused

many to extend their tours of duty. Unknown to many of our citizenry, we are developing a new breed of military with far greater sophistication, understanding, and empathy regarding the counterinsurgency crusade than was required of our military in our previous conflicts. We need more of them. We need soldiers, sailors, marines, and airmen who are not only trained in the use of conventional weapons and tactics but who are wise and judicious in the application of thought and action in a world that has neither war nor peace. He must have an interest in cultures, languages, economics of development, the psychology, and the political rationale of whatever countries he is required to assist. He must be willing to appreciate and understand his military counterparts of the less developed states, the functioning of the society of which they are a part, and the role of the military in this society. He must learn the role of the military function in the less developed environments while our scholars are only beginning to examine this field. He must also be sophisticated enough to understand the role of psychological operations in support of U.S. national aims that supplement the aims of the country that he is assisting.

As with the man, our tactics and our weapons are not the last word. We have progressed in our study and application of counterinsurgency techniques during the past four years. New concepts and new weapon systems have emerged. We have gained a greater appreciation of the threat and difficulties inherent in the threat. But much still needs to be done, for our Communist opponents are learning from our ripostes as we have learned from them. We must not be satisfied with our progress. We must challenge, question, argue, and define. Are our conventional weapons and tactics adequate? Are new concepts that may be more efficient being examined? Can we improve upon our advisory techniques and increase the learning capability and the ultimate efficiency of the military in the Free World areas faced with potential insurgency?

We have only scratched the surface, yet we have a growing reservoir of experience in which new ideas and concepts have been tried

with success in battle on the ground, in the air, and at sea. We must not allow these lessons to be lost; we should exploit them to the fullest. Additionally, each day the scientific disciplines are producing new findings, physical and human phenomena, which have relevance for the new faces of war. We must be alert to discover, test, and apply these findings.

We need also to separate myth and reality. We cannot, for example, accept the proposition that conventional warfare techniques alone, though militarily competent, can succeed in gaining the hearts and minds of a population.

New considerations must be applied to our military art. Our focus, largely on the use of force after Communist insurgency occurs, must be widened to determine how best we can assist our allies in less developed areas to *prevent* Communist subversion and insurgency. We have usually found that our and their attempts to stop outbreaks of insurgency rest on very slender reeds. Political, economic, and social grievances are incapable of purely military solutions. Indigenous insurgent movements are only partially visible. All too often the national government's efforts to stop the insurgency are characterized by poor coordination and cooperation among the intelligence, police, and military forces that must meet the threat. Intelligence about the subversive movement is poor and not integrated. A diverse view of the seriousness of the threat often exists among the national leaders. While the military has the role of making a contribution to the national effort—of contributing to nation-building tasks—to alleviate major grievances during this volatile period, it must also ready itself for outbreaks of terrorism, mob action, and guerrilla warfare. Thus, we must develop new programs and techniques to assist in maximizing efficiency during this critical period. A broad preparatory base can be established for furthering the need for counterinsurgency efforts: the integration of police-military operations centers, of police-military quick-reaction capabilities, of communication systems, and of intelligence networks. With this integration, the response of the national government can be attuned to the degree of the threat ascertained from apprehended leaders of the move-

ment, *the conduct of raids*, and, if necessary, *the use of stronger military action*. Prevention, then, is of inestimable value. It avoids the major expenditure of manpower and resources at a later time when they would be devoted more usefully to national progress.

While the military must rise to new challenges, the same is true for the Foreign Service officer, the men from AID and the United States Intelligence Agency, others representing United States technology and industry in the less developed areas, and, last but not least, the American people. Within the next decade more insurgencies will occur. Many will be in the interest of obtaining freedom from totalitarian dictatorship and repression of individual freedoms. Others, of course, will be for the imposition of totalitarian rule. To these changes we must be ready to adapt, to assist or resist, and to be patient. As our President has said, "We live in a rapidly moving world. There will be new burdens and new challenges and we must respond with resourcefulness and responsibility . . ."[5]

The real way to counter an insurgency is to prevent it in the first place—here an ounce of prevention is truly worth a ton of cure. The faces of the new form of war today are the faces of the people, the free and the oppressed. The latter are the target for our will, our hope, our aid, and our patience. He who wins the people wins the war. A new Twentieth Century Centurion is needed to fight the insidious tide of subversive aggression spreading through the underdeveloped parts of the world.

Headquarters Command

Notes

1. Letter from President Eisenhower to President Diem, 1 October 1954.
2. Press conference statement by President Johnson, The White House, 28 July 1965.
3. "Political and Military Aspects of U.S. Policy in Vietnam," Department of State *Bulletin,* LIII, No. 1366, p. 345.
4. Address to the Association of American Editorial Cartoonists, The White House, 13 May 1965.
5. Remarks of President Lyndon B. Johnson, Department of State Auditorium, 5 December 1963.
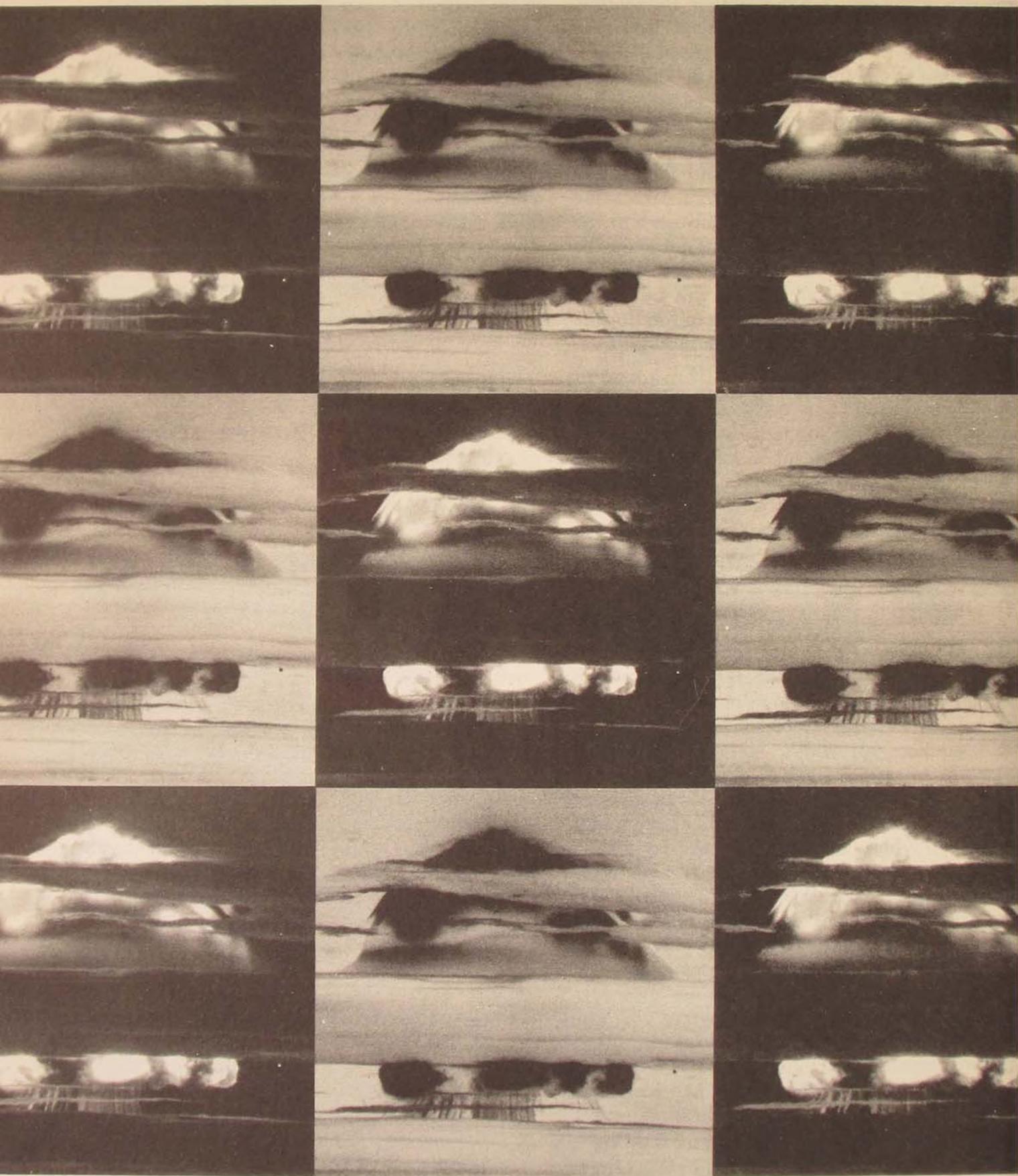
AMERICAN STRATEGIC THINKING

Major John W. Chapman, USAFR

STRATEGY "is a *method of thought . . . .*" So says, and rightly, General André Beaufre in *An Introduction to Strategy* (1965). Is there a single and unique method, one which the very nature of the subject imposes on strategic thinking? According to the General, the aim of strategic thinking "is to codify events, set them in an order of priority and then choose the most effective course of action." This definition has an unmistakably Gallic ring to it. For it invites toward a Cartesian clarity and is the product of a philosophical style of thinking known as "rationalism," the assumption of which is that through the grasp of concepts and principles the apparent disorder of our world may be comprehended and ultimately managed. Compare a typically American philosophy of strategic thinking expressed by Bernard Brodie in reviewing two of General Beaufre's recent books: "strategy being essentially the pursuit of success in certain types of competitive endeavor, a pragmatic approach is the only appropriate one." British strategic thought is perhaps best exemplified by the "historical empiricism" displayed in the work of Captain B. H. Liddell Hart. Russian thinking would appear to be influenced by the postulates of Marxism, and it is evident that Mao Tse-tung's writings and pronouncements are very much a reflection of his own experience.

These gross contrasts suggest that there is no one universally accepted method of strategic thinking. Rather there are various styles in strategic thought, each of which has its roots in philosophical tradition and historical experience. This is not to say, of course, that strategic thinking is arbitrary or undisciplined. Clearly it is disciplined and purposive thought, not scientific, strictly speaking, but obviously something more than an art. My purpose here is to identify and compare leading aspects of American strategic thought and to appraise their significance. I shall attend primarily, although not exclusively, to the works of Herman Kahn, Thomas C. Schelling, and Bernard Brodie, for their writings are of sufficiently extended nature to make possible a reliable assessment of the influence of style on substantive strategic recommendation. (Some contributions of The RAND Corporation, and of Albert Wohlstetter in particular, are examined by Bruce L. R. Smith in his *The RAND Corporation* [1966].) My hope is that by revealing such influence we may become more sensitive to the various dimensions of strategic thinking and more aware of the inescapable role of judgment in strategic decision.

I

First, let us consider Herman Kahn, who is perhaps the greatest strategic thinker of the twentieth century, our contemporary counterpart of Thomas Hobbes, the English political philosopher known in his own time as the "Monster of Malmesbury." Kahn, formerly with RAND and the founder and director of the Hudson Institute, is a Hobbesian not only in the quality and toughness of his thought but also, and more important, in that throughout his analyses there is an emphasis upon the present consequences of future insecurities. This is the theme which unifies Kahn's work and which is distinctive to the style of his strategic thinking. Some quotations from his leading work, *On Thermonuclear War*, will illustrate my thesis. He tells us that ". . . a nation is most likely to go to war when it believes it is less risky not to go to war." And later in the same book he says that "the fear of future instability caused by an insufficiently controlled arms race is so great and growing that it may create pressures for preventive war or other destabilizing moves." This perspective generates a strategic conclusion: "Independently of any

international crisis, the general pressure on all nations to control the spread of armaments and the technological race could put pressures on the Soviets to try to establish a world hegemony, pressures which the threat of the Minimum Deterrence forces might not be able to balk." Like Hobbes's men in the "state of nature," Kahn's nations look anxiously to the future and find it disagreeable; rational fear for their security drives them into mutually destructive action. Without a "sovereign" to guarantee reciprocity, there can be no peace, only competition.

In a world where future perils loom large in the calculations of statesmen, Kahn sought security and stability in the possession of a "Credible First Strike Capability" (CFSC). Only "Type II Deterrence" could deter the provocative and forestall competitive instability. The analogue here is with the Hobbesian sovereign endowed with sufficient power to curb the mutual terrors that infect all in the "state of nature." Kahn's belief in the efficacy of a CFSC accounts for his interest in "the explicit capability for increasing our strength very rapidly whenever the other side provokes us." Hence also his continuing advocacy of measures for active and passive defense; a credible first-strike capacity depends on being able to handle a retaliatory blow. More recently and more generally, Kahn has argued in his *Thinking About the Unthinkable* (1962) that "The pressures toward war are likely to be restrained effectively only if the fear of punishment is not diminished to the vanishing point."

As Kahn's confidence in the determination of the United States to maintain a CFSC has diminished, his concern for the irrationalizing consequences of persistent insecurity has increased. Reciprocal fear encourages "psychological and political pre-emption." Committal strategies become attractive as the impact of resolve in the resolution of crises intensifies. Rational behavior can be forecast; not so the irrational, which depends heavily on will, morale, and risk-taking. Kahn would assign top priority to study of the implications of the "arms race." We need a "really modern definitive study of the revolutionary routes to a radical change in international relations." Here

Herman Kahn

his preoccupation with the dangers involved in reciprocal insecurity is thoroughly Hobbesian, as is his insistence that only some form—in desperation, any form—of world government and order can provide an environment in which rationality may be expected to prevail. "A world armed with nuclear weapons would provide a fertile field for paranoiacs, megalomaniacs, and indeed all kinds of fanatics." Strategic instability foreshadows a politics of hysteria. To Kahn, instability promotes strategies based on the "rationality of irrationality," and the danger of "pre-emptive escalation" is ever present (*On Escalation: Metaphors and Scenarios* [1965]).

How best to deal with these anxieties that make for aggression? On Kahn's escalation ladder, "the more terrifying the upper rungs, the more all the thresholds are strengthened." His policy, as was Hobbes's, is to fight fire with fire; only a greater fear can prevent the lesser from driving men into panic. And given a fear that restrains, reason recovers influence. According to Kahn, "the U.S. should be willing to adopt the concept that the only purpose of nuclear weapons is to negate nuclear weapons, and make it national policy not to use nuclear weapons first, but only in retaliation for use by some other nation." We have come a long

way indeed from reliance on a CFSC. "The restraints on the outbreak of large-scale violence in nuclear war are . . . chiefly intellectual, ethical, or doctrinal ones." Kahn looks to a future in which we may "find a strategy or tactics competition complementing the technological competition, and partially substituting for it." Political and diplomatic activity, either routine or inspired, cannot resolve the tensions generated by strategic insecurity; "in the absence of war or crisis, a general political settlement is itself most unlikely," according to Kahn's "Strategy, Foreign Policy, and Thermonuclear War" in Robert A. Goldwin (ed.), *America Armed: Essays on United States Military Policy* (1963).

This brief survey of Herman Kahn's leading ideas is sufficient, I think, to show that while his strategic posture has evolved or changed, the style of his strategic thinking has not. The latter is thoroughly consistent and unified, its consistency and unity depending upon his Hobbesian political presuppositions. Kahn understands that a great and fundamental purpose of political activity is the provision of security and further that human rationality itself depends directly upon the achievement of security. This was Hobbes's message, and Kahn has brought it home to us once again with a force and clarity worthy of the master. In this light, strategic analysis and thought in a context of competitive insecurity can at best buy time. Time for what? For survival. Political effort cannot be expected to reach a solution for the problem of insecurity. Neither a politics of bargaining nor a politics of incrementalism can lead to world order. Moreover, insecurity irrationalizes; persisting anxiety means political irresponsibility and places a premium on strategic resolve. Kahn is forced to entertain the prospect of an apocalyptic transformation of the world's political structure, triggered by the intensification of terror to an intolerable degree. In the meantime, with the passing of CFSC we may stave off general war with intelligence and the cultivation of restraints—not forever, but only for a time.

In my opinion, the important thing to notice about Kahn's strategic concepts is that they are firmly based upon a classical insight into the nature of political activity. He does not offer an abstract definition of strategy as does, for example, General Beaufre, who says that it is "the art of the dialectic of two opposing wills using force to resolve their dispute." Rather, on the basis of his conviction that the perception of future danger energizes men to self-defeating and ultimately irrational competition, Kahn proceeds to explore the alternatives logically, quantitatively, and comprehensively. And the outcome of his analyses is preordained. Given his basic presumption about the nature of political activity, there can be no escape from insecurity and consequent irrationality in strategic effort. There is no purely strategic solution to our predicament; only a political solution is adequate, imperfect though it may be. Ultimately only freedom under law, the Western ideal, will suffice. Note also that no moral solution can serve as a substitute for a politically organized society, world-embracing. Morality, in the form of tradition and courage, can help to buy time by supporting restraints; reason and experience both suggest that it would be unwise to ask for more. Kahn's commitment to the liberal tradition of the West is shown by his belief that only through enforceable law can security be provided and rationality sustained. Kahn's style of strategic thinking is rooted in Western political theory, and his "grand strategy" is a projection of the political experience of the West. Perhaps his critics would do well to recall that the "Horror on the Hudson" is a Hobbesian to the core!

II

Compare now with Kahn a thinker who comes to strategy from economic theory, Thomas C. Schelling, whose strategic thinking is characterized by an emphasis on uncertainty. Uncertainty, not insecurity, which is the dominant note in Kahn's thinking. Schelling sees strategy and military activity as comparable to oligopolistic bargaining, the outcome of which is theoretically indeterminate and hence fraught with uncertainties: "The fact of uncertainty—the sheer unpredictability of dangerous events—not only blurs things, it changes

their character. It adds an entire dimension to military relations: the manipulation of risk." (*Arms and Influence* [1966]) Here an insight derived from economics is used to illuminate strategy and to unify and give a distinctive style to Schelling's strategic thinking. If Kahn is a Hobbesian, it is perhaps no less appropriate to link Schelling with Machiavelli, but not because he is Machiavellian; rather Schelling tends to think somewhat abstractly, to concentrate on the discernment of principles, those which apply in the manipulation of risk against the background of strategy conceived as the "diplomacy of violence."

Comparison of Kahn and Schelling suggests that an emphasis on uncertainty, as distinguished from insecurity, does tend to place certain possibilities in a rather different light. One of Kahn's central strategic conceptions is that the danger of general war imposes restraints further down the "escalation ladder." Schelling's "bargaining" orientation raises a doubt, or at least a question, here. He says that "a main consequence of limited war, and potentially a main purpose for engaging in it, is to raise the risk of general war." Surely here emerges an issue of the first importance on which different styles in strategic thinking bear divergently. Does the prospect of destruction sober men and operate to sustain their rationality, or does it enable the reckless to exploit the rationality of others? We have no conclusive empirical evidence on which to rely in facing this question. Apparently for Kahn the possibility of general war functions as a sort of impersonal sovereign threatening each and all with destruction for deviation from rational behavior; it is in the main a stabilizing influence. For Schelling, however, this possibility offers an opportunity—"potentially" at least—for deliberate use of danger and risk; resolve can be exerted to extract advantages from the more rational. Thus risking becomes integral to bargaining, and rationality is placed on the defensive. In such a situation, lacking in theoretical stability, attention naturally turns to psychologically grounded restraints in the form of established thresholds and to precedents that may have arbitrary, legalistic, and traditional dimensions. Strategic conduct becomes a proc-

ess in which principles derived from Gestalt psychology are applicable, principles that indicate or govern the modes in which implicit negotiation works and which suggest points at which restraints may be expected to hold or to give way. Such considerations are of more than merely speculative interest in view of the "past dynamic tendency toward unrestrained war," revealed in the analysis of World Wars I and II by George H. Quester (*Deterrence before Hiroshima: The Airpower Background of Modern Strategy* [1966]). Even if the difference between Kahn and Schelling is only a matter of degree, it could be extremely important for the appraisal of our strategic environment. The precariousness of the situation will inevitably influence strategic decisions, and here cautiousness could be as dangerous and provoking as its opposite. Misestimation of the strategic balance may lead us to "recalibrate evaluations" (Fred Charles Iklé, *How Nations Negotiate* [1964]) or may invite "strategic deception" (Arnold L. Horelick and Myron Rush, *Strategic Power and Soviet Foreign Policy* [1966]).

Consider now the bearing of these ways of thinking upon the nuclear-conventional distinction. Here emphases upon insecurity and uncertainty produce more nearly convergent results. In Kahn's perspective, so long as there was the probability of maintaining a Credible First Strike Capability, it seemed pointless to reinforce this threshold. Once this possibility has gone, then he comes out for a "no-first-use" policy, and this alteration in posture is fully consistent with the essentials of his strategic philosophy. On the other hand, Schelling, thinking of strategy in a "bargaining" perspective and convinced of theoretical indeterminacy, would strengthen this threshold and so seek to preclude the use of nuclears in exploitative strategies. Moreover, to him the very introduction of nuclears will alter "the environment of expectations" in an unfortunate and irreversible manner: what has happened once people will expect to happen again. But psychological restraints, even if well founded and respected, would seem to offer only fragile protection. Miscalculation is always possible and, without restraints in depth, could lead to fatal escalation. Quester argues that a factor "per-

Thomas C. Schelling

haps increasing chances of dangerous miscalculation in the atomic age, is the degree to which the nuclear-conventional distinction has become the principal focus of qualitative restraint." Here emerges what I would describe as a case of strategic perplexity. Considerations of both insecurity and uncertainty point toward the retention of the nuclear-conventional distinction, and yet its worth may remain in doubt, for, once it is breached, there may be no stopping point, unless indeed Kahn is correct about the restraining effect of the threat of general war. Other styles of thinking may put the whole question of the distinction in a new and different light, as we shall see in our examination of Bernard Brodie's strategic ideas.

I do not wish to exaggerate the differences between Kahn and Schelling. For it is clear that Kahn has come to view military activity under a stable balance of terror as a form of bargaining and has also come to give greater weight and value to attitudes as the foundations of restraints essential in the working of a strategy of deterrence. There is much upon which he and Schelling would appear to agree, and this is reasonable, for analyses based upon insecurity and uncertainty may usually be expected to support one another. Still there are at the very least nuances that should not be overlooked and possibly dimensions that de-

serve further exploration. Future insecurity and present uncertainty are not the same thing, and measures or prognoses based on the one need not logically flow also from the other. Notice that in Kahn's view it is the prospect of future greater insecurity or risk that is likely to determine a nation upon war; men look ahead and their vision of the future shapes their present action. Schelling seems to make uncertainty the prime motive for war; not diffuse anxiety but specific danger governs. "The premium on haste—the advantage, in case of war, in being the one to launch it or in being a quick second in retaliation if the other side gets off the first blow—is undoubtedly the greatest piece of mischief that can be introduced into military forces, and the greatest source of danger that peace will explode into all-out war." In this sort of situation, in which there is pressure of an intense kind on each side to pre-empt, it may not greatly matter whether analysis runs in terms of uncertainty or insecurity—both are clearly present. What is of interest, however, is that Schelling's temporal horizon seems much nearer than Kahn's; it is the clear and present danger that moves to action, whereas for Kahn the relatively remote is always gnawing at men's minds. Intuitively one senses that this kind of short-run uncertainty and insecurity could be dealt with more easily—perhaps because of the effectiveness of hardening and dispersal, now demonstrated—than the sort of insecurity which pervades Kahn's analyses and seems impervious to any attempt at solution other than political.

Some additional light, not much, may be thrown on the styles of thinking here under scrutiny by turning to other issues. Credible First Strike Capability would appear to be a destabilizing force, and as such one which Kahn could not ignore. How does he handle this? He remarks in *On Thermonuclear War* that "the main destabilizing effect of Type II Deterrence can be handled in part by not keeping the first strike forces on alert." This would seem satisfactory from an American point of view and appealing to one who places his faith in Hobbesian sovereigns. But could one expect the opponent to accept a position of lasting strategic inferiority?—the Russians do not ap-

pear, in the recent past, to have been willing to do so. Here one feels that Kahn's politico-strategic philosophy may have led him into wishful thinking, rather rare for him. Above all one feels that Kahn would avoid, if possible, getting into a situation where the "bargaining" aspect of military activity and strategy becomes prominent. And this is certainly consistent with his basic political and strategic outlook that the "prudence instilled by fear" (Klaus Knorr, *On the Uses of Military Power in the Nuclear Age* [1966]) depends on the magnitude of the fear.

Kahn, more than any other thinker, has pressed the desirability of having effective civil defense, both active and passive. Initially it was fundamental to the possession of CFSC. More recently, he has urged civil defense, on the ground that it could make the difference between losing or not losing our society and ideals. On the other hand, Schelling argues that "sheltering" would be a "dramatic signal"; but he does concede that it could be "graduated." Conceivably each side could take steps to protect populations without triggering the other, provided that the necessary understandings were arrived at. Still Kahn exhibits continuing belief in the desirability of being able to increase one's defensive strength quickly. Instinctively he seems to yearn for ways in which to restore the force of rational calculation and reduce the influence of factors such as resolve and capacity for risk-taking and so to eliminate so far as possible from the strategic equations the element of uncertainty. For to him, a co-incidence of insecurity and uncertainty can only prompt toward explosive escalation or pre-emption.

A style of thinking which emphasizes uncertainty may not diverge often from a style which emphasizes insecurity, but the divergence could be crucial for strategic calculation. Further comparisons, and further analysis of the various forms of uncertainty, may well be in order if we are to grasp fully the various dimensions of strategic thinking. Consider that, in a world based on a firm balance of terror, uncertainty might well decline in importance. Insecurity would also likely decline, but one suspects not as much. For, as Quester says, the very stability of such a world might lead

or tempt to "daring ventures." And against these, only disciplined imagination might prove effective.

III

Bernard Brodie is a strategist whose style of thinking differs significantly from those exhibited in the works of Kahn and Schelling. Brodie describes himself as a "pragmatic" thinker and derides the "romantic" and "mechanistic" and other deficiencies which he detects in the writings of others. By comparison with Kahn and Schelling, Brodie seems inclined to regard the world as not so pervaded by either insecurity or uncertainty as they would have it. In his perspective the relevant alternatives narrow down sharply. We are indeed in a difficult and dangerous situation, but situations have a structure to them, which is open to historical and analytical investigation; we can, as we have in the past, think our predicament through. Brodie's concern with the structure of the political and strategic environment derives possibly from his background in political science; analysis in that field typically runs in terms of the shaping influences which the structure of an institution exerts upon its constituent processes. In this connection, perhaps one should notice also his earlier work, *A Guide to Naval Strategy*, naval strategy being an area of strategic thinking which is peculiarly responsive to reflection that is styled structurally. In any event, Brodie is resolutely empirical, looking hard at the given and specific situation, manifestly reluctant to drift off into conceptual speculation; it helps in differentiating him from other strategic thinkers to stress his sensitivity to the structural aspects of strategic confrontations. He exhibits a bracing suspicion of the abstract, of thought that moves on rails of principle—he once said that the classical principles of war are little more than refined common sense—and of the overly sophisticated. Compare his reference to "the marvelous clarity of the choice between nonwar and destruction" (in *Escalation and the Nuclear Option* [1965, 1966]) with talk of "thresholds," "bargaining," "escalation ladders," and the like.

In this study Brodie argues that there has been a "crucial change" in the "general strategic environment." A stable balance of terror has been reached at the strategic level, and his evaluation of this development does differ interestingly from those of Kahn and Schelling. "Unless we are dealing with utter madmen, there is no conceivable reason why in any showdown with the Soviet Union appropriate manipulations of force and threats of force, along with more positive diplomatic maneuvers, cannot prevent deterrence from failing." Strategic stalemate implies, of course, that "Type II Deterrence" is gone. "It is a fairly safe prediction that from now on neither side will be able seriously and convincingly to use for political ends threats of strategic nuclear attack, or anything that in scale is even close to it." What are the implications of strategic stalemate?

According to Kahn in *Thinking About the Unthinkable*, "If (or as) the balance of terror becomes more stable we can expect to see more study and discussion of the theory and practice of Controlled Reprisal and Controlled Counterforce." And further, "as the balance of terror becomes more firm . . . it is likely that explicit and implicit bargaining, negotiation, and a crude kind of adjudication by 'world opinion' will become the rule in whatever peaceful adjustments of U.S.–Soviet interests actually occur." It would seem that a condition of stalemate makes possible a sort of politics by means of which adjustments may be achieved. Although the possibility of general war is greatly diminished, Kahn envisages, in *On Escalation*, more limited and more esoteric forms of struggle: "Many strategists believe that reciprocal-reprisal wars of resolve may be a standard tactic of the future when the balance of terror becomes firm and absolute." In these statements one feels again the force of Kahn's conviction that in the absence of world law men are bound to resort to violence. For Kahn, paradoxically and not inconsistently, to remove the restraining danger of escalation to general war is to open the way for violent displays of resolve; a sort of military politics comes into being, based on nuclear threat and attrition; the resolute will have their way. This diagnosis seems consistent

Bernard Brodie

with his earlier statement in *On Thermonuclear War*: "The possibility of escalation and eruption makes it unlikely that either side can afford to try to gain a very important or clear-cut victory in a limited war with nuclear weapons." Once the restraint imposed by vast danger is gone, one must look to the kinds of psychological restraints about which Schelling has written so eloquently. In particular, nuclear strategic stalemate would seem to imply the desirability of preserving and reinforcing the nuclear-conventional distinction. As we noticed earlier, Kahn has come out for a "no-first-use" policy. If no one has the power to maintain order, then we must make do with the restraints that are available and so far as possible minimize the extent to which displays of provocative resolve can be effective. Politics in such a world cannot be entirely civil, of this there can be no doubt. Without the constraints of convention, politico-military activity—the new form of politics that would emerge in an armed, stalemated, and unordered world— could be very ugly indeed.

Compare Brodie's appraisal of the implications of nuclear strategic stalemate, especially his position on the use of tactical nuclear weapons in *Escalation and the Nuclear Option*. To him strategic stalemate means tactical freedom, and he suggests that "the use or threat of use of tactical nuclear weapons may often be counterescalatory." Contrast this position with his former argument, in *Strategy in the*

Missile Age (1959), that "between the use and non-use of atomic weapons there is a vast watershed of difference and distinction, one that ought not be cavalierly thrown away, as we appear to be throwing it away, if we are serious about trying to limit war." Apparently Brodie has had occasion to change his mind on this issue. It should prove instructive to see why, especially so since Kahn, and presumably Schelling, continue to be so cautionary.

A number of considerations seem to influence Brodie's stance on tactical nuclears. If any one consideration is decisive, it is his belief in strategic stalemate: there can be no general war. And this circumstance of itself offers encouragement to the provocative and the aggressive, those who would escalate, not to the top rungs of the ladder, to be sure, for they are gone; rather up the ladder for political advantage. Some such nations can be deterred, and safely so, by the threat to use, or the actual use of, tactical nuclear weapons.

In Brodie's analysis in "What Price Conventional Capabilities in Europe?" (Henry A. Kissinger, ed., *Problems of National Strategy* [1965]) there are secondary and supporting points. "I see no basis in experience or logic for assuming that the increase in level of violence from one division to thirty is a less shocking and less dangerous form of escalation than the introduction of any kind of nuclear weapons." If there is force to Schelling's psychological observations, one cannot help wondering at this statement. It seems hardly persuasive or compelling, unless all the concern with qualitative differences in thresholds is wildly misconceived. Still Brodie's appraisal is consistent with his style of strategic thinking, with his focus upon the structure of the situation, as distinguished from the way in which the use of nuclears would stand out. If it is structure that counts, i.e., the relations of the adversaries, then one can ignore the subleties of psychological restraints. Indeed, their introduction only serves to blur the realities, appreciation of which is at the foundation of rational calculation.

Further, Brodie would appear to be distrustful of the more fancy, or fanciful, strategic conceptions; and he is rather more confident than many that the intentions of potential enemies can reliably be interpreted and forecast; politics is a less volatile activity than many are tempted to think; speculation about the use of resolve is no substitute for study of an opponent's character and characteristic ways of behaving. Still an enumeration of considerations would not seem to exhaust Brodie's analysis fully or to convey the full force of his argument. And this is the point that I should like to emphasize. It is his style of thinking that brings Brodie to suggestions, if not conclusions, that diverge from the recommendations of other strategists.

Brodie does not rely upon a crucial political insight to guide and unify his strategic thinking, nor does he brilliantly illuminate by exploring the analogy of war and oligopolistic bargaining. His method is to begin with direct analysis of the situation confronted; this sensitizes him to changes in the strategic environment, as he calls it; this in turn would seem to prepare him to place greater confidence in the possibility of forecasting political behavior, in estimating the pressures of codes and character in a situation. Here I would contrast Kahn's assumption that political behavior is likely to be irrational, the more so when persisting insecurity is present, and his assumption that the irrational cannot be forecast. In this perspective, any confrontation is likely to seem more precarious than it would appear to Brodie. Contrast also Schelling's emphasis on uncertainty, derived from his conception of military and strategic activity as dynamic processes containing their own inherent tendencies. Brodie would seem to be saying that the very structure of a confrontation imposes constraints upon the political and military processes that go on within it, including those human responses that would be called irrational. Stability need not be premised on the presence of a dominant and dominating power, as Kahn would have it; nor need stability be tied to the kinds of mental processes revealed by Gestalt investigation. Ultimately what is at stake among these thinkers is a theory of the requisites of political civility and order. Their ultimate political beliefs govern their styles of strategic thinking, and these styles influence, if not govern, their strategic appraisals.

IV

According to Henry Kissinger (in "Editor's Conclusion" in *Problems of National Strategy*), "national security policy is not primarily a technical problem, but a challenge to political understanding, and ultimately, to philosophical insight." Political theorists and philosophers differ over the ways in which it is profitable to think about ourselves and to investigate our environment. And so, too, do our strategic philosophers. They all have styles, each one of which is powerful and illuminating, and perhaps also constricting. Need we choose among them? I think not. For strategic thinking is the meeting point of political and economic theory, and strategic principles must partake of both. But principles do not apply themselves; application is an operation of judgment, and this requires an understanding of the environment in which they are to be applied. We need not choose among styles of thought; rather we should be aware that there are various dimensions to strategic thinking, no one of which may with impunity be neglected.

Kahn's way of thinking is grounded in the political principle that men require security in order to be rational. No enduring security may be had other than through politically organized society. Hence Kahn seeks to impress upon us the inherent limitations of strategic thinking. Instability will not finally be banished until mutual suspicion and fear are removed; and to banish these, law and sovereignty on a world basis are essential. Schelling seems more concerned with the destabilizing effects of the uncertainties involved in bargaining, and he builds his thinking on the foundations of economic and psychological theory.

The pragmatic Bernard Brodie would fix our attention upon the actual situation that we confront. Theories generate principles, and situations have structures. Both sorts of consideration are fundamental, but in different ways. Without principles, we lack direction; without a map, directions lose their meaning. "Strategic principles" there are, but they can be misleading without a grasp of the "strategic environment."

Brodie's environmentalistic way of thinking seems particularly relevant to gauging our present relations with the Soviet Union and Red China. It reminds us how a sudden attempt to alter the structure of the strategic environment can be immensely destabilizing. For instance, in *Escalation and the Nuclear Option* he says: "The essence of President Kennedy's case against the Soviet missiles in Cuba was . . . that they represented a sudden change in the status quo of military power . . . ." And it suggests that disregard of the real relationships obtaining between two nations can encourage escalation: "If the Chinese should manage to fight two wars with us during the first three or four decades of the nuclear age without suffering exposure to a single nuclear weapon, we will have fixed for them a pattern which they have every further incentive to exploit." These are impressive insights, and ones which flow directly from Brodie's concern with structural relationships. But they should not lead us to underestimate the significance of the principles formulated by Kahn and Schelling. Situations alter; principles endure. We have styles in strategic thinking; the challenge is mastery of its dimensions.

Pittsburgh, Pennsylvania

THE ANALYSIS MYSTIQUE
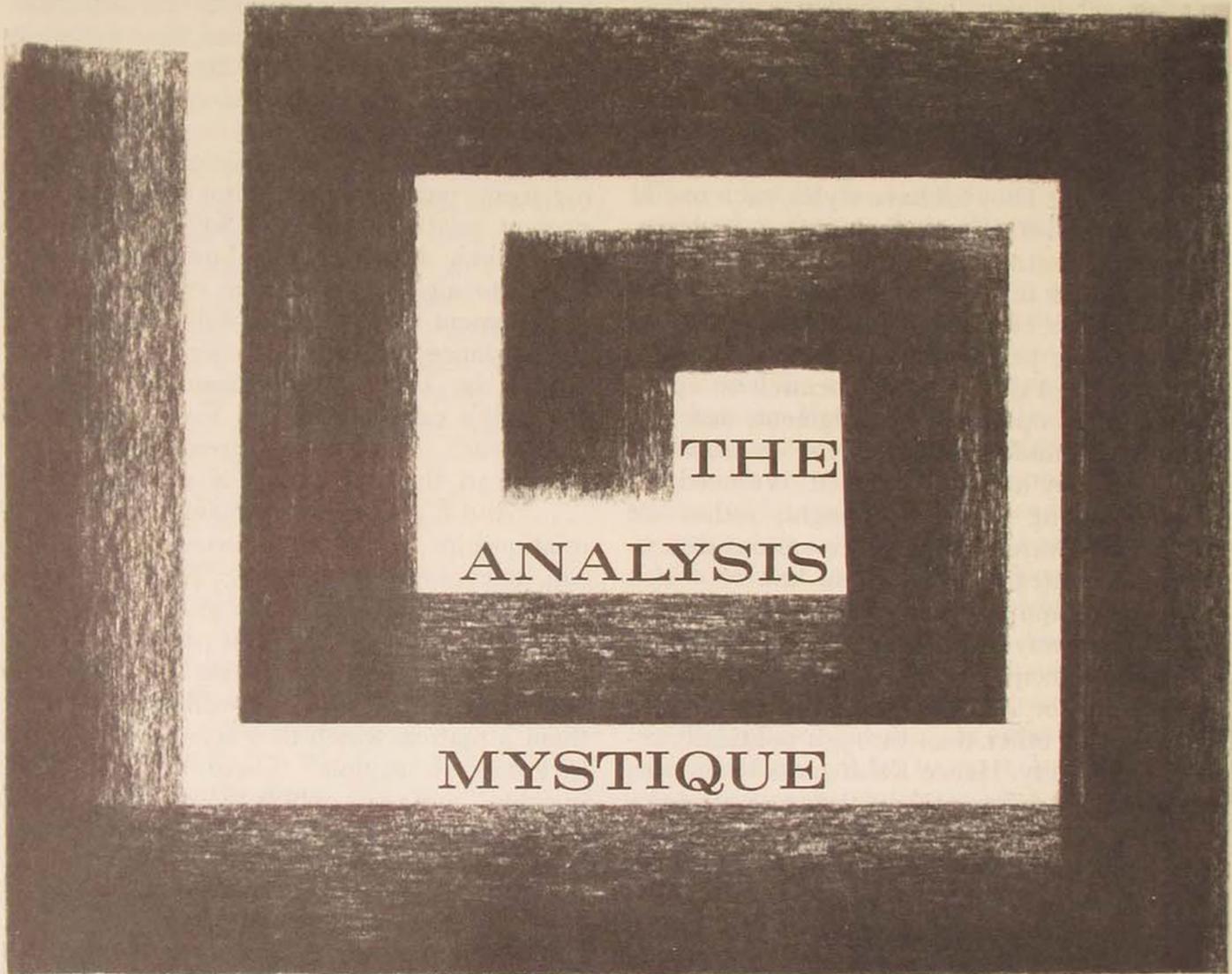
MAJOR WILLIAM M. HENDERSON

THE WORD "analysis" in recent years has become a status symbol in the services. A commander feels naked without a special staff group to do analysis. No self-respecting staff officer would write more than a paragraph without using the word at least twice—especially when replying to a proposal from a subordinate organization—". . . a thorough analysis of your proposal reveals that it is neither practical nor feasible. . . ."

Every year hundreds of officers in the professional military schools write theses that use our favorite word in the title. Everything from "An Analysis of Civil-Military Relations and Defense Decisions" to "An Analysis of the United States Army's Enlisted Assignment System." Yet how many of them—and how many of you—could adequately define what is

meant by "analysis"? Must this word forever suggest an elusive, ephemeral concept? I think not.

And yet, if you have done any reading lately in the literature of analysis—management science, decision theory, operations research, systems analysis, etc.—you may have concluded, as I have, that like most specialists the analysts have difficulty communicating with us laymen. Of course some of the recent articles in the *Air University Review* on this subject have been notable exceptions.

The purpose of this article is to propose a structure for commanders and staff officers to use to evaluate the analysis capability available to them. The mystique which surrounds the analysis function is born of the multitude of charts, graphs, formulas, and computer models that seem to equate to "scientific" analysis. These complexities conceal more than they reveal about the quality of an analysis. For analysis—I almost said "in the final analysis"! —is nothing more than thinking very carefully about something. The commander or staff officer is going to have the greatest success using the analysis capability available to him if he recognizes it as an extension of, not a substitute for, his own thinking.

For all the controversy it has aroused in recent years, analysis is as innocuous as motherhood. If we rule out clairvoyance and slavish adherence to the Holy Writ of published directives, the only process left for arriving at decisions is—you guessed it—analysis. For analysis includes everything from the simplest application of common sense—"Should I take my raincoat today?"—to the most complex mathematical formulation imaginable. Indeed, it is really quite ridiculous to argue for or against analysis. The only argument—and it is an essential one—is over the proper degree of precision. One of the toughest decisions for the conscientious manager is determining an appropriate degree of precision for each analysis. It is ridiculous to contemplate using a complex mathematical computer model of rain probabilities based on weather statistics to make the raincoat decision. But it would be just as ludicrous to contemplate deciding whether or not to produce the B-70 bomber by merely thinking about it for a few minutes.

Finding the appropriate depth in this bottomless sea of analysis is probably the most critical function of the manager-commander. As captain of the good ship *Analysis,* he should not abdicate this function to his crew of analysts. Rather, the decision should be a joint one. The captain can intelligently use the talents of his crew and evaluate how well they perform their tasks without being able to repair an engine or operate a sextant. Similarly, a manager can intelligently use the talents of his analysts without being proficient in the techniques of linear programming, multiple regression equations, or Markov chains. Naturally, the more he knows about these techniques, particularly their limitations, the better. What he must have, however, to evaluate the product of analysis properly is a clear picture of what characterizes good analysis.

For what it is worth, here is a layman's guide to evaluating analysis. First, there seem to be four characteristics of any good analysis of a complex problem: (1) a systems approach, (2) use of an interdisciplinary group, (3) the scientific method, and (4) the explicit treatment of uncertainty.

the systems approach

In recent months interest has been widespread in attempts to apply the systems approach to analysis evolved by the aerospace industry and the military to social problems at all levels of government. Problems such as urban transportation, medical care, waste management, education, water pollution, and government information systems are being scrutinized by the systems analysis teams of the aerospace industry. A recent article in *Aviation Week* pointed out that one of the primary problems in this effort was the tremendous communications gap between engineers and state administrators: "Contributing to this gap is the lack of any agreed upon nomenclature and definitions for the process of systems engineering and its associated functions of systems analysis or operations research." Let me try to bridge this communications gap by offering a definition.

What is a system? Try this definition on any "system" you know: A system is a collection of elements defined for a specific purpose. That should fit your circulatory system, the California transportation system, or the F-111 weapon system. So maybe it is useful—even if you won't find it in Webster's *New Collegiate* or AFM 11-1.

But why a "systems" approach? The good

tual creation of man's mind. For example, if I mention the Pacific Command intratheater airlift system, it undoubtedly conjures up some mental picture of what that system includes. If my purpose in defining that system, however, were to determine its maximum cargo-carrying capacity, I might include the aerial port facilities, crew manning, aircraft maintenance, aircraft characteristics, etc. If my pur-
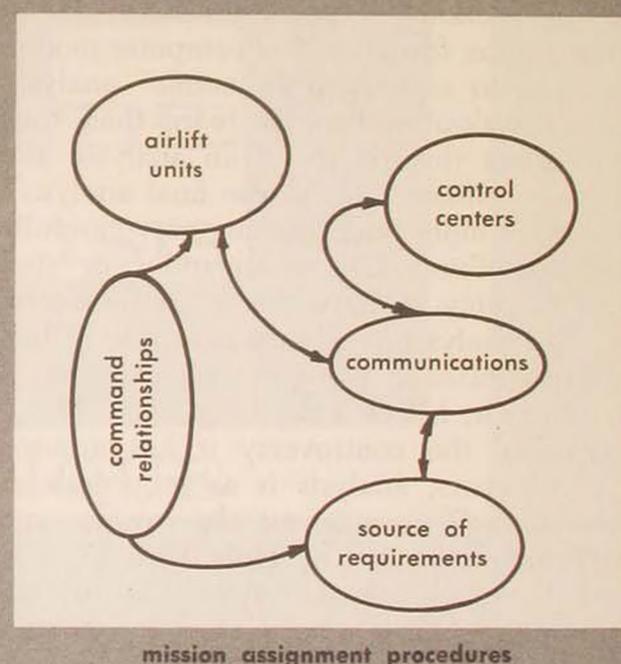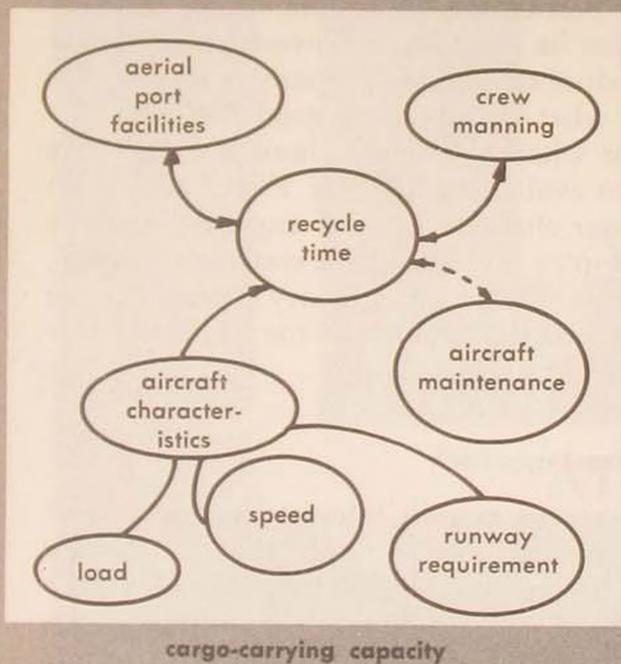

Figure 1. Which is the real PACOM intratheater airlift system? Either or both! A system does not exist until it is defined by someone for a specific purpose.

analyst recognizes the necessity of carefully defining the *set* of things he is interested in and their interrelationships. When he draws a box around his "system," its parameters are determined by his purpose. We often speak of "a system" as if it had an entity all its own. This is a mistake. Every system is a concep-

pose were to determine the optimum method of assigning missions, the definition of my "system" would be quite different: now the important elements would be the operations control centers, communications, command relationships, etc.

The systems approach suggests one other

important concept: every system is a sub-system. This sounds like double talk, but it is not. My circulatory system can be a system for a given purpose, yet it is a subsystem of my body, which is a subsystem of all Air Force officers, etc., ad infinitum.

A good analysis, then, starts with a careful definition of the system under consideration. To make them manageable, most systems so defined must be limited in scope. A proper question for the manager to ask when evaluating an analysis is, "Have any critical elements been omitted?"

the interdisciplinary group

The old saw that two heads are better than one—unless they are on the same person—certainly holds true in analysis of a complex problem. In the Department of Defense today it is not uncommon to see a study group composed of a political scientist, an economist, a mathematician, a sociologist, and several military officers of varying backgrounds. Why is such a diverse group desirable? Doesn't this diversity make consensus more difficult? Let me take these questions one at a time.

First, to consider adequately all aspects of any broad question of national security, one needs a wide variety of knowledge. No single discipline, and certainly no single individual, can possibly have the necessary breadth and depth of expert knowledge in all these fields. But there is another even more important reason why almost any analysis—even those at the "working" level—will benefit from a diverse group: the difference in viewpoint. A military officer with a background in operations sees a problem quite differently from one with a background in personnel, or supply, or transportation. Each member of the group should realize that his viewpoint on the total problem, not just his specialty, is desired.

But what about achieving consensus among such a diverse group? That is a natural concern. In any bureaucracy, most groups are composed of individuals with vested interests and prejudices. The product of such groups is usually less than the sum of the parts—a watered-down compromise at the lowest com-mon denominator of agreement. No wonder that the average military officer's reaction to convening a group for any reason is "Boy, that's all I need!"

The analytical group should be poles apart in mental attitude from this "committee action" approach. Conflict of ideas should be encouraged; it is the yeast that makes the group product rise above the sum of the parts. The manager must encourage, particularly in the group leader, an attitude that creates this stimulating atmosphere. At the same time the manager, the group leader, and the participants must be conditioned to expect considerable groping and several false starts. These are normal at the beginning of any analysis of a complex problem.

the scientific method

The term "scientific method" has become a synonym for an investigative technique involving painstaking measurement and experimentation. This is unfortunate. No scientist would claim that there is any standardized method by which he arrives at answers, but all would agree that there is a manner of *thinking about* a problem which separates scientific from nonscientific methods. What characterizes this way of thinking?

First, it is inquisitive. Nothing is taken for granted. All assumptions are carefully scrutinized. No unquestionably right sacred cows are admitted to exist. What most men commonly accept as immutable "truths" the scientist recognizes as human theories. As such, they are subject to the limitations in human ability to perceive, interpret, and report what we experience. Therefore they are always subject to modification.

When Einstein began his investigations into the nature of matter and energy, he undoubtedly did not set out to disprove Newton's theories. Luckily for the advancement of science, however, he did not feel constrained to make his own theories completely consistent with those of Newton.

Rudolf Flesch, in his very useful book *How to Write, Speak and Think More Effectively,* put it this way:

The scientist lives in a world where truth is unattainable, but where it is always possible to find errors in the long-settled or the obvious. You want to know whether some theory is really scientific? Try this simple test. If the thing is shot through with *perhapses* and *maybes* and hemming and hawing, it's probably science; if it's supposed to be the final answer, it is not.

Second, the scientific way of thinking is objective. The scientist respects only investigation that is bent on discovering true cause and effect. He has little patience for the specious joining of effects to causes that is practiced by the bigots, the fire-breathing zealots, and the advocates of whatever stripe.

Complete objectivity among military officers or any other group in our society is rather rare. The heroic image, the legendary figure, is the one who fights valiantly for his beliefs, come what may—the Billy Mitchells, the Curt LeMays. Indeed, the rewards for complete objectivity are not great. An Air Force general who advocated the Navy's Polaris weapon system during the late 1950's would have been putting his neck in the noose. How many Navy admirals championed the B-36 a decade earlier? Possibly this explains the impatience sometimes shown by military officers with the scientist who refuses to make categorical statements, to "take a stand" and defend it. The scientist has long been disciplined to distrust the doctrinaire and dogmatic answer.

None of this, however, suggests that the scientist and the military officer are in opposing camps. Indeed, most military officers have had considerable scientific training. The intent here is merely to suggest that we should expect to have difficulty in finding support in scientific analysis for some of our views that are born at least partially of such homely virtues as patriotism, pride in our service, and belief in air power.

Finally, the scientific method is reproducible. Development of a new scientific theory that stands the test of time is a painful process. Every scientist knows that he must ultimately expose his theory to the scientific community in some form. Therefore, he takes great pains to record his process of investigation, his assumptions, his measurements.

The measurement process, in this age of mechanized information, can easily be overdone. Several planeloads of paperwork were required to support the recent C-5A procurement decision. Like a college thesis, the quality of an analysis is not proportional to its volume. Indeed, the multitude of charts, graphs, and statistics often masks the really key elements of the analysis. Unless the decision-maker can reproduce the essential elements of the analysis, he cannot intelligently evaluate it.

The scientific method, then, is a way of thinking that has three characteristics: it is inquisitive, objective, and reproducible. But how scientific can we be in a business that involves as many unmeasurable and imponderable variables as national defense? Obviously, there are limits to precision.

the explicit treatment of uncertainty

Most writers in this field seem to agree that the quality of an analysis is pretty well determined by the way in which it treats uncertainty. All statements about the future and most statements about the past involve some uncertainty. A great mathematician, C. J. Keyser, once put it this way: "Absolute certainty is a privilege of uneducated minds—and fanatics!"

A lot of study has been devoted to the treatment of uncertainty since the turn of the century. The highly developed mathematical disciplines of probability theory and statistics are devoted to reducing as much uncertainty as possible to a calculable risk. The responsible analyst uses this body of mathematical knowledge to attempt to quantify the degree of confidence he has in his statements about the future. For example, let's say the accident rate of the F-4C in TAC has been 1.92 accidents per 100,000 flying hours. The mathematician may be able to say by analyzing the data that he is 95 percent confident that the accident rate this year will be between 1.53 and 2.21. If the accident rate turns out to be 2.32 at the end of the year, the decision-maker should seek out a cause other than pure chance. Here is where some knowledge of mathematics is helpful. The utility of statistical data and prob-

ability estimates is great. However, they must be used and evaluated with a knowledge of the limits of their precision and the dangers of their misuse.

For the evaluation of analysis, the key question is, Has the real uncertainty been suppressed? In quantifying and evaluating that part of the uncertainty which can be calculated, has the analyst failed to point out other uncertainties that might change the entire picture? A good analysis will point out these remaining nonquantifiable uncertainties so that a responsible judgment can be made about them.

The really good analysis will have these four characteristics: a systems approach, an interdisciplinary group, use of the scientific method, and the explicit treatment of uncertainty. Maybe if you jot these four characteristics down on your mental blotter, they will provide a helpful check list to evaluate the analysis capability available to you. Better yet, they might help you to examine the way you perform analysis yourself every day.

completed staff work—Beware!

It is almost an axiom that analysis will be useful for decision-making to the degree to which the sponsor of the analysis has been able to communicate his intent to his analysts. If the problem is worthy of analysis in depth, it is highly unlikely that the sponsor will have anything more than a vague outline of the nature of the problem at the outset. This presents no major problem as long as both the sponsor and his analysts recognize the need for continual communication between them during all phases of the analysis. This "feedback" is particularly vital during the period of time when the parameters of the study are being defined. What are the objectives? What are the critical variables? What are appropriate assumptions? What is an appropriate criterion for choosing among the alternatives?

Unfortunately, this type of feedback is somewhat foreign to many experienced military officers. Most of us have been schooled in an environment in which an officer's effectiveness is roughly equated with his ability to work without detailed supervision. "Completed staff work" is held up as the ideal; only as a last resort is the superior to be consulted prior to submission of a completed action paper.

An enormous amount of resources can be wasted by this orientation to analysis. Analysis of the type we have been discussing is appropriate for any problem, but it is vital for questions of such complexity that no real "solution" is possible. The intent of analysis should be to explore the range of alternatives open to the decision-maker. Only by a process of successive approximations can a course of action be arrived at that comes close to accomplishing the purpose. Objectives, assumptions, and criteria in such studies are not self-evident. They require a good deal of preliminary study.

Despite all the hullabaloo about decision-making these days, decisions are easy to make if quality is not a primary concern. Where we sometimes get in trouble is in equating decisiveness with courage. Sometimes it takes a great deal *more* courage to insist that a sound decision cannot be made until adequate time and effort have been devoted to analysis.

The final portion of this article will suggest another way of looking at the analysis process that is useful in evaluating analysis. Some of the jargon of the professional analyst will be dissected, and plain English translations will be offered.

W̲E̲ H̲A̲V̲E̲ suggested that analysis is not the special province of a small group of eggheads. Indeed, every military officer performs "analysis" every day. Most of us lack access to professional analysts to help us structure our thought processes about complex problems, but structure is the key to understanding any problem.

"Professional analysts" from Plato and Aristotle to Hitch and McKean have suggested essentially the same structure for disciplining our approach to thinking about complex problems. I cannot hope to improve on their basic ideas, so I shall boldly plagiarize them.

My intent is to take this basic structure

for analysis and show that it is not something vague and mystical but that it is appropriate, indeed necessary, as an everyday tool for all military officers. My basic thesis is that most of us are too willing to dismiss analysis as the concern solely of the military officer or professional civilian with the word "analyst" in his title. We are not critical enough of their work. This is dangerous. For by refusing to track through his study with him to the extent that we can be intelligently critical of it, we delegate to the analyst more power than he can or should wield in the affairs of men. The analyst can and should be expected to help us by providing structure for our thinking. But he cannot and should not be allowed to do our thinking for us.

One of the most serious responsibilities we have as professional military men is to create and maintain within the Air Force the capability for penetrating, objective analysis of possible future courses of action. Whatever energy we have left could not be better spent than in carefully evaluating the product of this analysis capability and putting the results of the analysis effort into practice. By recalling the characteristics of good analysis, the military executive should be able to tell when he encounters a quality product. Now let us look closer at the elements of the analysis itself.

Most professional analysts, in particular those with a RAND Corporation background such as Drs. Hitch, Enthoven, Quade, *et al.*, seem to agree on five elements of analysis: (1) an objective or several objectives, (2) alternatives, (3) costs, (4) a model or several models, and (5) a criterion or several criteria. None of these writers suggests that any particular analysis will be structured in this format, with each of its elements neatly labeled. Quite the contrary. Since analysis is nothing more nor less than thinking very carefully about something, the results of analysis may be as varied as the process of human thought. The knowledge that has a bearing on military problems comes from a wide variety of sources—educational institutions, nonprofit research organizations, individual writings, civilian contractors, and various government institutions. No standardization in format of this knowledge can rea-

sonably be expected. However, an understanding of the five elements of analysis will help you to restructure any analysis and ask the right questions. Let us look at each of the five elements of analysis individually.

objectives

In considering any problem, a necessary first step is to carefully define an objective, a goal, a desired level of accomplishment. For many military problems, this is extremely difficult. For example, let us say that a hypothetical study was made to determine whether or not to build mobile, land-based intercontinental ballistic missiles. The objective initially established was to "provide the most effective missile system to deter thermonuclear war." A noble aim, indeed. But how does the analyst measure how well mobile missiles deter war? Deterrence is a state of mind. And what's worse, it is a state of the enemy's mind, not ours.

In this situation, the analyst can only do what you do when you buy a new car. He chooses a way of measuring the effectiveness of any missile system which he hopes will come *close* to measuring its deterrent value. For example, he might choose as a measure of effectiveness the number of surviving megatons on missile launchers after the enemy's first strike. (Admittedly this would be a long jump down the abstraction ladder from deterrence.)

It is for the decision-maker to decide if there are qualitative considerations that must be weighed along with the quantitative method of measuring effectiveness chosen by the analyst.

What does this have to do with buying a new car? Actually, the thought process is quite similar. When you buy a car, it is probable that your objective—if you ever stopped to define it—would be something like "To provide a means of transportation that will satisfy me and my family." After giving it some thought, you find it difficult to come up with any numerical index that adequately measures the degree of satisfaction. There are all sorts of statistics on horsepower, acceleration, dis-

placement, wheelbase, leg room, and so on. But which of these features comes closest to describing satisfaction for you and your family? Only you can decide; and only the commander or staff officer can decide whether the analyst's chosen way of measuring accomplishment of the objective was appropriate. A great deal of judgment is required for this choice, particularly for higher level, more abstract studies.

But probably even more important than choosing a decent measure of effectiveness is defining the proper objective. Almost any problem of any complexity requires a process of successive approximation to define an adequate objective. Impatience on the part of the analyst or the sponsor of the analysis with this imprecise process of probing for an appropriate objective will invariably result in an inadequate product. The manager who insists on asking *answers* instead of questions is going to be continually dismayed by the low quality of work he gets out of his analysis staff.

alternatives

It is practically axiomatic that there are always alternative ways of accomplishing an objective. The function of an analysis is to explore alternatives systematically. If the alternatives explored are found to be inadequate, the good analyst invents new ones.

In our mobile missile study, the alternatives might be Minuteman missiles (fixed location), Polaris-submarine-launched missiles, Titan II missiles, mobile medium-range missiles based in Europe, and anti-ICBM missiles. All these alternatives can be compared. Considerable computation would be required. But, using the measure of effectiveness agreed upon —"the number of megatons surviving on missile launchers after an enemy first strike"—we could compare them. Suppose, however, that we redefine our "system" to include more than missile offense and defense. Then alternatives might include such things as better early-warning radars, more fallout shelters for the population, air-launched ballistic missiles, improved interceptor aircraft, etc., ad infinitum. The point is that alternatives need not be direct substitutes. They are merely various ways of accomplishing the objective. This stage, the invention of alternatives, requires the greatest amount of creativity in the study process. Free-wheeling creative thinking—brainstorming, if you will—often produces dramatic new concepts.

costs

Every alternative for accomplishing the objective involves the expenditure of some resources—money, materials, time. In recent years the science of determining and estimating costs has become quite sophisticated. However, there are certain fundamental ideas which are generally accepted, and familiarity with these concepts will help the commander or staff officer to evaluate the costing function performed by the analysts.

Cost streams. The first of these concepts is the idea of "cost streams," sometimes referred to as "total life cycle system cost." Either term suggests the same thing. The costs to be used in comparing alternatives should not be confined to one arbitrary period of time—a fiscal year, five fiscal years, or whatever. Comparisons should be based on the costs over the entire life cycle of the alternative. And they should be based not merely on total costs but on the cost stream, the way the costs are distributed over the life cycle. For example, car A is a very expensive alternative to car B when only the initial cost is considered, but if the total lifetime of the car is considered and costs of maintenance, operation, and depreciation are added, the picture changes radically: car B may have to be replaced every six years while car A may last for fifteen.

Sunk costs. Another concept which may seem self-evident but which is often ignored is the idea of "sunk" costs. In comparing an existing system to a proposed one, it is inappropriate to include the capital expense of the existing system. These are sunk costs. For example, cost of the B-52 and the Advanced Manned Strategic Aircraft (AMSA) cannot be meaningfully compared except by excluding those resources expended on the B-52 which

can be used by the AMSA. For instance, the AMSA can undoubtedly use many of the same fixed facilities as the B-52—runways, hangars, shops, etc. These should not be charged to either system. Neither should the costs of research, development, test, engineering, or procurement of the B-52 be included in the B-52 system cost. These are *sunk costs*. In other words, they are spent whether or not we buy the AMSA.

Opportunity costs. If you spend $400 for a color TV set, you sacrifice the opportunity to invest that $400. The $30 or so yearly interest which you could have gained on the money

Figure 2. Strategic retaliatory forces. This typical cost-effectiveness curve suggests a possible explanation for the Air Force's difficulty in getting the AMSA program approved. There are competing requirements which offer greater increase in effectiveness per dollar expended. (See Figure 3.)
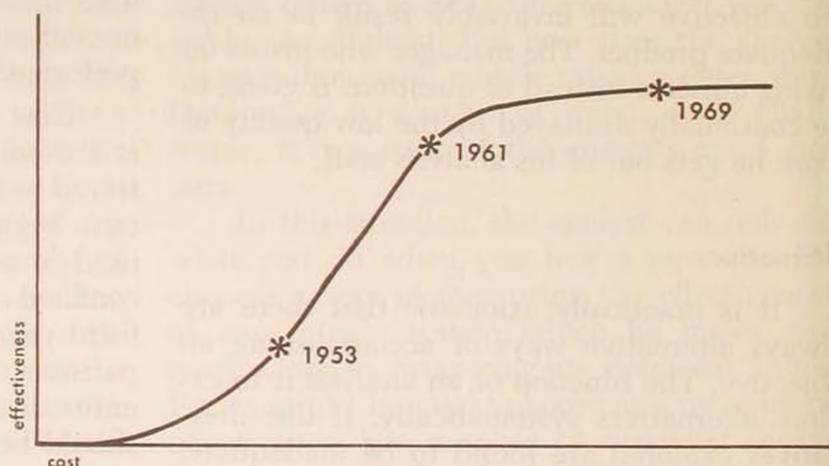
if you had invested it is properly a part of the cost of the TV set. This is called an opportunity cost.

In defense spending, these costs are extremely difficult to compute with any accuracy because of the multitude of alternatives available for spending resources. All that can be done, usually, is to take account of opportunity costs in a gross way when making choices. For example, purchase of the OV-10 aircraft in a particular fiscal year may mean that development of an anti-ICBM system may have to be delayed. Sometimes opportunity costs are a

powerful argument for delaying a commitment until sufficient study of alternatives has shown that the opportunity costs are not excessive.

Cost effectiveness. Pure cost in terms of expenditure of resources is never a proper basis for making defense decisions. The cost must be related to the gain in effectiveness which those resources buy. This sometimes leads to a rather confusing paradox for the professional military man. The very effective development of our strategic retaliatory might in the 1950's has brought us to the point where very large expenditures are required to achieve a small increase in retaliatory effectiveness. Conse-

quently, new weapon systems in this area run into terrific headwinds in a national decision process based upon cost-effectiveness considerations. Usually there are other areas where the same resources will buy a much greater increase in effectiveness.

The science of determining costs and comparing the costs of alternatives has become highly developed in the last several years. But a great deal of managerial judgment is required to evaluate the relative cost effectiveness of various alternatives. As aids to the application of this judgment, models are extremely useful.

models

A model is a representation of reality. It is usually greatly simplified. It eliminates much of the complexity of reality. But *if* it includes the *key* factors in their proper relationship, it can be very useful. In fact, complexity in a model is a drawback. The more complex a model, the harder it is to keep it representational of the real world. Also, the usefulness of a model is diminished if the decision-maker cannot appreciate its design. The most ingenious and useful models are those which avoid the complex mathematical formulations of queuing theory, linear programming, and ad-

such as a drawing-board missile system, an operational test is impossible. Then the judgment of the decision-maker becomes critical, for he must determine through the use of his best judgment how close the model comes to predicting what will happen in the real world. The only true measure of a model is its ability to predict.

The model-builder, quite humanly, will tend to be too uncritical of the output of his model. The decision-maker must encourage the analyst continually to check his model against the real world. If there is a conflict, the model must give way.
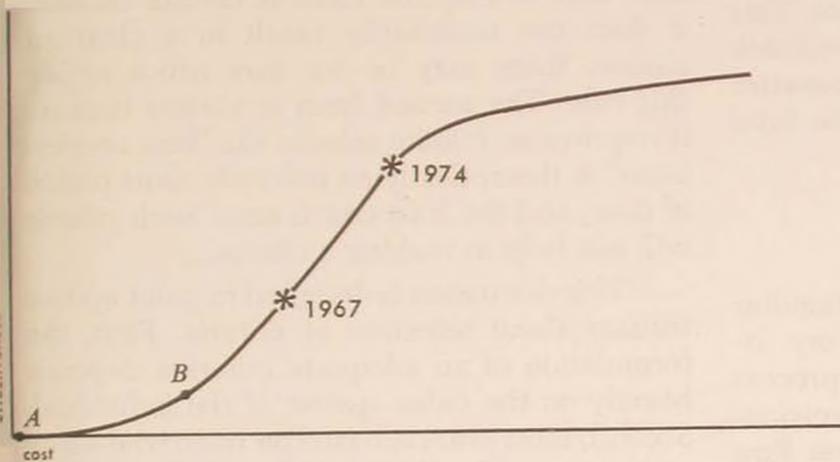

cost

Figure 3. Anti-ICBM missile system. This hypothetical curve depicts why expenditure of large amounts of money on an anti-ICBM missile might be attractive. As with all new developments, the early portion of the curve (A to B) shows expenditure of a large amount of money for a small amount of effectiveness. If we are actually at the 1967 point shown, expenditure of additional resources on this system is more attractive than expenditure on any strategic retaliatory system.

vanced calculus and instead merely show essential relationships between key variables.

A model suggests many different mental images. Probably all of them are correct. For a model can take on a number of different forms—a picture, a map, an organization chart, a graph, a series of mathematical formulas, a computer program, a PERT chart, and so on. In our mobile missile example, the model would probably be a series of equations representing the various alternatives. Ideally, an operational test would be used to determine how close the model came to predicting reality. In some cases,

Let's take a very simple but real-life example. One very complex war game being used as a model of a hypothetical limited-war situation contained an element (called a "payoff function" by the analysts) which purported to compare the effectiveness of the Red and Blue forces in terms of close-support sorties during the play of the war game. Thus the relative effectiveness of the various air forces available to the Blue commander could be measured, the analyst claimed, by subtracting the close-support sorties available to Red from the close-support sorties available to Blue during the

war. Can you spot the fatal flaw in this logic?

It is simply this. Effectiveness of close-air-support sorties depends on their being available in sufficient numbers *at the right time*. Although the numbers of close-support sorties flown during a war may average out to some figure like 20 or 30 a day, the normal requirement is probably for several hundred a day for a few days at a time to support major ground operations. Without this consideration of the timely availability of large numbers of sorties, the "payoff function" would be worthless.

The process of building a model requires a great deal of patience. Like the analysis process in general, it requires successive approximations. The analyst may go several times around the circle of defining the key elements, deciding what is trivial, what is significant, what can be measured and what can not. This process often benefits greatly from feedback from the decision-maker or a subject-matter expert who is capable of picking out the fatal flaw in the logic of the model.

criteria

Most military officers are quite familiar with the word "criteria." Virtually every attempt to codify the problem-solving process includes the use of criteria to aid in decision-making. Just to be sure that we are on firm ground, however, let me offer a definition: A criterion is a rule for choosing among alternatives.

Criteria may appear in many forms, but they are most useful in an analysis when they can be stated as a rule. The two most common forms of criteria give preference to either the alternative which maximizes accomplishment of the objective within a fixed budget or the alternative which obtains a specified objective or goal at least cost. Both these forms of criteria avoid the most common pitfalls in stating criteria. Without enumerating all the pitfalls, I will merely suggest that you try to reconstruct the criteria of any analysis in one of these two forms. However, if neither a fixed budget (expenditure of resources including men, money, materials, and time) nor a desired level of effectiveness has been established, the criterion is almost certainly worthless.

Let's look again at your choice of a new car. Suppose you settled on acceleration from 0 to 60 mph as your measure of effectiveness. In order to complete your analysis, you would have to formulate a criterion based on this measurement. For example, a suitable criterion might be "to prefer the car which achieves the best acceleration from 0 to 60 mph and costs less than $4000." We might say that this criterion is closed on one end.

Useless criteria are those which are closed on both ends ("to prefer the car which accelerates from 0 to 60 mph in less than 9 seconds and costs less than $4000") or those which are completely open-ended ("to prefer the car which achieves the best acceleration at the least cost"). The first form is useless because it does not necessarily result in a clear-cut choice: there may be ten cars which satisfy this rule. The second form is useless because it requires an infinite search: the "best acceleration" is theoretically an infinitely short period of time, and the least cost is zero. Such criteria will not help in making a choice.

This discussion is designed to point up two truisms about selection of criteria. First, the formulation of an adequate criterion depends heavily on the *value system* of the individual. Second, most criteria based on nontrivial value systems contain elements that are not easily quantifiable.

A more realistic criterion for the choice of a new car would be "to prefer the car which has the best combination of luxury, ride, and performance and costs less than $4000." Defining adequate quantitative measures of luxury, ride, and performance is difficult enough, but when we specify the "best" combination of these features we are obviously beyond the realm of numerical measurements.

Just this type of value judgment is required in establishing criteria for virtually all decisions in the Department of Defense. Unfortunately, many decision-makers are not expert in explicitly defining their criteria. They themselves are not aware many times of the value systems which they use.

A DECISION-MAKER in today's complex military environment is confronted with a bewildering maze of graphs, charts, and mathematical mumbo jumbo. His most important function, however, is to provide critical evaluation to every analysis. He need not understand the mathematical mechanics used to derive the values, though it helps if he does. He cannot function effectively, however, without structure for the application of his judgment. Every analysis of a complex problem, however poorly organized it is, should have the five elements we have considered: objectives, alternatives, cost considerations, a model, and criteria. If these are not clearly identifiable in the report of the analysis, they provide the basis for questioning the analyst: Do we really have a problem? If so, have we properly identified it? What were the objectives? What measure of effectiveness was used? How were costs computed? What criteria were used to choose among the alternatives?

Three simple guidelines will assist military commanders and staff officers in their trek through the analysis jungle:

• Know what characterizes good analysis.

• If you are going to have to make the decision, apply *your* judgment during the analysis process, not just at decision-making time.

• Use your knowledge of the structure of analysis in general to evaluate each particular analysis.

Randolph Air Force Base, Texas

THREE BULLETS ON A KNIFE: Saga of the P-38

AN AIR UNIVERSITY REVIEW STAFF REPORT

SECRECY veiled the U.S. Army's March Field in California on 1 January 1939 as the prototype of America's first twin-engine fighter was moved into a hangar for final assembly. Designated the XP-38, the aircraft was to undergo test trials and, hopefully, make a cross-country flight to New York's Mitchel Field with Lieutenant Ben S. Kelsey (now a retired Air Force brigadier general) at the controls.

Misfortunes began plaguing the P-38 prototype during the testing, however. On the first taxi run the brakes failed at near flying speed, sending the aircraft into a ditch and hub-deep mud. The wing flaps, which were designed to give extra lift on take-off, failed during the first flight (27 January), but Kelsey managed to fly for half an hour and land safely. The aircraft had about five hours' flying time before it was termed ready for the flight to Mitchel Field.

On 11 February Kelsey took off for Amarillo, Texas, where he made a 22-minute fueling stop. He landed at Wright Field, Ohio, with 5 hours 58 minutes flight time elapsed. Major General H. H. ("Hap") Arnold was waiting there to confer with the pilot about the final leg of the trip. The decision was to continue the flight, which might result in a transcontinental speed record. As the aircraft approached Mitchel Field for the final landing, Kelsey idled the engines to lower the troublesome wing flaps and avoid overshooting the field, but when he attempted to accelerate, the engines would not respond. The XP-38 crashed in a golf course ravine short of the runway—7 hours 45 minutes 36 seconds after the California take-off. The aircraft was a loss, but Kelsey walked away with only minor injuries. The XP-38 had reached an approximate speed of 420 mph during the flight from Wright Field and averaged 340 mph on the 2400-mile flight; the elapsed time was 17 minutes 11 seconds short of the record.*

The XP-38 had undergone its first extended flight testing, and, even though it encountered difficulties, the outlook, thanks

*Howard Hughes had set the transcontinental in-flight and elapsed time record of 7 hr 28 min 25 sec in 1937 by flying nonstop. Kelsey's in-flight time was 7 hr 36 sec. The National Aeronautic Association credited Kelsey with bettering three transcontinental time records: in-flight; twin-engine elapsed (1 hr 20 min 9 sec faster); flight with stops (2 hr 17 min 15 sec faster).
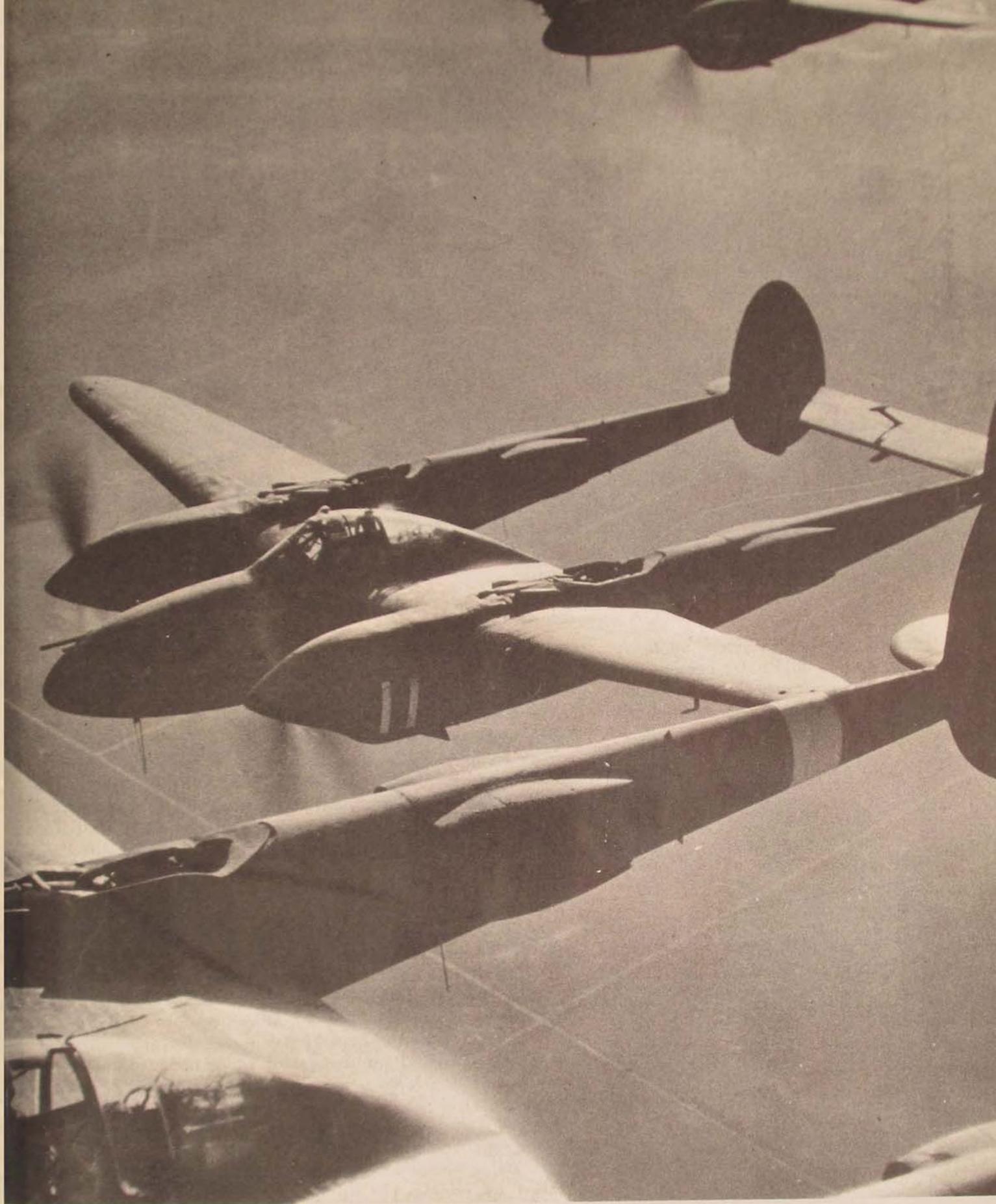
P-38s in close-formation training flight. Lockheed designed and built the versatile twin-boom, twin-engine fighter, the first to exceed 400 mph and encounter compressibility.

The YP-38, dubbed "Yippee" by Lockheed employees, had more horsepower, less weight, and other improvements over the XP-38 prototype.... Belly tanks increased the round-trip strike range.

largely to Kelsey's favorable reports of the flight, was promising enough for the Air Corps to place an order for thirteen YP-38s for further evaluation.

Two years before Kelsey's historic flight, the Air Corps had asked the aircraft industry to submit designs for a pursuit aircraft to have "the tactical mission of interception and attack of hostile aircraft at high altitude," with specifications for a 20,000-ft ceiling attainable in six minutes from sea level and a top speed of 360 mph. The Air Corps wanted a defensive aircraft capable of intercepting any bomber that might attack the U.S. In June 1937 the Lockheed Aircraft Corporation's blueprints for a twin-engine, twin-boom fighter which was to more than meet the Air Corps requirements won the contract. Lockheed and the U.S. Government invested $924,000 before the XP-38 made its first flight.

The XP-38 was revolutionary for its time. The twin booms provided room for turbosuperchargers, which supplied pressurized air to the two liquid-cooled Allison engines (980 hp each) and thus increased overall engine power for take-off, climb, and high-altitude flight. Armament, which included one 20-mm cannon and four .50-cal machine guns, was housed in the nose of the aircraft. The first fighter with a tricycle landing gear, the XP-38 was 100 mph faster than any other American fighter at the time it was introduced.

Major alterations for the YP-38, the second test model, called for adding 170 hp to each engine, eliminating 1300 pounds gross weight, redesigning the armament compartment, changing the propellers so that they would have an outward rotation (the top of the propeller arc moving toward the wing

tips), and substituting a 37-mm cannon for the XP-38's 20-mm.

In September 1939, with war brewing in Europe, the Air Corps placed an order for 66 P-38s even before construction had begun on the YP-38. A second order for 607 P-38s was given prior to the YP-38's first service test flight in September 1940. Production workers at Lockheed nicknamed the YP-38 "Yippee" after the aircraft's prefix.

For two years prior to America's entry into World War II, Lockheed designers had been experimenting to solve compressibility problems, which the P-38 encountered appreciably at 425 mph. Wind failed to flow over the wings smoothly during the compressibility period, causing the airplane to shake violently. Placing counterweights on the elevators and raising the tail failed to solve the problem, but during wind-tunnel tests Lockheed designers found that a dive flap fixed to the main wing spar solved the problem by giving lift to the underside of the wing.

The P-38E Lightning* rolled off the production line at Lockheed's Burbank, California, factory in September 1941. This model had a redesigned nose section, with twice the ammunition capacity of previous P-38s, and new hydraulic and electrical systems.

°"Lightning" was strongly recommended from a list of seven names proposed by Lockheed to the British, who had placed an order for modified versions of the P-38 in 1940. The British agreed on "Lightning," and the U.S. Air Corps later adopted the name for its P-38s.

A P-38 Lightning lands on a watery field after striking Japanese-held Attu, most westerly of U.S. Aleutian Islands.

The P-38 figured in the massive buildup of U.S. warmaking capability in the European Theater in 1942–43. Some USAAC pilots, like the one at left, received training at bases in England prior to patrol and escort missions across the Channel. . . . A flight of Lightnings from the Fifteenth Air Force (right) streaks over the rough Yugoslavian terrain. . . . A P-38G stands ready on snow; others were ski-equipped.
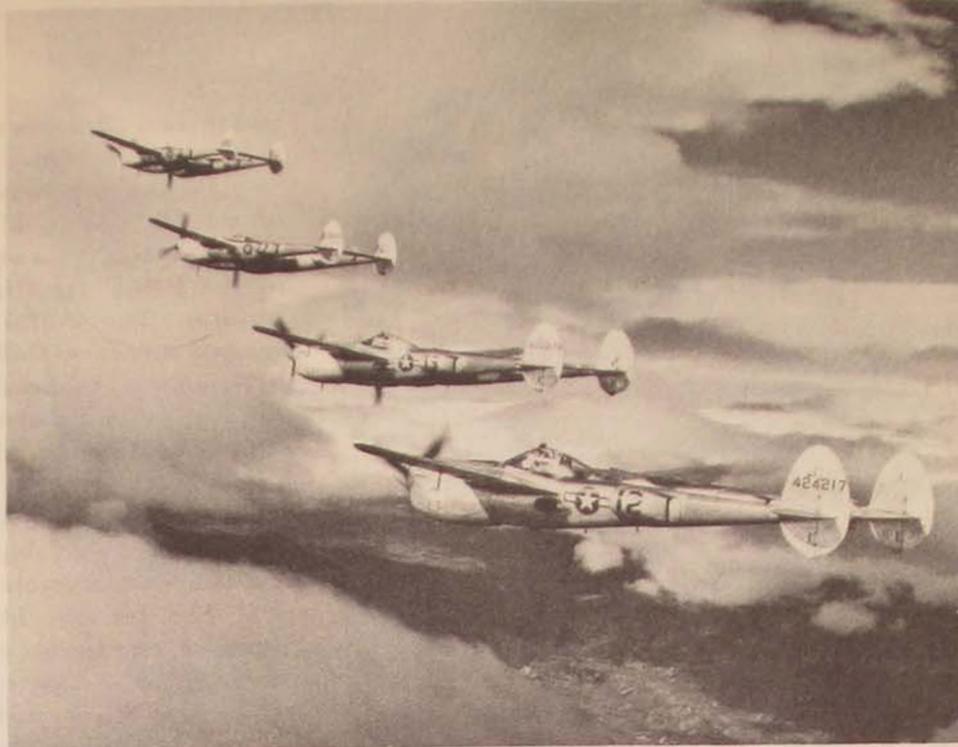
The P-38F became available in February 1942, with engines of 1225 hp for take-off and 1150 hp at 15,000 feet. The aircraft could also be adapted for drop tanks, which extended its range over 2000 miles with a 2000-pound bomb load.

A rash of fatal accidents in the early 1940's gave rise to speculation that the P-38 was "too much for one man to fly and fight." It was graphically described as "three bullets laid on a knife" and criticized as having a "cockpit about the size of a very deep bathtub fitted with a bus seat." Its 21 clock-like dials, 36 switches, 20 levers, 5 cranks, 2 plungers, 6 thumb buttons and radio controls led one new pilot to say, "It looks like a plumber and an electrician got together and had a nightmare."

The first combat-ready model was the P-38D, which became operational in August 1941. As a result of aerial combat reports from Europe giving an indication of the equipment needed, the P-38D was modified to include self-sealing fuel tanks, bulletproof glass, pilot armor, and as armament one 37-mm cannon and four .50-cal machine guns.

On the morning of 14 August 1942, Lieutenant Elza K. Shahan, piloting a P-38D with the 27th Fighter Squadron of the First Fighter Group in Iceland, made a diving pass at a German Focke-Wulf Kurier bomber, which was on a reconnaissance mission near Iceland. The shells of the P-38 hit the bomb bay, and the bomber exploded. Lieutenant Joseph D. R. Shaffer of the U.S. 33d Squadron, Iceland Base Command, flying a P-39, had set one of the German bomber's engines afire before Shahan's decisive blow. Shaffer and Shahan received Silver Stars and shared credit for the destruction of the aircraft, the first against the Nazis in the European Theater by American pilots in a U.S. unit. Later in the day of the air battle a Lockheed representative in Iceland bought the drinks at the officers club

Its Plexiglas nose housing a bombardier and a Norden bombsight, the P-38 "Droopsnoot" led Lightning bombers to enemy targets. . . . The 38th Fighter Squadron takes off from its Nuthampstead, England, base to fly bomber escort over Europe.

and invited all flyers not on duty to join him in celebrating the P-38's achievement.

During the removal of radio equipment from the rear of a P-38 cockpit, a Lockheed test pilot noticed that enough room was left for a second man. Thus the "piggyback" version of the P-38F (and later the "G" model) was developed for training. The P-38G had improved Fowler flaps, which increased maneuverability. In July and August 1942 the "G" and "H" models became the first to be flown across the Atlantic to the European Theater. When the 1st and 14th Fighter Groups arrived in England, via Labrador, Greenland, and Iceland, 179 of the 186 Lightnings that had left the U.S. finished the flyover. The ability of the P-38 to fly the long distance eased the workload on American shipping which would have been necessary to transport the fighters across.

The 1st and 14th Fighter Groups trained in air-to-air gunnery, navigation, and instrument and formation flying while in England. P-38s, camouflaged olive drab and light bluish-gray, were used sparingly for coastal patrols and for sweeps across the English Channel to France as bomber escorts. Since the P-38 was used for relatively few missions before being sent to North Africa, little light was cast on its combat effectiveness at the time.

Near the end of 1944, P-38Ls in England were modified to accommodate a bombardier in the partly transparent nose. These "Droopsnoots" led formations of P-38s, each carrying a 4000-lb bomb load from bases in England, in raids over Berlin without opposition from the Luftwaffe. The Germans, with a diminishing number of fighters, were concentrating on Allied bombers, and it was several months before they realized that the P-38s were carrying bombs and should be attacked.

P-38 involvement in the North African campaign began in November 1942, when some were flown over the Atlantic Ocean parallel to the European coast to North Africa. There the 1st, 14th, and 82d Fighter Groups used them in their first major operation. The Lightning was not overly successful against the German Messerschmitt 109 and Focke-Wulf 190, partly because the enemy's low-altitude flying forced the P-38 below 12,000 feet, decreasing its speed and maneuverability against the more agile German fighters. When chasing enemy fighters down to ground level, the P-38 pilot needed top cover to avoid being attacked from higher altitude. A lone German decoy aircraft was sometimes sent in low, and without top cover a pursuing P-38 pilot often found himself outnumbered by enemy fighters from higher altitudes.

U.S. pilots flew their P-38s abreast so that enemy planes could be observed approaching from the rear. P38s often began an attack by making a turn in the enemy's direction and then climbing for a high-altitude dive attack. If it was not possible to make a diving attack, the P-38s would pull into the abreast formation and wait for another opportunity to attack. Against German transports, the P-38s held the upper hand, destroying many of them over the Mediterranean Sea before they could get troops and supplies to North Africa.

An F-5A, photoreconnaissance version of the P-38F, casts its shadow on the Italian shore (right), and another "Photo Joe" overflies the coast of North Africa (below). The F-5s took photos vital to the Allied invasions.
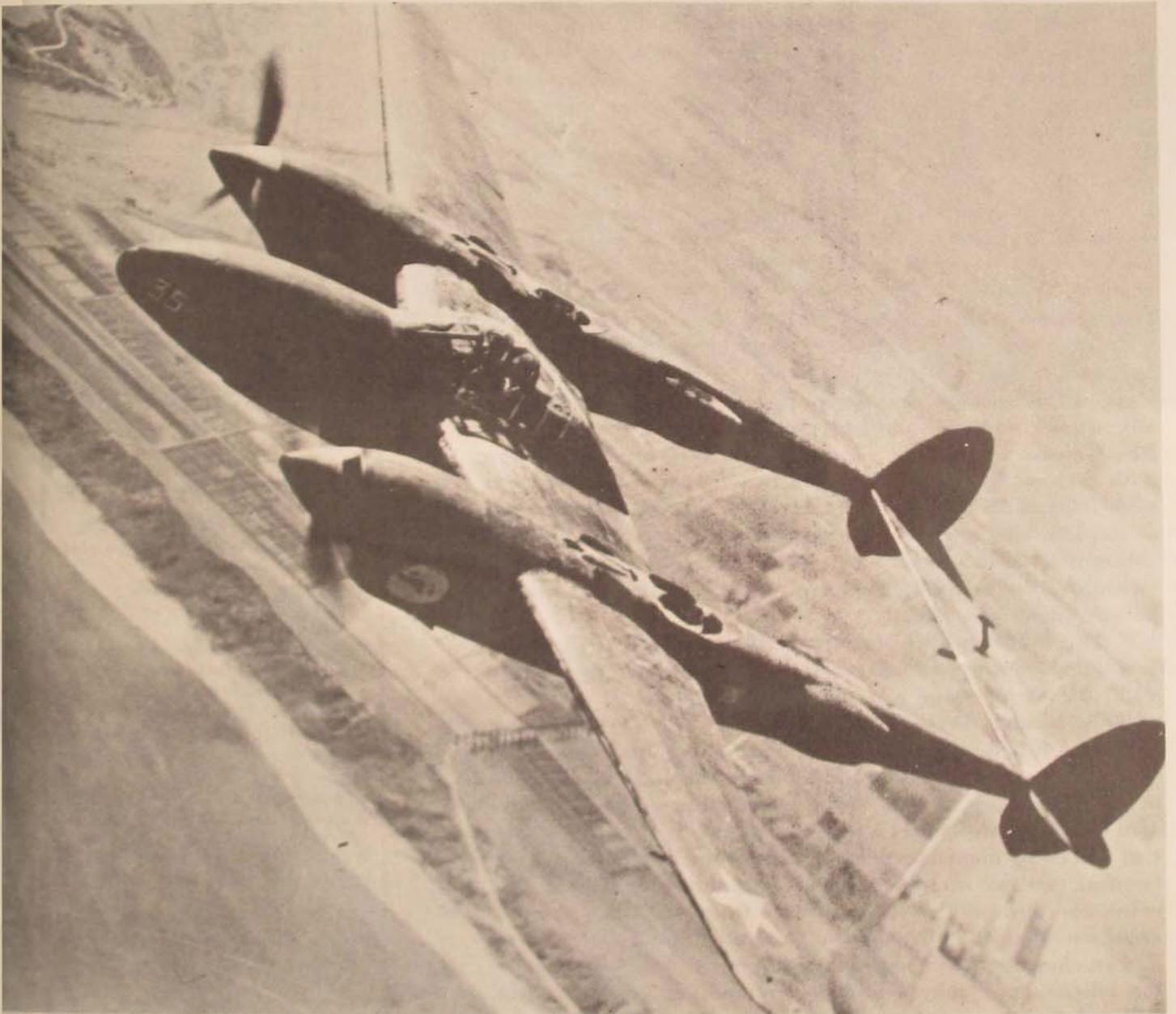
Called *Der Gabelschwanz Teufel* (the fork-tailed devil) by the Germans during the North Africa campaign, the P-38 was effective at tank busting, skip-bombing underground aircraft hangars, bombing Italian airfields, and escorting bombers on missions over Italy and other targets. During a 36-hour period of the German evacuation of Tunisia, P-38 pilots claimed 80 enemy aircraft downed. The Lightning received praise from Allied airmen and grudging respect from the enemy. General Arnold, who had favored the P-38 ever since its test days, called it a "headache to the enemy and a source of pride and confidence to our own forces." A captured Italian officer in North Africa said, "We were doing all right and winning the war until those damned fork-tailed airplanes showed up."

The Air Corps received the first F-4 photoreconnaissance planes in March 1942. The F-4, a modified P-38E with four K-17 cameras replacing the nose armament, became the first Lightning to operate in combat zone as a reconnaissance aircraft when some were sent to the Eighth Photo Squadron in Australia and used in flights over New Guinea. The F-4 and the F-5 (a modification of the P-38F containing five cameras) accounted for approximately one thousand of the more than ten thousand Lightnings produced—9924 by Lockheed and 113 by Consolidated Vultee (Convair). The reconnaissance aircraft, called "Photo Joes," provided three million photographs of the Normandy coast prior to the invasion, as well as preinvasion photos of North Africa and the Pacific. Near the end of the war Lockheed developed an improved version, the F-5G, whose five cameras, shooting obliquely and straight down, could take distinct pictures from as high as 30,000 feet.

Approximately sixty P-38Fs reached the Fifth Air Force in Australia during October 1942, but because of several problems, such as leaky fuel tanks and supercharger repairs, the aircraft saw no action until two months later in the battle for New Guinea. In the first victory claims, twelve P-38Fs of the 39th Fighter Squadron shot down two Japanese bombers and nine fighters in one mission. The P-38 proved a distinct advantage in the Americans' island-hopping toward Japan because of its long range and its twin engines—one engine had enough power to return the plane to base if the other failed or was silenced by flak.

The P-38H, which began operations in May 1943, had a new type of turbosupercharger that increased the horsepower to 1425 for each engine and was the first model to carry two 1600-lb bombs. Three months later the "J" model became available; it had a fuel capacity of 1010 gallons and droppable tanks for a range of 2700 miles at more than 420 mph. Some of the "J" models, in addition to introducing electrically operated dive flaps to remedy a nose-down pitching at high speeds, had increased maneuverability by means of an aileron power-boosting system composed of a hydraulically activated bell crank and push-pull rod; others were fitted with snow skis for arctic use. Both the "Droopsnoot" and the "Pathfinder," which had an elongated nose and radar equipment for guiding bombing missions in cloudy weather, were modified versions of the "J" series.

LIGHTNINGS IN THE SKY

Written by a Radio Operator-Gunner on a B-17 in the African Theatre

Oh, Hedy Lamarr is a beautiful gal
And Madeline Carroll is, too;
But you'll find, if you query, a different theory
Amongst any bomber crew.
For the loveliest thing of which one could sing
(This side of the Heavenly Gates)
Is no blonde or brunette of the Hollywood set,
But an escort of P-38s.

Yes, in days that have passed, when the tables were massed
With glasses of Scotch or champagne,
It's quite true that the sight was a thing to delight
Us, intent upon feeling no pain.
But, no longer the same, nowadays in this game,
When we head north from Messina Straits,
Take the sparkling wine—every time just make mine
An escort of P-38s.

Byron, Shelley and Keats ran a dozen dead heats
Describing the view from the hills,
Of the valleys in May when the winds gently sway,
An army of bright daffodils.
Take the daffodils, Byron; the wild flowers, Shelley;
Yours is the myrtle, friend Keats.
Just reserve me those cuties, American Beauties,
An escort of P-38s.

Sure, we're braver than hell; on the ground, all is swell—
In the air it's a different story.
We sweat out our track through the fighters and flak;
We're willing to split up the glory.
Well, they wouldn't reject us, so Heaven protect us,
And, until all this shooting abates,
Give us courage to fight 'em—and one other small item—
An escort of P-38s.

Dropping napalm bombs on Japanese-held Luzon was one of many P-38 tasks in World War II. . . . Charles A. Lindbergh added crucial range to the P-38 as a result of his experimental flights out of New Guinea. Here he is seen talking with Major Thomas B. McGuire, number two ace of the war.

The vast Pacific distances were the despair of many pursuit planes, but P-38s using extended range techniques usually made it to target and back. . . . Major Richard I. Bong, the leading U.S. ace of the war, checks victories he has chalked up in his Lightning.

By the fall of 1943, the six P-38 squadrons of the Fifth Air Force in the Pacific had compiled an overwhelming victory record against the lightly constructed Japanese aircraft, including the once-feared Zero. Major Richard I. Bong, who flew with the 9th Fighter Squadron of the 49th Fighter Group, was the leading American ace, with 40 kills, all scored while flying a P-38. He was followed closely by Major Thomas B. McGuire, another P-38 pilot in the Pacific theater, who had 38 victories.

American pilots attempted to dogfight with the Japanese Zeros during the early stages of the P-38's Pacific combat action, but the Zero held the advantage because it was more maneuverable than the P-38. The enemy aircraft often executed a split-S to escape pursuing Lightnings. However, the P-38s began patrolling in teams at altitudes beyond reach of the Zeros, and at the right moment they would make diving passes to scatter a formation of Zeros while other P-38s descended to battle the dispersing enemy. The P-38s could out-climb the Zeros and reassemble for another diving attack. Thus, the Americans learned to wait until conditions were favorable before engaging in combat. The Japanese described the P-38 as "two airplanes and one pilot," and they lost more aircraft in air-to-air combat to the Lightning than to any other.

The Army Air Corps received valuable assistance from Charles A. Lindbergh when he went to the Pacific theater in early 1944 to evaluate and demonstrate the P-38's maximum range capabilities while flying in combat. During June 1944 he flew with the 431st Fighter Squadron and showed that under certain operating conditions the P-38's fuel supply could be better conserved, adding critical mileage for bomber escort. Lindbergh's method of conserving fuel was to lower the rpm, raise the manifold pressure, and fly at a slower speed. Prior to this instruction in fuel conservation, pilots were often forced to refuel before returning from missions, but afterward these stops were usually unnecessary. Lindbergh was credited with adding 500–600 miles to the P-38's range.

On 18 April 1943, sixteen P-38s from the 12th, 339th, and 70th Fighter Squadrons combined efforts to intercept and shoot down an aircraft carrying Admiral Isoroku Yamamoto, Japan's highest-ranking naval officer, who was flying to Bougainville in the Solomon Islands on a naval inspection tour. Captain Thomas G. Lanphier, Jr., 70th Squadron, led the attack with four P-38s. After 2 hours 9 minutes in flight to rendezvous with the Japanese aircraft, the American pilots had only a few minutes for combat before low fuel would force them to leave. Lanphier shot down one fighter and in the ensuing battle was credited with downing the Mitsubishi "Betty" bomber carrying Admiral Yamamoto. The Americans returned to base, having lost one pilot.

The Lightning model "L," which had a speed of more than 425 mph, a 40,000-ft ceiling, and a range of more than 3000 miles, was being produced in August 1945. The "L" was capable of carrying rockets mounted under the wings or 4000 pounds of bombs. The P-38M night fighter, a modified "L" model, was operational shortly before the war's end. At 425 mph

(50 miles an hour faster than earlier Air Corps night fighters) the radar-equipped P-38M could carry rockets or two 1000-lb bombs.

Also at the close of the war, the P-38 was modified with 300-gallon auxiliary drop tanks to evacuate wounded or to transport crews and cargo. With transparent noses on the tanks, this fighter (the fastest ambulance aircraft at the time) could carry two wounded men in each tank. A modified P-38 could carry ten men or 4000 pounds of equipment, which allowed the utilization of captured airstrips in the Pacific theater without waiting for slower transports to bring reinforcements.

The Lightning was the first fighter to pull gliders, three at a time. It was also used to lay smoke screens preceding invasions and to carry and launch torpedoes. Future Lockheed plans proposed it for aircraft-carrier service and as a seaplane fighter.

Considered the most versatile fighter of World War II, the P-38 was used in all U.S. combat theaters. Since its production and combat career ended, the P-38 has been used by private owners for aerial photography and mapping, by flyers in air

The "L" model, last of the "daylight" versions of the P-38, had greater firepower with rockets added to its one 20-mm cannon and four .50-cal machine guns. . . . The "Captivair Trainer" at Coffeyville AAF, Kansas, prepared trainee pilots for initial checkout.
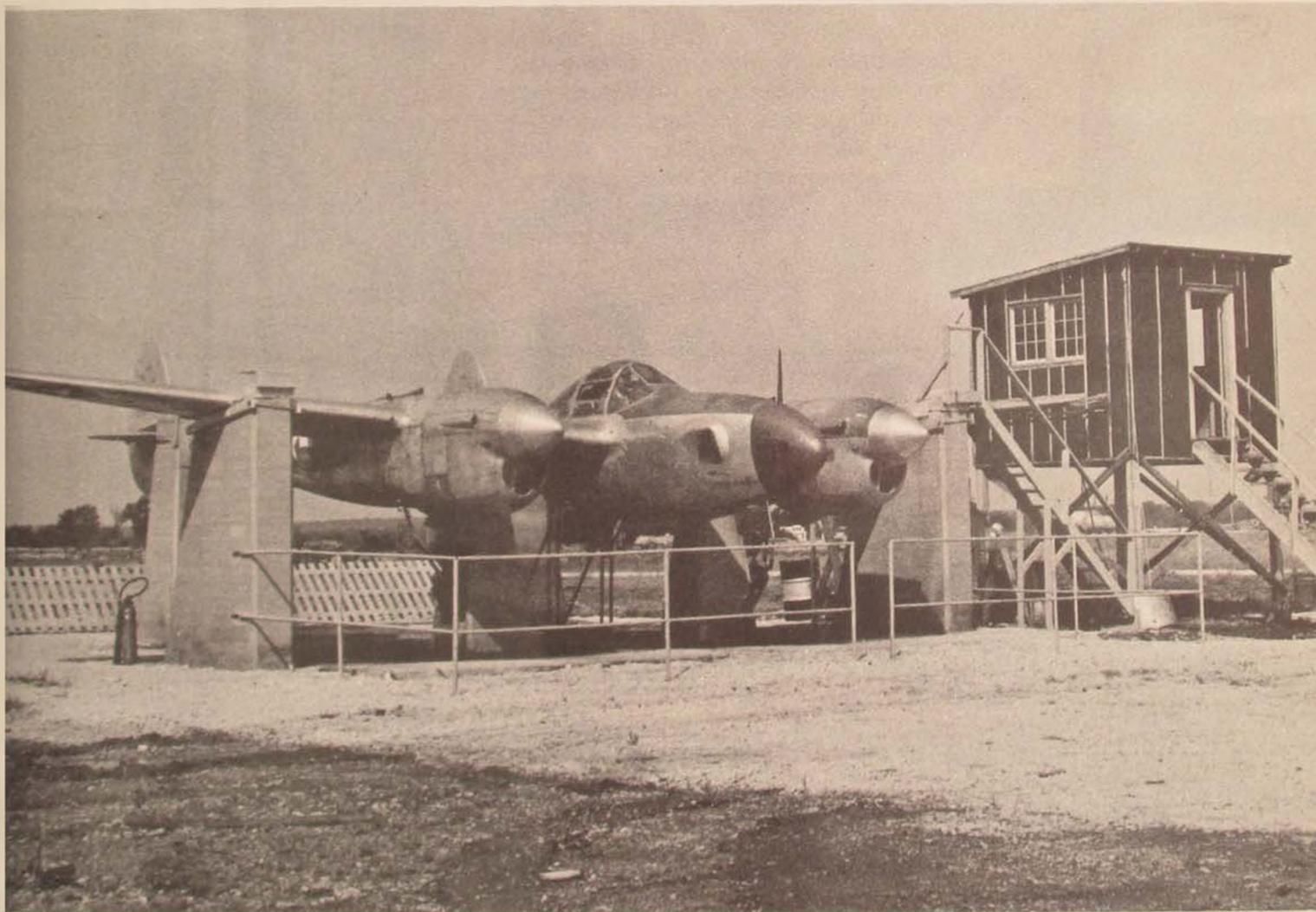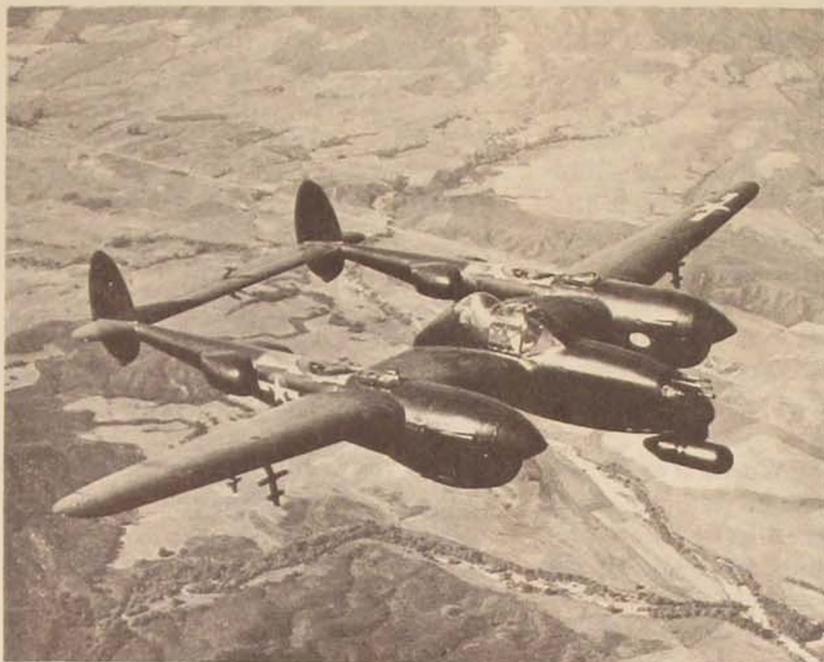
Equipped with radar for seeking out Japanese bombers in darkness, fog, and bad weather, the Lightning night fighter (above) could carry rockets on its inverted "Christmas tree" launchers. . . . Modification enabled other P-38s to load six 500-lb. bombs.

races, and by Lockheed in research programs to check telemetry and flight characteristics of test aircraft. Although it was off to a shaky start in its initial testing in 1939, with more than 700 changes to improve its performance in combat, the Lightning became a bolting success.
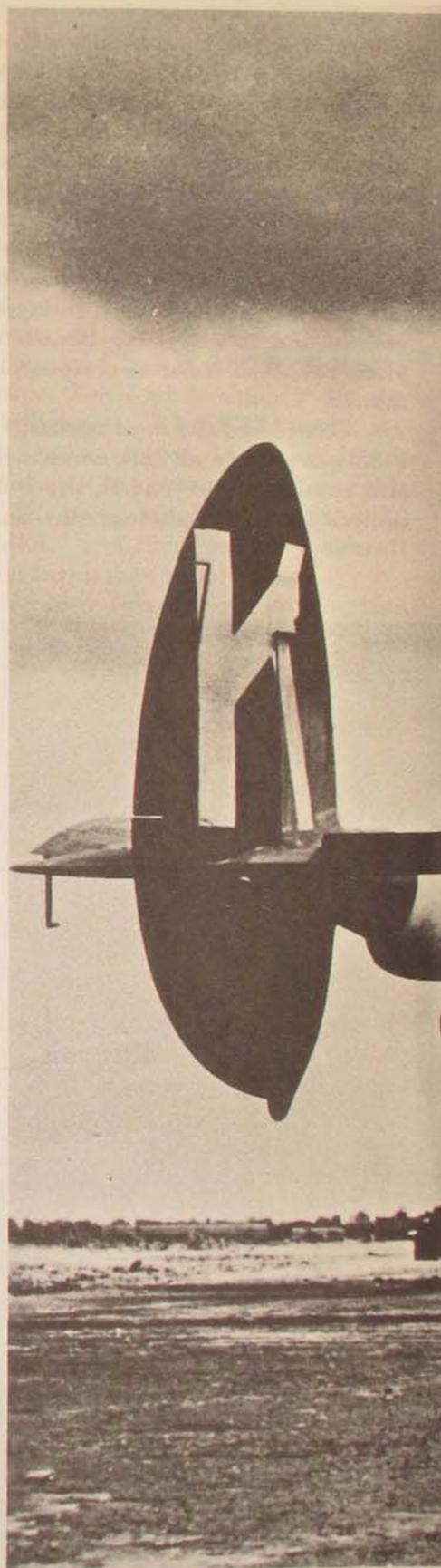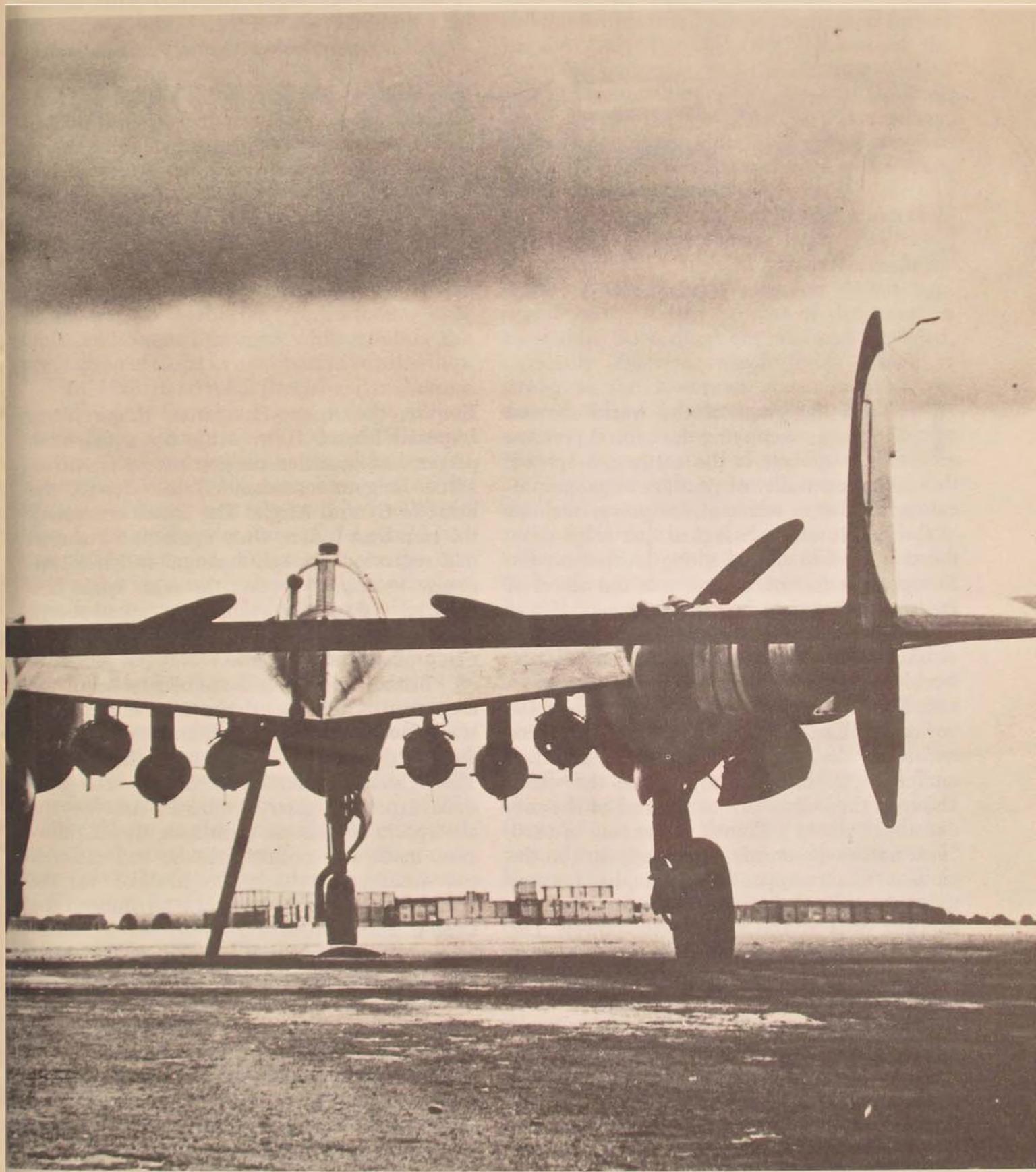
NATIONAL POWER AND FIREPOWER
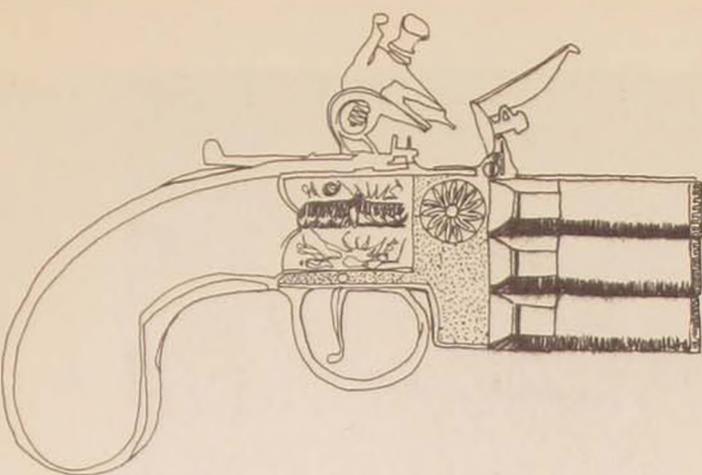
Anthony Harrigan

IN 1913 the maps of the world showed Europe as occupying the central position on the globe. As the earth is a sphere, there is no centrality of position in geographical terms. But in terms of the power realities of the age, it was only logical that maps show the central area of the globe located on the European continent. Europe *was* the center of the world, not only in European eyes but in the eyes of Asians, Africans, and Americans.

In a very real sense, Europe discovered the world without ever having been discovered itself. The Chinese had an opportunity in the voyages of Cheng Ho to sweep around Africa and reach the northern hemisphere, but they muffed their chance. They lacked the world vision of the Europeans at the end of the medieval period. As a French writer said in 1816, "This narrow peninsula, which appears on the globe as a mere appendix of Asia, has become the metropolis of the human species." Europe, in 1913, was at the peak of its power. The states of Europe had divided the entire African continent, with the exception of Ethiopia. The subcontinent of India was the crown jewel in the British Empire. China was subdued and impotent. What Europe did not control outright, or manage by way of military protectorates, it manipulated through a variety of financial and other pressures.

The heart of the European world consisted of the major powers—France, the new German Empire, the Austro-Hungarian Empire, and Imperial Russia. Italy, while not a first-rank power, had considerable possessions in Africa. Little Belgium commanded the Congo, the heart of Central Africa. The Dutch controlled the rich East Indies. Only Spain and Portugal had regressed, though Portugal still held immense territories beyond the seas. Spain had suffered many misfortunes, the most recent having been the bad luck to tangle with the rising power of the United States of America.

Britain's power still seemed to be in the ascendancy, the British having won a protracted war with the Boers and strengthened their hold over the Cape Town to Cairo route. Throughout the nineteenth century the Russians expanded their empire in Asia by the absorption of Chinese territories. Russia, however, made one critical mistake and suffered one significant setback. The mistake was the decision to sell the vast Alaska territory to the United States. Alaska represented a beachhead in the New World, but the Russian government lacked leadership with an understanding of the potential of Alaska in strategic terms. The setback was defeat at the hands of the Japanese in 1905.

Germany's power was increasing rapidly. She held large and valuable territories in East Africa and South-West Africa, the latter being the world's principal source of diamonds. Germany also maintained a foothold in China on

the Shantung Peninsula. Had war not broken out in 1914, Germany might have arrived at an understanding with Britain regarding a division of the Portuguese colonies of Angola and Mozambique in Africa.

The United States, while not subordinate to European power, was linked to Europe. Its people were overwhelmingly European in origin. American culture, commerce, and finance were joined in various ways to the nations of Europe. America in 1913 was a complement to European power, not in any sense a threat. The United States had a role to play in shaping the history of the western hemisphere. It was on its way to establishing protectorates over Haiti and Santo Domingo while guiding the new nation of Cuba in a protective relationship.

In 1913 it seemed that the *Pax Europa* would endure for a long time, perhaps as long as the Roman Empire had endured. Westernization of isolated pockets on the globe seemed a certainty. Within 50 years, however, or the life span of many men educated before World War I, the power structure of the world had completely changed. For a time, in the late 1940's, the very survival of the European nations was in question. Indeed much of central and all of eastern Europe had fallen under control of the Soviet Union, which had largely rejected Russia's European past. Germany in 1945 was in ruins, as was Italy. France was a moral wreck, bitter and divided. Britain, having "won" a world war, was exhausted and ruined by a second colossal conflict within a quarter century. Only the power of the United States enabled the European nations to make an economic recovery. American military power had to stand guard from Norway to Greece to protect prostrate Europe. Psychologically, Europe found itself unable to retain its overseas territories or even to remember its civilizing mission. Where there was not outright collapse in Europe, there was a contraction of goals and a loss of faith in the ability to develop and use power. The United States, while protecting western Europe against economic ruin and Soviet military conquest, showed no understanding of Europe's need for power bases elsewhere in the world. American administrations applied pressure to help oust

the Dutch from Java and Sumatra, the French from Algeria, the Belgians from the Congo, and the British from many parts of their former empire. Only Portugal, the weakest of the European countries, had the stamina to stand firm against terrible pressure. As Elie Deloches wrote in *Le Charivari*, "Portugal in a pillory, the only one of the older nations of Europe to grace the storm, is like the symbol of the West, which does not want to die."

That Europe could fall to such a humiliating condition in so short a time, after being at a peak in 1913, has sent a shock through the minds of thoughtful Westerners. What happened? Why? Is the process of deterioration inevitable? Such questions confront the West, especially America, which today stands as strong as the European states in 1913. An examination of the metamorphosis of power is essential if we in the West are to be masters of our fate, not victims of new historical tides.

To begin with, the inner structure of Europe did not change as the major European nations developed overseas empires and protectorates. The crowned heads of Europe knew each other, and many were related by blood. But their countries had scant appreciation of the changed relationships in the world—relationships which require a considerable measure of collaboration among the advanced states. Europe had the interests of a single house, but European diplomats did not see this. They could have pondered the Japanese naval victory over Russia at the Battle of Tsushima Strait, but they did not do so; or at least they did not reach the right conclusions. Apparently it never occurred to the masters of European chancelleries that, in Franklin's words, they had to hang together or assuredly they would all hang separately. They did not grasp the fact that European technology was spreading and that new power centers—competitive centers—would emerge as threats to Western nations. Being rooted in the conflicts and enmities of previous centuries, they could not take stock of the new challenges just over the horizon. Indeed history was repeating itself in a sense, for it had proved very difficult in earlier times for the nations of Christendom to see beyond their disputes and deal effectively

with the power of Islam. Because they lacked vision, the great nations of Europe turned to civil war, not once but twice in the twentieth century. The two European civil wars—known as World Wars I and II—gutted Europe's power. The millions killed at Verdun, Stalingrad, and scores of other battles took away the edge that the advanced nations of Europe had over the backward lands of this planet. The vast outpouring of blood and treasure, in what amounted to domestic struggles, represented a near-fatal bleeding of a civilization.
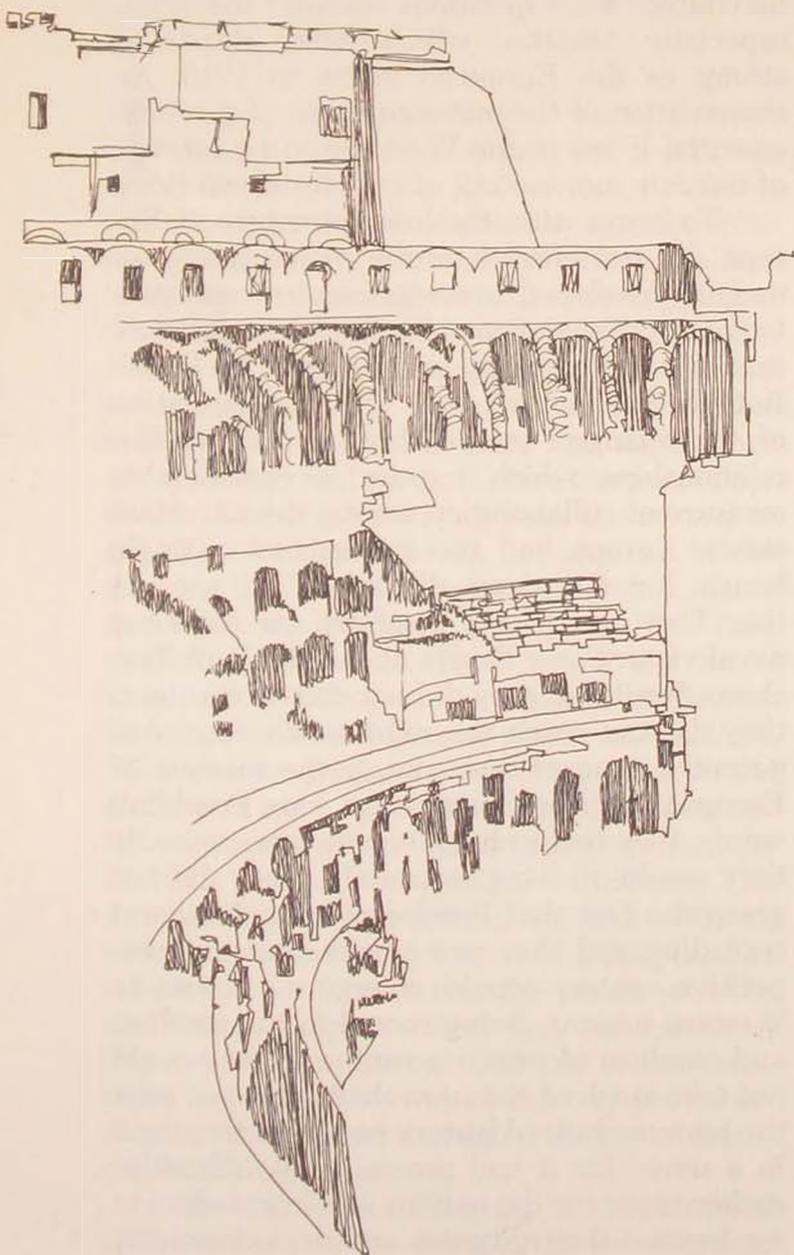
What strange and terrible ironies one finds in this period of European madness! For example, after the awful struggles between Frenchmen and Germans, the French Foreign Legion, fighting in Indochina to save an important piece of the French Empire, had its ranks filled with former soldiers of the German *Wehrmacht*. The British Commonwealth, created as a link between English-speaking nations with a shared constitutional heritage, in the 1950's and 1960's became an assembly in which backward and turbulent states had the dominant voice.

These two civil wars of the Western world represent a kind of massive failure of control, a breakdown through irritability. True, the components of Europe in 1913 were often contradictory. Styles of national life were different, as in England and Germany. Nevertheless, there were lessons of history that the wise men of early twentieth century Europe should have been able to read. Through the Dark Ages and the Crusades, in the period of the advance of the Mongol armies of Genghis Khan, in the era when Spain was flattened and France half overrun, Europe had been the underdog and the loser because of a lack of unity—a failure to direct conflict feelings against the external enemy. Then, with the coming of the Renaissance, Europe turned outward toward the new worlds being discovered. The forces set in motion by discovery, in terms of space and ideas, galvanized the Continent. As Denis de Rougemont has said, "Their [the Europeans'] fusion produced energy so great that it had to spread to the entire planet. First, it was a conquering energy, belligerent and business-minded out of necessity, spiritual by vocation and then unifying. Europe did not merely discover the world; it practically made the world."

Europe's lapse in 1913, its plunge into suicidal strife, was the strangest crisis of our civilization. The retreats and nihilism that have followed are the products of that breakdown.

The result, after 50 years, has been a transformation of power in the world. Today, power

centers exist in lands that seemed hopelessly backward in 1913. After 500 years of slumber, China is reasserting power as in earlier dynastic periods. The Soviet Union, consisting of an Asian as well as a European component, is the second largest power center in the world. The Indian Union, despite its internal problems and stresses, looms large in global politics. Unstable, proletarian states such as Cuba and the United Arab Republic seem capable of far more decisive action than many of the old, stable states of Europe, economically recovered from World War II. Belgium in 1960 cast loose the vast empire of the Congo, under pressure from the United States. Meanwhile Cuba, which the United States seems impotent to handle, works hard to build a Communist political empire in South and Central America. France fought a war to retain Algeria and faced terrible opposition within and without. The United Arab Republic wages war in Yemen and receives massive financial aid for its economy from the United States while the Soviets supply weapons. The situation is such that the West is not only witnessing the establishment and strengthening of power centers that threaten its existence but is actively helping such centers augment their power. For the West, however, this is not just part of a bad dream; it is a reality. The West on many occasions seems determined to accomplish for itself a final ruin that the two wars of 1914–18 and 1939–45 could not achieve. If there is not positively hurtful action, there is dangerous inaction. Thus the West fails to take pre-emptive actions against Communist China's increasing nuclear arsenal, even though it now realizes that pre-emptive action against Imperial Japan would have been wise in the 1930's.

In ignoring the power realities in this manner, the West—and this includes the United States—acts as though human nature had been repealed. It acts as though—indeed it openly professes that the good will of masses of people is more important than a solid advantage in terms of power. Thus we have the slogan that we must "win the minds" of the people. But the impossibility of doing this, in a period when nations practice thought control through news media, public education, and other instru-

ments of policy, is ignored. The people who are developing new power centers in Africa, Asia, and Latin America are not answerable to their peoples. The good will of the Russians toward individual Americans, for instance, has no bearing on the policies of the Soviet state. Writing in the Columbia University *Forum*, David Cort has pointed out, though many Westerners refuse to believe it, that "while there may be different kinds of power, power has always been and will probably always be a decisive element in human affairs." Arnold Toynbee touched on this reality in another way: "Self-assertion is of the essence of life. This self-assertion is perpetually being challenged, because there are more self-assertive creatures than one."

This is the real world of self-assertive creature against self-assertive creature; power center against power center. In this age-old struggle for power, the role of firepower has been and is crucial. Europe's decline from the power it held in 1913 involved not only a kind of inner crackup but a loss of firepower, or failure to control the spread of weapons once exclusively in Western hands. The decline is involved also with the failure of the European powers to look ahead and master new forms of command and control in remote regions, to develop a combination of military and political warfare as scientific as the doctrines taught by enemies of the West in the Lenin institutes.

Historically, the evolution of the West has been deeply involved with the evolution of arms and military command systems. Professor Eddy Bauer, a Swiss military historian, has described the intimate relationship of the Roman legion to the overall Roman order:

> Going no further back in history than the start of the Christian era, one finds that the Roman army held sway, guaranteeing order, security and peace throughout the entire Mediterranean world. The highly organized legions which, in the days of Augustus, numbered 30 major units all with interchangeable weapons, maintained the upper hand over such varied adversaries as Hannibal's mercenaries, the Macedonian phalanx inherited from Alexander and the mass rising of Vercingetorix.

When the legions were reduced to half their

former strength, and when barbarian contingents filled the ranks, Rome's decline set in. Thus Rome's political crisis was essentially a military crisis. Oddly, it was not that Rome's military adversaries were so formidable in numbers and equipment. The aggressors against Rome were generally few in number, but the defenders were even fewer. Moreover, the Roman military machine was in disrepair in many ways. Once the barbarians broke through the empire's outer defenses, they found little to impede them in the interior zones. This contains a warning for Westerners who in recent decades have seen the "countryside" of the world conquered by Communist revolutionary forces as they prepare to ring the inner citadels of the West.

The influence of weapons and military formations upon history has been enormous. Hellenism spread over the ancient world because of the phalanx. Military changes have brought about new social systems. Consider the establishment of heavy cavalry units after Charlemagne's time. To ensure the availability of these shock troops, the cavalrymen were granted land which they held on the promise to render service to their lord. It was therefore a military need that laid the foundation of the feudal system and new social relationships. The employment of new weapons also has had the most striking effects on the lives of nations. An example of this was the decision of Edward I to equip his infantry with a longbow capable of rapid fire. This military instrument enabled the English to inflict terrible defeats on the French at Crécy, Poitiers, and Agincourt. The ultimate in history-making through weaponry was the exploding of atomic bombs over Hiroshima and Nagasaki in 1945.

The great expansion of the West from the sixteenth through the nineteenth centuries can be attributed in large part to the monopoly that the Western nations had on firepower. They achieved a technological breakthrough on arms that allowed Europeans to penetrate and hold vast areas of the world. But before the nineteenth century came to an end, there were signs that the non-Western world intended to obtain the West's tools of power. Gunrunners found markets from the Western territories of the United States to the grasslands of south-central Africa. Custer's death at the Little Big Horn was symbolic of what would happen when backward peoples obtained modern weapons. In southern Africa, warlike Zulus obtained firearms and wiped out a British force at Isandilwana. Fanatic Moslems murdered Gordon at Khartoum in 1883. But European nations were strangely complacent about the non-Western world's interest in modern arms. They were almost exclusively concerned with the threat they posed to one another.

The Japanese were the first of the non-Western people to realize that modernization meant the acquisition of contemporary weapon systems of great destructiveness. By acquiring a modern fleet and learning how to handle it expertly, the Japanese were able to virtually destroy Russian seapower in the Pacific at the Battle of Tsushima Strait. The Japanese learned their lesson well. From that time on, they knew that a greater empire could be built on greater firepower. Imperial Russia learned nothing, however. It failed to modernize its armed forces, with disastrous—indeed fatal—results for the Romanoff dynasty in World War I. Had the czars developed a modern military machine, it is questionable whether the Russian Revolution would have taken place or, if it had, whether it would have succeeded. It was the shock of defeat at the hands of the Japanese that did much to undermine the confidence of the Russian people in the imperial government.

THE VITAL role of firepower in shaping history is still not recognized in many quarters. Critics of the American role in the Vietnam war repeatedly have come forward with the argument that you cannot bomb an idea out of existence. They have said that bullets will not stop revolutionary advances. In this connection, it is well to bear in mind the words of Professor Stefan Possony of Stanford University, that the Communist "use of violence must be preceded, accompanied, and followed by techniques aimed at demoralization and at preventing the enemy from using vio-

lence." Thus while Communism is an armed doctrine and while Communist use of violence has given it all its victories, the Communists use their political "transmission belts" to convince Westerners that counter-force is futile. Nowhere in history, however, is there any substantiation for the belief that it is futile to try to stop force with force. Indeed it is the organization of violence in military systems that always has been basic in effecting change in the world. Pre-World War II China was under the influence of an idea—the idea of democratic development; but this did not prevent Japan from conquering large parts of China and, in World War II, coming close to ultimate victory. It was only the existence of superior American firepower—from the South Pacific to Hiroshima—that blunted the Japanese drive. And at Hiroshima and Nagasaki the United States unquestionably *was* able to bomb out of existence the Japanese idea of conquest of Asia and the Pacific world.

The underdeveloped revolutionary nations —Communist China is the prime example— profess to believe that firepower has only limited application. Their spokesmen have worked very hard to convince the West that this is true. Indeed China hopes that the war in Vietnam will convince Americans that their vaunted firepower is useless against a revolutionary enemy in the countryside. But the successes that the Communists enjoyed in the Vietnam war were not due to a failure of Western firepower but simply to the long delay on the part of the United States in utilizing its weapons on sufficient scale and against significant targets. It is true that there is a certain equality in warfare between the forces of advanced and underdeveloped nations when warfare is restricted to rifles, machine guns, and mortars. The absurdity of Western nations limiting themselves in this way should be obvious. It is as though Europeans had attempted to conquer Africa in the nineteenth century, using only spears instead of the repeating rifle and the Maxim gun. The real Western advantage is in area weapons, the delivery of immense firepower over large areas in which guerrillas find concealment. It is these weapons, of course, that are most bitterly cam-

paigned against by the underdeveloped revolutionary states—understandably so as they are not prepared to counter these weapons.

But the Communist nations that are resorting to guerrilla war will have to reckon with the cybernetic revolution, that is, the control of machines by machines. The late Ralph McCabe touched on this in writing of the cybernetic revolution and backward nations:

> Military applications are of critical concern now and will be more important if, as some observers predict, conflict in the world tends to increase with population. This would suggest that the variety of military applications also will increase.
>
> Casualty-limiting applications are of first importance. In Viet Nam, the cost of locating guerrilla positions is high—in lives and time. A fleet of cybernetic automata, programmed to move out over a defined course and report on the presence of the adversary, would be more efficient than military patrol operations and less costly. Linked to artillery, this kind of cybernetic force would be a new weapons system —and a formidable deterrent.

With the development of electronic, infrared, and other sensors for detecting guerrillas, the underdeveloped revolutionary nations would lose one of their most important military advantages. Western firepower would gain in decisiveness.

What we have seen in recent decades is a narrowing of the military gap between the advanced countries and the underdeveloped revolutionary nations—partly because of the spread of automatic weapons to countries such as North Vietnam, partly because of the West's decision to restrict use of its most powerful weapons, and partly because of the idea that firepower is not a particularly significant factor in history-making. But there is no assurance that the military situation will remain unchanged.

As mentioned earlier, the cybernetic revolution will affect military systems. The West may shed its mistaken sense of guilt over possession of area weapons. Finally, there may be a new appreciation of the role of firepower in affecting political decisions in the world. If we have eyes to see and use them, we will not be misled.

This is not to say that the clock will be turned back. It would be foolish to believe that the conditions of 1913 will be duplicated in 1973, let us say. The power centers that have grown up in Asia and Africa will continue to exist in one fashion or another. China has awakened and is unlikely to return to sleep in the foreseeable future. But the gains that the emerging nations have scored since 1945 may not be matched by further significant power gains. The West may regain much of its supremacy because of the technical revolution and because of the underdeveloped nations' inability to pay for the latest stage of the industrial revolution.

It is clear that the United States, Canada, Australia, Western Europe, Japan, and the Soviet Union will go through an immense amount of cybernetic change in the decades ahead. These countries have the economic resources to apply machines to the learning process and the storage of information, to the control of industrial processes and the management of transportation. They will be able to eliminate costly man-hours, lay aside the slide rule, subject agriculture to a precise new kind of direction, obtain optimum yields from natural resources, and install new controls over machine-tool industries such as shipbuilding. In short, the populations of the advanced countries will have a rapidly rising income and will be free for other tasks.

Countries such as China, Indonesia, India, and the parts of Africa where European leadership is absent, however, are decades behind the advanced countries in overall industrial development. Thus, after several decades, although the military gap between the advanced and preindustrial countries may have narrowed, the technological gap may well be further widened as a result of cybernetic change in the advanced countries.

The *German Tribune* has rightly pointed out that "a world power of today is a country that can muster the tremendous material means needed to make modern missiles and nuclear armament, airforce, navy and army equipment with all basic formations, bases, ground installations, logistics systems; and, what is more, maintain them and modernize them continuously."

The process of continual modernization will put the greatest strain on the revolutionary nations that have become power centers in recent decades. Thus, unless the advanced nations are brainwashed into believing that firepower is not decisive in history, the atlases of the 1970's again may show the advanced states of the northern hemisphere occupying the central position.

Charleston, South Carolina

In My Opinion

USAF OFFICER EDUCATION IN COUNTERINSURGENCY

Colonel Thomas H. Curtis

COUNTERINSURGENCY became a by-word within the Air Force following President Kennedy's budget defense message of 28 March 1961. The President pinpointed the need for countering "subversive and guerrilla warfare" by trained military forces. When the White House National Security Action Memorandum appeared one year later, the Air Force directed that specialized training be provided to selected officers in the new arena of insurgency warfare. Air University responded with a formalized educational program.

Insurgency, at the outset, was to the Air Force a threat that never would assume the characteristics of a general or even limited war. As a threat, it is less obvious than either. Furthermore, its origins are imbedded in the social, political, and economic structure of a society. Nevertheless, the Air Force launched an intensive effort to develop and implement plans to provide selected officers with the im-

plications of insurgency in general and Communist insurgency in particular.

Over the past five years counterinsurgency (COIN) doctrine has developed slowly, and many officers in the U.S. Air Force have no clear understanding of what it is or should be. Furthermore, doctrine is dynamic—it must be updated continually. Therefore, the time has come to articulate the United States Air Force concept of low-intensity conflict. Clear guidelines must be established from which Air Force policy-makers can formulate actions to support the national objectives in conflicts similar to Vietnam and from which Air Force educators can develop meaningful curriculums.

COIN doctrine

The primary objective for air power in counterinsurgency warfare is to end the conflict as soon as possible on favorable terms and

at the lowest practicable level of intensity. This objective provides an insight into what is meant by "winning" in this type of operation: the attainment of U.S. political objectives, not the complete destruction of the enemy.

On the other hand, the pivotal point of the Air Force view of low-intensity operations is a firm conviction that success at any level of the spectrum of conflict is contingent upon the maintenance of a superior general-war capability. Air power must be capable of responding with whatever application of force is necessary. Unquestionably this basic tenet of Air Force doctrine must remain in clear and sharp focus and not become obscured as the student studies the complexities of insurgency operations. Of almost parallel importance, however, is a need to balance the general-war tenet with a declaration that the application of force will always be used to the selective degree required to achieve the objective.

To provide an example, we can draw upon the Vietnam experience. In no event should the Vietnamese Communists be permitted to conclude that the conflict in Vietnam will follow any particular course. The regime of North Vietnam should be absolutely certain of our response, but uncertain of the means we would employ. The conflict must be controlled by the United States, not the Communists. The Communists should not be able to predict either the magnitude or the type of weapons that would be used. The Air Force officer's thought pattern should be directed towards gaining and maintaining control and thus posing to the aggressor a risk too great for him to accept—the loss of his own military force.

In its continuing educational endeavor, the Air Force must persistently stress that there can be no artificial distinction between low-intensity forces and general-war forces. If such a barrier does exist and the reasons for eliminating it are not set forth, the interacting strength of these two facets of U.S. air power would be destroyed. Overwhelming force superiority is of paramount importance if we intend to deter an aggressor at each and every level of conflict. This concept does not preclude the building of conventionally equipped

forces when there is a necessity for such forces. The key to the argument is to stipulate that such forces must be considered additive to the existing nuclear capability. Conventional equipment for the Air Force should not be a substitute for nuclear delivery aircraft, but it should provide a dual capability. There is no assurance that nuclear weapons will not be introduced eventually, even if the conflict initially is labeled low-intensity.

Perhaps the most salient feature of any Air Force educational program should be the study of policy. The Air Force should emphasize to the student that any policy which appears to lower the risk of retaliatory action in the eyes of the aggressor will encourage his aggressive acts. It must be a firm Air Force belief that the one risk that is unacceptable to any Communist state is the threatened loss or neutralization of its military capability. Senator Everett Dirksen has recently urged "maximum use of American airpower against all significant targets in North Vietnam." He added, "We don't quarrel about being in Vietnam, but we have been there too long without getting decisive results." This does not suggest that the Senator was advocating total destruction of the Viet Cong or North Vietnam by U.S. Air Force bombing. The comment does suggest, however, that the Communists so far have been undeterred by any apparent or implied risk to their military forces.

the requirement

Air Force COIN educational programs should be aimed squarely at developing within the student an open mind that is receptive to the need for changes in doctrine, concepts, methods, and equipment. Furthermore, COIN operations should be discussed in seminars, schools, and Air Force educational activities as a type of combat that cannot be won by the usual techniques of conventional air warfare. In these discussions it should be emphasized that the essentials of COIN combat are high mobility, quick reaction, good reconnaissance —all under the limiting conditions of terrain and visibility. The strategic objective must be recognized as the need to win the support of

a civilian populace that is easily intimidated and whose loyalty is capricious in nature—a populace that is subject at any time to attack from guerrillas who dress and behave like peasants.

Present Air Force concepts and methods of communications also should receive a searching reappraisal. Are they effective in COIN operations? Is there a better way to communicate? One excellent example of new Air Force thinking toward old methods has been a novel employment of the ancient but reliable C-47 airplane. C-47's not only have been armed for use as attack aircraft in Vietnam but have been equipped with external loudspeakers so that while circling low they can be used to instruct villagers in remote areas. Perhaps there are many other such applications.

Key advantages favoring the use of air power in counterinsurgency warfare should be illuminated in Air Force instruction: jungle rebels, for example, are not equipped with an interception capability, and air superiority is thus practically assured. The disadvantages also should be stressed: targets are fleeting, hard to locate, and, in general, not subject to pattern bombing attacks. Some new thoughts on tactics could now be generated in the vitally important areas of reconnaissance and assault airlift. Should these two missions be considered equal in importance to the delivery of weapons on target? Another fertile field for new thinking is in the employment of close-support air power in counterinsurgency operations.

some suggestions

It requires little speculation to conclude that the United States will continue to be involved in low-intensity conflicts. As a logical outgrowth of this involvement, moreover, it appears that the Air Force educator must concentrate upon low-intensity conflict as a significant phase of study. The concentration must be upon doctrinal concepts and methods for the employment of air power in low-intensity conflicts. To accomplish this education effectively, new ideas are needed.

This writer has no quarrel with the established counterinsurgency training courses

within the Air Force. Unquestionably they are achieving the intended objective. The Air Force educational system, however, now must take an additional step. A new idea, the generation of a thoughtful analysis of Air Force doctrine, should be injected into every phase of instruction throughout the system. As former Air Force Secretary Eugene Zuckert recently observed, "There are thousands of first-rate minds in the Air Force that produce a tremendous range of original, stimulating thought." We should use those minds.

It appears that most Air Force officers have not had channeled to them the questions and the thought-provoking issues surrounding counterinsurgency. COIN problems need to be solved, and the educational system appears to be the most likely place to assign the task. The institutions are already established, the courses are developed, and the requirement exists for a continuing effort. The Air Force educational system, therefore, should seek out every new and unique means to identify and examine every Air Force doctrinal statement, concept, or method concerned with low-intensity conflict. The objective of this approach would be to relate these concepts to today's strategic variables surrounding this type of warfare. Where the concept or doctrine applies, it should be restated, if necessary, to reflect the current situation. Where there is a void, new ideas should be generated from which a method or doctrine could evolve.

The strategic diversity of counterinsurgency operations presents the Air Force with a host of problems that are new and different from those of all-out war. There has been wide appreciation of what air power can do, but the Air Force officer must be able to counter opinions that indicate disappointment because air operations have not been successful in ending the Vietnam war. The Air Force officer who understands doctrine realizes that air forces almost invariably are a vital element in achieving objectives but not the only element. He also knows that if that vital element is not employed in the degree and application for which it is designed, something less than total achievement of objectives must then result.

It is central to any effort in the Air Force

educational field to appraise doctrine continually. It is imperative that this appraisal be phrased in relation to counterinsurgency. Some valid questions could frame seminar discussions: What are the different strategic and environmental factors separating all-out war and low-intensity conflicts? What Air Force concepts would need revision if a low-intensity conflict should erupt in Latin America, Africa?

Such questions presently are not being raised within the Air Force educational system in the frequency and scope demanded. The USAF does not believe that low-intensity conflicts can be won by air power and air power alone. It does believe these conflicts can be *lost* without air power.

U.S. Army War College

A PHILOSOPHY OF NBCP WARFARE

MAJOR HARRY H. MALVIN, USAF (MC)

Foreword

This article, although broadly outlining a strategic campaign, is meant not as a system blueprint but rather as a portent of possibilities that are already within the state of the art and do not require astronomical budgets to develop or support. Since such a system is possible, it is time to consider countermeasures.

For those who consider the material unworthy of consideration for moral and ethical reasons, it is interesting to note that one of the earliest references to an organized biological warfare campaign is in the Bible. Coincidentally, it included a psychological warfare component, and apparently a chemical warfare one as well. It is also probably the first record of controlled escalation and is attributed to the Almighty. For those who wish to verify this allegation, see the story of the ten plagues, the onset of the Exodus.

CLAUSEWITZ, in his strategic primer *On War*, verbalized the concept that war was an extension of international relations by extraordinary means. Hitler demonstrated the validity of the converse corollary, namely, that a suitable dynamic foreign policy could improve the strategic position of a nation's armed forces and thus facilitate its operations.[1] The Communist powers standardized opportunism and coexistence in their armamentarium for practice of international relations.[2] These de-

velopments have resulted in the negation of the following logical equation:[3]

$$Peace = \overline{War}$$

and the substitution of four conditions for the earlier two, namely, Peace and not-Peace ($\overline{Peace}$) and War and not-War ($\overline{War}$), which bear the following relationships:

$$\overline{Peace} = War + [\overline{War} - Peace]$$
$$\overline{War} = Peace + [\overline{Peace} - War]$$

With this introduction, and with proper attention to Liddell Hart,[4] who describes the ideal battle as the one in which the general secures his objective without any casualties to his forces, the technic of the scenario as exploited by Kahn[5] will be used to develop a philosophy of NBCP operation from the point of view of the devil's advocate: to present a possibility so that effective countermeasures can be prepared. In this article the letters "NBCP" represent the *Nuclear*, *Biological*, *Chemical*, and *Psychological* armamentarium, with its full range of capabilities.

the scenario

The time, the year *Y*, is a suitable distance in the future (perhaps four generations). The national character of the world then is of no special consequence: it may be similar to the present configuration, it may consist of continental supernational aggregates, or it may consist of any intermediate configuration. The United Nations Organization may or may not be in existence.

For simplicity, attention is focused on two protagonists, Alpha and Omega. These nations have both advanced to a high level of scientific and technological development. Except for the limits of reasonable possibility, the state of development bears no special relation to their status in 1966. Further, Alpha and Omega may or may not be identifiable in the geographic or political structure of the world of 1966. Relations between Alpha and Omega were amicable until the year *Y* — 2, when strains began to develop and grow. At time *Y*, Alpha and Omega are at the point of opening hostilities.

The birth rate in Alpha began a logarithmic drop in 1966, and at present (*Y*) it is approximately one-quarter of the 1966 level. Concomitantly, the median age of the population has risen from approximately 30 years to approximately 50 years. This has effectively reduced the manpower resources available for maintaining a military force in-being and for manning the industrial resources available to support the military force.

Prior to *Y* — 2, a series of poor crops of feed grain resulted in increased slaughter of meat animals (beef, veal, pork, and poultry); and though the feed situation improved, there was a marked depression in birth rate and in meat production during the period *Y* — 2 to *Y*.

In summary, at the brink of a major conflict, Alpha finds itself deficient in the quantity and quality of human resources necessary to cope successfully with the situation.

What happened?

In order to explain the situation presented in the scenario, it is necessary to examine the grand strategy devised by Omega circa 1966. Convinced that Omega is destined to become pre-eminent and omnipotent on earth (and perhaps in the solar system) and equally convinced that all means designed to effect such a state are justified, Omegan planners, beginning in 1966, launched a covert attack against Alpha, the champion of the anti-Omega bloc.

The covert attack was implemented by a combination of NBC (nuclear, biological, and chemical) agents and directed at the population base of Alpha and the Alphan bloc.[6] During the years of amicable coexistence, manpower deficiencies in Alpha were covered by encouraging emigration from the Omegan bloc.[7]

Monitoring the effectiveness of the fundamental campaign by following the medical literature[8] and governmental statistics,[9] Omegan strategists selected an appropriate time for initiating phase two, the campaign against feed grain,[10] which created food shortages in Alpha and made the return home of Omegan emigrés both desirable and reasonable. The final effort against the meat produce industry was a veterinary modification of the antihuman effort initiated very early in the campaign.

Using psychological and motivational research technics, the subtle rumor, and a planned program of disseminating scientific and popular information, Omega exploits its strategic advantage and reduces the effectiveness of Alphan countermeasures.

the "program"

The program, as outlined, is designed to reduce the fertility of the human and livestock

populations of Alpha to an arbitrary level acceptable to Omega.[11] Assuming a birth rate of 25 percent of the selected base-line level to be acceptable, this program is theoretically attainable in a variety of ways:

(1) Seventy-five percent of the fertile female population could be eliminated, either physically or functionally.

(2) The period of female fertility could be reduced by 75 percent.

(3) Fifty percent of the population of both sexes could be sterilized, and then random selection of mates would produce the desired combination.

(4) The incidence of abortions, miscarriages, nonviable anomalies, and neonatal deaths could be increased.

(5) The foregoing methods could be combined in suitable proportions.

Considering initially the first and third possibilities, one realizes that no nation would consciously permit sterilization of a major portion of its population; yet the mumps virus is capable of producing gonadal atrophy, while the German measles virus and drugs like thalidomide are capable of teratogenic effects. Physiology texts list a number of gonadotropic compounds that are amenable to tagging with beta emitters, such as tritium, carbon 14, phosphorus 32 and 33, sulfur 35, chlorine 36, calcium 45, selenium 79, etc. As pure beta emitters, these elements would be difficult to detect without warning and could provide an excellent source of internal radiation to the gonads. It is also possible to create changes in subsidiary reproductive organs, such as the fallopian tubes, prostate, and epididymis, using agents like N. gonorrhoeae or radioactive tin or zinc. This second possibility is more difficult to arrange, but agents such as the oral contraceptives make it a possibility. This area is a variation of the first and third.

The teratogenic portion of the fourth possibility has already been cited in the first and third, while the neonatal death rate can be enhanced by infantile diarrhea, pneumonia, and a variety of other processes that can be induced by biological and chemical agents.

psychological aspects

With the overall objective always in view and sufficient operational details available, the psychological warfare expert can exploit the advantages as they develop in the overall campaign. The immediate objectives of the psychologists are to undermine the Alphans' confidence in their scientific and political leaders: to create unrest and disorder and ultimately to strain and exhaust the will to resist. To illustrate, assume that the public health officials of Alpha isolate, identify, and develop an antiserum against a specific agent in use; a report in the Omegan medical literature of a similar outbreak could also contain a statement to the effect that the proposed Alphan therapy was dangerous. Field agents of Omega would switch agents, on cue, and fatalities would develop among the treated population. Such an approach would be, to say the least, uncomfortable for the Alphan public health service, especially after it was leaked to the people by periodicals. A second exploitation could be in the vicinity of a major military support project, such as a special weapons plant. Following a suitable incident, reports of infertility, documented by biopsy of repatriated Omegan nationals whose presence in the key area was documented, could generate problems among employees of the plant. In the late phases, dissatisfaction with shortages of labor and food could be advantageously developed and manipulated.

THIS ARTICLE is purely an academic exercise on the part of the author. It outlines, albeit sketchily, a means of effectively employing biological and chemical (including radiochemical) agents, augmented by a psychological warfare campaign, to secure an ultimate military victory after a period of "peaceful" coexistence.

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Notes

1. Adolf Hitler, prior to opening of overt hostilities in September 1939, carefully laid the groundwork for Germany's subsequent military successes. By occupying and fortifying the Rhineland, Germany obtained steel and coal resources to maintain its war machine and also brought its fixed defenses face to face with those of France. By the *Anschluss*, Czechoslovakia was flanked; and Czechoslovakia became the flanker of Poland after Munich. The Russo-German accord provided for the dismemberment of Poland, etc.

One additional point of planning, though unsuccessful, is worth noting. Evidence was planted to indict Poland as the aggressor. This, together with the speed of the campaign, was designed to present the world with a *fait accompli* and to present the Western powers a graceful way out.

2. Opportunism and program flexibility have been causes of much strife in the Communist camp. Classical Marxists, of whom Mao Tse-tung is the present champion, tolerate no such compromise with Marxian dogma. Lenin, Stalin, and Khrushchev have not only compromised the differences between ideal and practical but also on occasion have resorted to domestic incentives, as well as international coexistence, in promoting the Communist state.

3. This equation in symbolic logic reads "peace is the class of all things which are not war (not-War)." The subsequent equations read "not-Peace includes all things which are war" and "those which are neither war nor peace" (cold war, for example), and vice versa.

4. B. H. Liddell Hart, *Strategy, the Indirect Approach* (New York: Frederick A. Praeger, 1954). This book gives the essence of successful strategy, with illustrations.

5. Herman Kahn (ed.), "Introductory Comments to Part II," *A Paradigm for the 1965-1975 Strategic Debates*, a report prepared for the Advanced Research Projects Agency, Director-ate of Defense Research and Engineering, Department of Defense, by Hudson Institute, Inc., Harmon-on-Hudson, New York, 1963; in "The Nature of Nuclear War," Chapter 2 of Vol. IV, *National and Military Strategy*, Air War College Associates Program, 1963-64 (2d edition), pp. 36-59.

6. Alpha and the Alphan bloc are terms used to represent a nation or group of nations. For purposes of simplicity, the world in the year Y is considered to be bipolar, Alpha and Omega.

7. Precedent is seen in the labor shortages in Germany which are relieved by immigration from Italy, etc.

8. Monitoring of case reports in the urologic, gynecologic, endocrinologic, and other medical journals published by the Alphans will provide a means of evaluating the effectiveness of the genocidal campaign. This will serve as a guide for implementing the subsequent phases and for employing the psychological warfare resources.

9. Census reports and local chamber of commerce publications can be utilized to augment the evaluation of the effectiveness of the program.

10. When the monitoring of data indicates that the desired level of efficacy has been reached, the second phase—the campaign against the food supplies—is to be instituted, first by reducing the population of breeding stock, then by reducing the fertility of the remaining animals in a manner analogous to the antipersonnel campaign.

11. Once genocide is recognized as the method of operation and the reliability of the weapon system is known, any effective population figure may be selected. "Effective population figure" represents only that portion of the population which can be mobilized in the defense of Alpha, either in industry or armed forces. Since no overt hostilities are involved, D-day may be opportunely selected with wide leeway.

Air Force Review

PERSONNEL MANAGEMENT RESEARCH FOR THE AIR FORCE

Colonel James H. Ritter

THE CONCEPT of personnel management as a more or less exact science, susceptible to a high degree of mathematical validation, is relatively new in American enterprise. As late as World War II the methods devised to select, train, promote, and retain employees, both in industry and in government, were largely intuitive, based on the personal experience and skill of the manager. Psychological testing had been established as a procedural aid, but the tests reflected mainly the insights of the psychologist into human characteristics, plus results obtained previously through trial and error by supervisors who had successfully directed great numbers of people.

The last ten to fifteen years have brought a radical change in managerial techniques. Increasingly precise measurements of aptitude, ability, and motivation have been introduced into the process of judging applicants and employees. These measurements have been developed by scientific research into human behavior. The tools that have made it possible to discover and apply these more rigorous management standards have been provided by advances in the techniques of statistical analysis, as a means of predicting performance, and by the use of computers to extract significant values from exhaustive files of recorded data.

The Air Force has been a leader in evolving and adopting these new methods. Although the ultimate aim of the Air Force in the management of personnel resources is to protect the United States and its allies from aggression, rather than to conceive, manufacture, and sell competitive products or services, the managerial problems and techniques of the Air Force in its use of manpower are essentially similar

to those of a large industrial corporation. In fact, if the Air Force is viewed simply as an organization composed of employees, it is one of the world's biggest and most varied. Considering only the 845,195 officers and airmen who comprised its active military strength on 1 April 1966, the Air Force ranks well ahead of the two biggest corporate employers, American Telephone & Telegraph (with 795,000 employees) and General Motors (with 734,594).

In the interest of its own effectiveness, within the budgetary limitations imposed upon it, the Air Force has had to look for ways to improve performance through selection, classification, and performance evaluation of all its people. The scientific agency that conducts these studies is the Personnel Research Laboratory, situated at Lackland Air Force Base, Texas, where nearly all airmen and many officer candidates receive their initial training. Itself a part of the Air Force personnel system, the laboratory is an operating unit of the Aerospace Medical Division (AMD) of the Air Force Systems Command. The laboratory's work is usually assigned, however, by the Deputy Chief of Staff, Personnel, Headquarters United States Air Force, and the findings go directly to the Pentagon.

The Personnel Research Laboratory has a close working relationship with the Air Training Command (ATC) and its Military Training Center at Lackland. The ever changing population of recruits passing through the center provides a pool of experimental subjects who can be drawn upon for studying the validity of the tests devised by the laboratory. Many of these tests are of primary interest to ATC, which uses them to channel the flow of incoming airmen and new officers to specialty training schools across the nation.

Indeed, the original group of psychological test experts from which the Personnel Research Laboratory has grown was established by the Air Training Command on 15 November 1941, to develop and administer tests for selection of aircrews. Although having gone through several reorganizations and name changes through the years, the laboratory completed 25 years of service to the Air Force this past November. Its professional staff has been composed of psychologists, educators, sociologists, mathematicians, and specialists in related fields, many of whom had attained or later attained positions of eminence in academic or industrial circles. During the war most of them were commissioned officers, but now about 61 percent of the 219 authorized spaces are civilian, roughly 7 percent officer, and 32 percent airman.

Almost all the laboratory's personnel concentrate on research and testing in one capacity or another. Of the 69 members of the professional staff, 24 have Ph.D. degrees and 35 more have master's. Only 11 airmen are assigned in strictly administrative duties. The preponderance of scientific and technical staffing (95 percent) is made possible by unusually streamlined organization. Overall management is by the Commander, his Executive Officer, and the Technical Director, a civilian scientist. Both technical and administrative services are combined in the Operations Office, which handles comprehensive research planning, publications, and preservation of records, in addition to routine administrative functions. The five specific areas into which the laboratory's work naturally falls are distributed among five research divisions:

Selection and Classification Division. In this the oldest area, going back to 1941, the laboratory develops and evaluates tests for the selection, classification, assignment, and performance of officers and airmen. On the basis of individual differences, the tests are designed to fit the subject into the position where he will be most effective.

Occupational Structures Research Division. Here the emphasis is on the job to be performed. The laboratory describes and evaluates Air Force occupations; structures them into career fields, specialties, and positions; analyzes the work accomplished in terms of the grade and pay which it merits; and from these factors determines the qualifications required to perform it properly.

Specialty Knowledge Test Division. This is the only division of the laboratory that administers an operational testing program for the Air Force. It develops and revises specialty

A computer programmer at the 6570th Personnel Research Laboratory, Lackland AFB, Texas, queries the Q-32 time-sharing computer in Santa Monica, California, for necessary data from its stored resources.

knowledge tests to determine the fitness of airmen for advancement in grade; distributes the tests to supervisors in the field; and scores the results in accordance with grade quotas established from time to time by Headquarters USAF.

Adaptability and Quality Evaluation Division. The interest here is in the broad area of personal adjustment to Air Force life and responsibilities. The division identifies, measures, and evaluates such individual factors as the subject's background, motivation, morale, aptitude, and response to specific situations, in a search for patterns that will predict the character of his performance and the likelihood of his promotion and retention. This research also supports the Human Reliability Program of the Air Force.

Statistical Methodology and Analysis Division. With a staff of 92 people, this is the largest division of the laboratory. Its studies are concerned with advanced mathematical and statistical methods in personnel management, with particular emphasis on computer techniques. These analytical procedures are applied extensively also in support of research carried on by the other divisions.

Scientists and technicians in Statistical Methodology are mainly responsible for operation of the largest and most valuable piece of equipment maintained by the Personnel Research Laboratory—the IBM 7040 electronic computer, with its files of research data now stored on some 5400 reels of magnetic tape. This computer already is outmoded for the work of the laboratory, so rapid is the increase in computer technology. Within the next year or so it will need to be replaced by a larger system with quadruple its capacity. In addition to the coded files now in use, approximately 15,000 square feet of records wait to be reduced to tape, at a cost of about $150,000. The 7040 computer, valuable though it is as a means of obtaining significant results from large collections of complex data, is limited to sequential operations; it can be programmed for only one research project at a time. When the laboratory wishes to obtain answers for one of a variety of continuing programs, drawing on a body of relevant data that have been previously assembled and stored, it turns to another, more sophisticated computer, located 1220 air miles away.

The massive Q-32 computer, owned by the Air Force and operated under contract by the Systems Development Corporation in Santa Monica, California, was designed and built by IBM as a key element in the SAGE system to provide early warning of attack. When it was no longer needed in air defense, the corporation made the computer available to a number of Air Force research organizations, among them the Personnel Research Laboratory. The advantage of the Q-32 is that it can accomplish parallel processing of as many as forty projects simultaneously for different agencies, drawing on separate blocks of programmed information, by the method known as "time sharing." The computer accepts commands from its clients in sequence, holds them in suspense while the processing is completed, and prints up to 119 characters of the response to each in turn until all the requested data have been transmitted.

Scientists at the laboratory in Texas con-

verse with the computer in California on a standard teletype keyboard, over a commercial microwave circuit leased by the Air Force. The service is almost as fast as when the questions are fed into the laboratory's own computer, provided they involve relatively simple tasks with small input and output, referring mostly to information already deposited in the machine. For larger and more complicated studies, in which great quantities of new data are exchanged, the home computer is more suitable. For one thing, its entire time is at the disposal of the laboratory, instead of being shared with many other users. For another, the flow of data between Lackland and Santa Monica is limited by the speed of the teletype printer, which is perhaps one-thirtieth as fast as the work done by the computer.

In most computer operations the prime factor affecting the rapidity with which answers are received is the efficiency of input and readout devices. Computer people define this problem by saying that the electronic brain is "tape-bound." The 7040 computer at Lackland is less tape-bound than the line to Santa Monica. Thus, the 7040 is a necessity for the laboratory, in spite of the convenience of the Q-32

in California for certain specialized inquiries.

The laboratory's unique file of officer and airman records, reaching back in many instances to World War II, constitutes its main source of raw material. They include, for example, test-score information on all airmen entering the Air Force since 1947; airman reenlistment and separation actions for the past decade; annual officer effectiveness reports, beginning in 1954; and similar follow-up material on airmen for the last several years.

If the laboratory wants comparative information on the educational levels of officers or airmen, the areas of the nation in which they grew up, their social or economic status, their skills, aptitudes, achievements in civilian life, or attitudes toward their work, it has only to consult these records, to choose a representative sample showing the characteristics whose effects are to be compared, and then to process the resulting mass of data through the computer, reducing it to statistical tables. The inferences drawn from these tables will help to predict the behavior of future officers or airmen having the same characteristics.

This presentation is of course a gross oversimplification of the studies compiled by the

Specialists assembled at the Personnel Research Laboratory from ADC, ATC, SAC, and TAC, assisted by a test psychologist from the lab, help devise tests for evaluating an individual's knowledge and experience. Such Air Force groups are convened periodically.

laboratory. It neglects, for instance, the rigorous and often abstruse mathematical procedures that must be deduced and then followed in assigning the proper statistical weights to the varied influences affecting a typical subject's performance. Nevertheless, this is in general the kind of determination which the scientists at the laboratory are making.

THE AIM of Air Force personnel management is, of course, to obtain the most capable people it can find, to train them in the jobs for which they are best fitted, and then to reward them adequately so that they will remain in the service to the end of their careers. This effort is complicated by many individual and social responses, not the least of which is the public attitude toward the military environment.

Throughout most of human history, from ancient times until perhaps two centuries ago, the military profession was a choice occupation for ambitious people. Military men usually were the heads of state and the leaders of society. They relied upon learned advisers, but policy decisions and actions were normally the responsibility of military persons trained to exercise command. There was then no problem in finding competent military personnel.

Since the industrial revolution, however, the occupations that enjoy the greatest prestige have come to be those in the upper levels of business management and in certain related professions, notably the law. Political leaders are drawn most often from these groups, while military service is relegated more or less to the status of a technical specialty that becomes briefly esteemed in periods of emergency.

As the armed forces have been made responsible for the development and use of vast scientific, technological, human, and material resources, their need for skilled managerial and operational talent has become increasingly acute. The personnel problem of the Air Force, then, is to attract and hold people with these qualifications. Upon the Personnel Research Laboratory devolves the task of discovering how this feat is to be accomplished. It is a basic objective in all the laboratory's programs,

most directly in selection and classification, which evaluate the incoming officer or airman and, later on, his fitness for promotion.

A recent study in this area aimed at the development of a management control system for Air Force Reserve Officer Training Corps detachments at civilian colleges and universities. The Department of Defense was concerned about the comparative costs of training AFROTC graduates at 188 institutions around the nation in relationship to their effectiveness and length of service. The cost varied from as little as $15,000 for a career-officer graduate of a small regional college to as much as $153,000 for a career-officer graduate of a large university of great national repute. The training cost by itself was not a reliable predictor of the long-term value of the graduate to the armed services.

The Personnel Research Laboratory turned to its data files as a means of evaluating the products of each of these institutions. Together with the academic standing of the college or university and the intellectual attainments of the graduates, the study considered such factors as the geographic, cultural, and economic backgrounds of the students. Along the way, some interesting facts were turned up. One was that the retainability of the graduate depended in no small degree upon his social and economic origins. If he came from a less prominent or affluent background and attended a regional college—perhaps on a scholarship—the outlook for his retention was more likely to be favorable. The reason inferred from this finding was that the Air Force then represented an opportunity for advancement, and the student might be expected to work harder in order to achieve it. Graduates of combined military and civilian schools also have been found to have a high retention rate. In such an institution, where the military commander and instructors usually exemplify the ideals of soldierly prestige and competence, the student gains a clearer view of the potential rewards from a military career than in a standard AFROTC unit at a predominantly civilian university.

Similar questions arise in research aimed at increasing the retainability of officers in professional specialties such as medicine, law, sci-

ence, and engineering. The retention rate for medical officers is particularly low. Most doctors remain in the armed forces only for the years to which they are committed and then go into civilian practice. Even though medical officers receive extra compensation in rank and pay (they enter the Air Force as captains, and flight surgeons draw flying pay as well), the military obviously cannot offer them either the financial return or the professional esteem which they can earn for themselves in private practice. Somewhat the same situation applies to many legal officers, scientists, and engineers.

Offsetting these disadvantages in some degree are the facilities provided by the military services for research and practice in exotic areas of medicine and science—for example, aerospace flight. Again, the armed forces afford opportunities for travel and experience in out-of-the-way places that few civilian specialists are likely to visit, such as the Asian countries. These are possibilities that appeal to certain temperaments, though by no means to all.

The Personnel Research Laboratory has been developing criteria by which to isolate and measure these factors, so that the Air Force may be able to attract and retain more professional people. So far, these studies suggest that the military may give too much thought to retention policies, as such, and not enough to finding persons with backgrounds and tastes that fit them for life in the armed forces and thus make them more readily retainable.

A continuing program of the laboratory in this area is known as "Project M." Based upon data showing the officer's aptitude, his education, the source of his commission, and his effectiveness reports for the past decade, Project M is a historical data bank identifying the many variable factors that determine his performance and the probability of his retention. Used for current evaluation as well as to predict success in the future, the file is revised periodically to bring the assessment up to date. Among other uses, Project M lends itself to cost-effectiveness analyses of officer procurement programs such as the AFROTC detachments and the Officer Training School. Also it evaluates the graduates of these programs in retention and performance characteristics.

An example of this kind is the study of officers entering the Air Force with college majors in science and engineering. From the Project M data file the laboratory can determine how many of these officers actually are employed by the Air Force in science and engineering assignments and how those in this group who are separated from the service after fulfilling their commitment differ from those who remain on active duty.

CLOSELY related to the task of weighing personnel performance is the process of appraising the jobs that the people perform. In the Air Force, as in other organizations, the measure of the man is his ability to handle the work assigned to him. It follows that the work must be assayed with equal care.

Defining the nature of the 600,000 different jobs in the Air Force raises a number of peculiar problems. For one, the jobs are continually changing, sometimes in response to the special needs of a commander, sometimes as a result of technological innovations. A man trained for a specific task may be diverted to another one in a different career field. Or he may find, upon reporting to his unit, that the work for which he was trained is now handled by a computer.

Traditionally, a job was described by having the person who performed the work write down what he did. Close analysis often showed, however, that jobs with different titles were essentially the same. Conversely, jobs with the same specialty code number might vary widely from one command or agency to another. When a man was transferred to the same position in a different organization, he might discover that the duties were outside the scope of his experience.
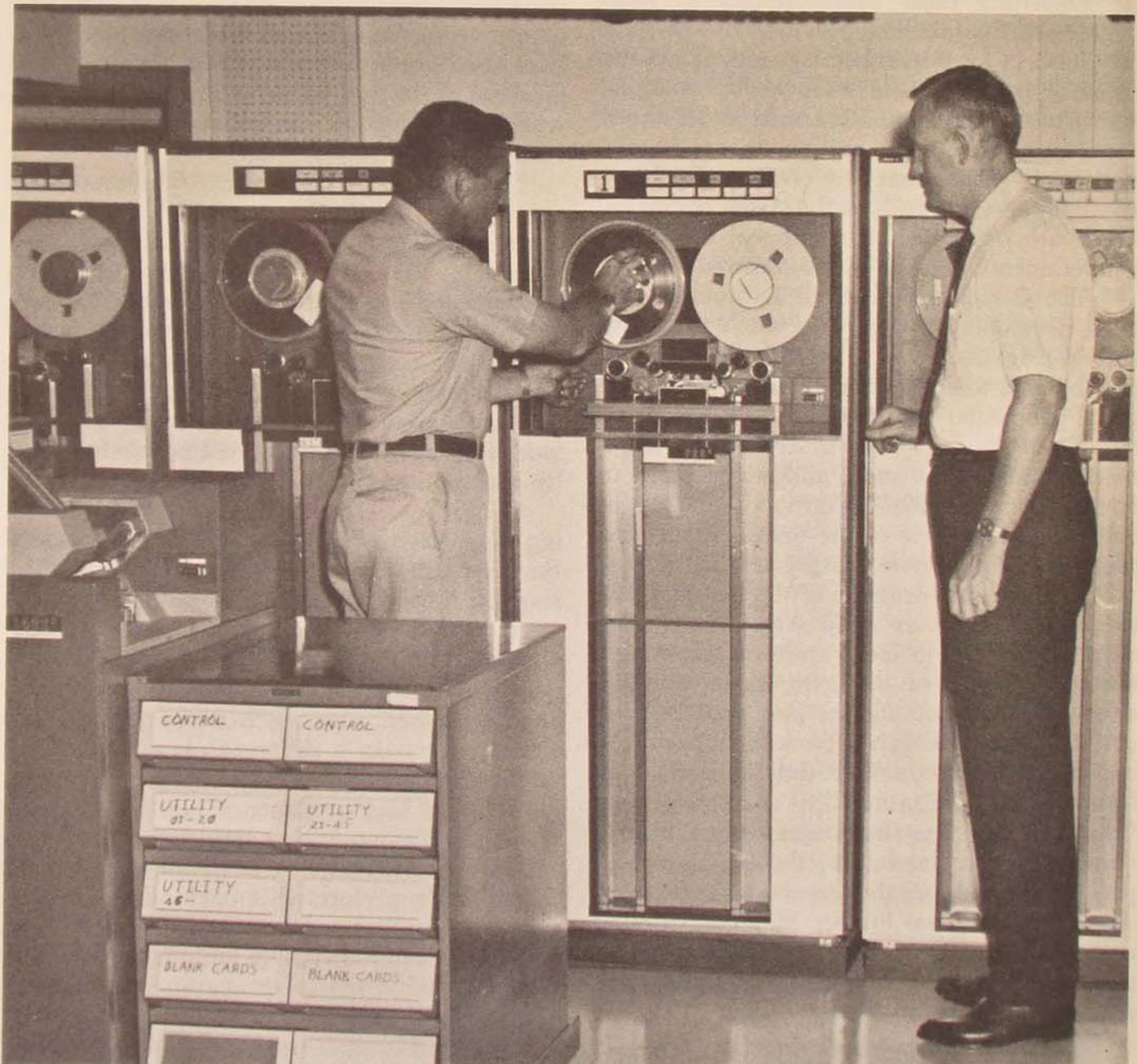
The Personnel Research Laboratory attacks these problems by developing an inventory of tasks performed in each officer utilization field and on each airman career ladder. Test control officers call in jobholders from the field and ask them to enumerate the amount of time they spend on tasks which they consider normal in their work and also to describe significant tasks which they perform but which

are not listed in the description. This information is recorded on magnetic tape for computer processing. The computer produces a consolidated job description of work done by people in particular commands, or at specific locations, or on given levels of experience or skill. Also the computer identifies persons who are performing essentially the same tasks and publishes their composite job descriptions.

Eventually the laboratory hopes to collect information showing the ability of each person to perform—or learn to perform—other tasks to which he might be assigned. Along with the task requirements for each job, this information can be used to establish an automated personnel reassignment system for the Air Force.

A senior computer operator assists in obtaining information for a research project.

The computer tape library at Personnel Research Laboratory contains nearly 5400 magnetic-tape reels, each reel storing the equivalent of two legal-sized five-drawer file cabinets full of personnel data.

Upon request from the Director of Manpower and Organization, Headquarters USAF, in 1964, the laboratory undertook a large-scale effort to formulate a scientific basis for the assignment of grades to officer positions. Job descriptions were obtained for some 80,000 positions in all the grades from lieutenant through colonel. From this file was drawn a criterion sample of 3575 descriptions.

A special Hq USAF policy board, composed of 22 colonels with a wide range of experience, was appointed to determine the appropriate grade for each job in the sample. The rating policy of the board as a whole was translated by the computer into a mathematical equation, giving numerical weights to all the factors that were found to be relevant in determining the grades of the jobs. The equation was then used to assign suitable grades to 10,000 more officer jobs. These results were projected to show the distribution of grades among different officer specialties and specialty groups. The information

tion assembled by the laboratory in this study was a contributing source of data to support the 1966 legislative program delineating officer grade requirements for the Air Force.

Administering the specialty knowledge tests used as a basis for the promotion of airmen is an end product of research conducted by the Personnel Laboratory since World War II, rather than a current experimental program. To the extent that it reflects continual refinements in testing techniques, the experimental work is done by research scientists in other areas, usually selection and classification, and then incorporated into the operational tests as they are periodically revised. The airman promotion system covers 691 specialties in 46 career fields. Some are too small to require written tests. Nevertheless, the laboratory maintains an inventory of about 450 separate tests for successive levels of skill from apprentice up through the supervisory grades to chief master sergeant. Revised every one to two years, they serve as the basis on which advancement is programmed for approximately 85 percent of the airman population.

To construct a series of revised tests for a specific career ladder, the laboratory calls in a team of three to fifteen senior noncommissioned officers from the field, on temporary duty for six weeks while working with the psychologist in charge of the project. After the tests have been reviewed and approved, they are published by the Government Printing Office and distributed to test control officers throughout the Air Force. The laboratory also scores the tests, averaging roughly 200,000 a year, most of them by machine scoring. Passing rates are established by Hq USAF. Promotion quotas for airmen are limited, as they are for officers, by the number of vacancies in higher grades of specialties and by the effort to maintain an orderly progression through the ranks. However, the scoring system is designed to see that the best-qualified candidates for advancement will be available to meet these quotas.

Retention of highly skilled airmen is, of course, a problem comparable to the one of holding officers with exceptional talents or administrative ability. In some respects the air-

man problem is more complex because of the larger numbers involved, the greater diversity of jobs, and the fact that the personal and vocational characteristics of recruits often are not so clearly indicated by their backgrounds or education.

Quality controls over the airman population are the particular concern of research in the area of adaptability and quality evaluation. The present program began in 1958, when the Personnel Research Laboratory was asked to make a study of the airmen discharged during that year as chronic offenders, or because their progress or behavior was unsatisfactory for other reasons, and to find out whether the personal factors responsible for their failure could be isolated for screening purposes. At that time the attrition rate for unsuitability was about 18,000 out of 100,000 recruits entering the Air Force each year. The accepted method of dealing with the problem was by counseling, punishment, reassignment to less challenging duties, and, as a last resort, discharge. The individual problem was rarely recognized until after the airman had received his basic training. So the cost to the service in dealing with these nonassimilable people was obviously high.

The laboratory turned to its files of airmen entering the service since 1956 and also to its data on re-enlistments and losses for the same years. Analysis showed that the dropout rate was highest among airmen who had not completed high school, especially in the 17-year age group with relatively low aptitude scores.

One result of this study was that the Air Force Recruiting Service changed its entry standards to give bonus points for recruitment of high-school graduates. From about 55 percent in the late 1950's, the proportion of high-school graduates among Air Force recruits has risen to more than 90 percent. Over the same decade the number of bad-conduct and unsuitability discharges has been reduced by about 5000 per year.

A corollary of this study was a project started in 1959 to find reliable methods of screening recruits for high-risk assignments in nuclear weaponry, security services, and intelligence. Some 10,000 new airmen every year were being routed into these sensitive positions, where the safety of the nation could depend upon their responsibility and discretion. The information obtained on their previous emotional or disciplinary problems was often sparse.

Again the laboratory recommended that none but high-school graduates be considered for these positions, not only because they were more likely to be successful but also because more information about them was usually available. An improved screening process was suggested: that if any psychiatric or behavior problems turned up in the airman's record, either before or after his entry into the Air Force, he would be assigned automatically to other duties of a nonsensitive kind. The alternative jobs were not necessarily less attractive to the airman; often he would find them more agreeable, if less exacting, than the high-risk positions.

These recommendations were adopted. But the report of the laboratory went beyond the obvious improvements in screening. It called for a background investigation of the airman's disciplinary and adjustment problems before he had entered the Air Force, starting with an airmail letter of inquiry to his high-school principal. (It was found, incidentally, that such letters almost invariably were answered fully, frankly, and promptly.) The mere fact that the investigation was begun would often lead the airman to reveal incidents in his background which he had not mentioned in the routine screening.

This procedure, known to the laboratory as the Human Reliability Program, also has been adopted by the Air Force. The Air Training Command activated the Assessment Branch of the Personnel Processing Squadron at Lackland in January 1966. In effect a specialized investigative service, it saves the Air Force an enormous amount of time, money, and administrative work by identifying potential security risks before they enter technical training or are assigned to sensitive jobs. The airman's record is in no way harmed by the investigation. If he is diverted to other duties of a less responsible type, he is saved from the possibility of a later security breach that could lead to disciplinary action or a dishonorable discharge. The investigations also provide the laboratory with data

on the background problems of recruits, from which more refined selection procedures are being developed. With these procedures it is possible to predict the influence of the airman's home environment on his future career in the Air Force. A similar program now is being extended to the other military services.

Fʀᴏᴍ ᴀʟʟ these studies in different areas of personnel selection, adaptation, and performance, the Air Force hopes eventually to obtain a computerized model of the entire personnel system, including all ranks, all jobs, and all identifiable factors that could affect the efficiency of an individual unit or the service as a whole. With such a model it will be possible to foresee not merely the probable result of a specific policy or situation in a single area but also the long-term interaction of different policies or situations in many areas. Future personnel problems then may be identified and solved in advance.

The development of this comprehensive model is the task of specialists in statistical methodology and analysis at the laboratory. Theirs is the responsibility for the advanced mathematical techniques by which nearly all the laboratory's present-day studies are accomplished. Projects in other areas of personnel management often are given to these scientists, particularly when they involve the manipulation of large quantities of complex data to reach an early decision or policy.

One such project in the last two years was the program known as Top-Flow. The problem was how to provide for a great number of earned promotions of airmen from the lower grades, in the face of an apparent stagnation at the upper levels. A change in current promotion policies would involve a vast amount of administrative effort. The laboratory ran a broad sample of the airman personnel structure through the computer, testing hypothetical effects of different promotion plans. It was found that increasing numbers of master sergeants could be expected to retire within the next several years, relieving the pressure at the top. Thus, no action would be necessary; the problem would resolve itself. That this was the cor-

rect answer is shown by the latest quota list for airman promotions. From 136,068 in 1965, the quota had risen to 264,246—an increase of more than 94 percent.

The Air Staff handed the laboratory an even more urgent question for statistical analysis in February 1965, on the eve of the annual budget hearings in Congress. What would be the long-term effects of a general increase in pay on recruiting and retention of officers and airmen? Here the key factors were the quality levels of the jobs to be filled and of the people required to fill them, not only at the present time but in the foreseeable future as well. Other factors were the trends in re-enlistment rates, the value of Air Force training and experience in civilian employment, and the cost of the pay increase compared with the cost of recruiting and training new personnel. In only nine days, by an all-out effort at the laboratory, the Air Staff had its data. The pay increase was recommended to Congress, supported with firm figures projecting its economies into the future. The bill was enacted into law and became effective on 1 September 1965.

It takes only a casual acquaintance with the studies carried on by the Personnel Research Laboratory to answer the criticism most often directed at computer techniques: that they take the human element out of personnel management. If by "human element" is meant the recognition of individual identity, the critic is, of course, right. The computer does not examine the unique personality of a single human being in depth, as a novelist or a biographer does. But in a vast collection of people such as the Air Force or any other large organization—or indeed society as a whole—the personality of a single human being rarely is known fully except to the immediate circle of his associates. To achieve this kind of recognition, there is no substitute for direct contact between one person and another.

The peculiar virtue of the computer is that it has the capacity to single out, remember, and compare the individual traits of many different people. Before the computer, when a large organization attempted a statistical study of its employees, the tendency was to establish an ideal against which they were to be meas-

ured and then consider only their conformance to or departure from this norm, which was assumed to be the standard measure of success. The bias was in the direction of conformity, toward the submergence of individual character in the type. With the computer, on the contrary, it is possible to establish the existence of many divergent types, possessing more or less of certain traits that combine to fit the people into different functions at varying levels of responsibility within the organization as a whole. The computer is a much more flexible instrument with which to view the heterogene-ous nature of society, whose every member is in some degree exceptional.

Considered in this light, the computer is not the enemy but the ally of human individuality. It may find a useful place for a person who once would have been considered an eccentric and looked upon askance in consequence.

As one of the few institutions making large-scale studies in this field, the Personnel Research Laboratory has been a pioneer in the art of evaluating the whole man for his employer—the U.S. Air Force.

Personnel Research Laboratory, AMD, AFSC

THE PAPERWORK PROCESSING DILEMMA

Major James M. Wheeler

WHO IN the Air Force, or in any of the services for that matter, has not been utterly frustrated by the excessive time it takes a document to travel from one part of an installation to another through distribution channels? Who has not decided, on more than one occasion, it was worth the time to hand-carry a document rather than wait until it finally wended its way through distribution? What person, having observed the manual shuffling and sorting of paperwork in a distribution center, has not marveled that any of it got to its proper destination? If you nodded affirmatively to any of these questions, then welcome to the club—it has a large membership.

The slow paperwork processing system that we live with in the Air Force constitutes a dilemma to everyone, even the administrators who are its prime operators. It is cumbersome, error-prone, wasteful of manpower, and unresponsive to real-time needs for information transfer. Actually, the system is little changed from ancient times. It is a manual system— "in one box and out another"—whose speed is largely dependent on the working whims of individuals. The system is riddled with stop points where paperwork rests in one location for several hours awaiting the next pickup. And for some strange reason, people seldom get excited enough to do anything to better the situation.

Although this description may sound harsh, it is only too accurate. However, my

purpose here is not to condemn the system for its shortcomings. Rather, it is to examine possible methods of rectifying them. Fortunately, as this article will demonstrate, a number of such methods are available.

To its credit, the Directorate of Administrative Services, Headquarters United States Air Force, has introduced a number of refinements to the manual system of processing in the past fifteen years, some of which have made a significant contribution to improving the speed of paperwork processing. The official histories of that office reflect these more important refinements:

• 1953 — The dimensions of standard-sized and legal-sized paper were specified, to increase the ease of handling.

• 1957 — Postage stamps were no longer required to be affixed to mailing material. — The phrase "FOR THE COMMANDER" was adopted for *all* correspondence requiring an authority line.

• 1959 — Air Force Regulation 11-14, "Recording and Controlling Written Communications," stressed a "source-to-user" concept for paperwork, replacing the more roundabout "command channel" concept.—Preparation of receipts for most CONFIDENTIAL documents was eliminated. — A revised edition of Air Force Manual 10-1, *Preparation of Written Communications*, introduced a single format for all letters and intraheadquarters memorandums. — AFM 11-4, *Directory of Addresses*, introduced a simplified format for addresses on correspondence.

• 1960 — AFM 10-1 was revised to allow a reply to be handwritten on a letter and returned to the sender. — A multiple-address letter was sent to Directors of Administrative Services at all major air commands offering suggestions for speeding the delivery of messages from writer to reader and urging that they seek more efficient processing procedures for both incoming and outgoing messages.

• 1964 — AFM 10-2, *Management, Use, and Preparation of Air Force Messages*, was revised and expanded, incorporating instructions contained previously in other publications.

• 1965 — AFM 10-1, *Preparing and Processing Written Communications*, was revised, incorporating material from two other publications.

Despite improvements made by the Air Force Directorate of Administrative Services, the paperwork processing system is still plagued with the inherent deficiencies of a manual system. The deficiencies constitute time-consuming roadblocks that seriously impede the flow of paperwork. The first two such roadblocks are the frequency and means of delivery. These are usually the most time-consuming aspects of paperwork processing because they represent the time periods when paperwork is either being delivered or is in an inert status awaiting pickup. It is axiomatic that the more frequently pickups and deliveries are made, the faster the paperwork is processed. Yet this obvious fact is given all too little attention by most Air Force units. Emphasis on frequency and means of delivery is also conspicuously absent in our Air Force manuals and regulations. Until greater emphasis is given to the need for more frequent pickup and delivery of mail and messages and to the means of delivery, the need is likely to continue.

frequency of delivery

Greater frequency in pickup and delivery of paperwork is a problem that good management and scheduling can best solve. Were it my responsibility to set an Air Force-wide standard, I would require that at least one pickup and delivery per hour be made from mail and message distribution centers in an organization. For some staff agencies in larger units, even more frequent trips to distribution centers would be warranted. The Directorate of Administrative Services, Hq USAF, learned this in 1961, as witness an extract from its official history:

Prior to 1 January 1961 the Air Force Mail Center made only four mail deliveries and pickups per day to Air Staff offices located in the Pentagon. This service was inadequate. . . . Through better management and control, we are now averaging six trips per day . . .

decreasing the transit time of this mail as much as two to four hours. Within the next month the Air Force Mail Center plans to make eight pickups and deliveries daily.[1]

One aspect of the problem is that Air Force people, for the most part, have not been conditioned to expect a rapid flow of paperwork, especially intrabase or intraunit. Most units and staff agencies content themselves with about four trips daily. Six to eight trips a day is certainly the exception. Lack of sufficient clerical personnel to make more frequent pickups and deliveries is the most commonly heard explanation, but not the only one.

One way to improve the speed of processing would be for a unit to have one or more members of the distribution center report to work before normal duty hours start. They would pick up all messages from the base communications center (and mail from the local post office when possible); sort, process, and route the material; and place it in distribution boxes ready for pickup by staff agencies prior to the beginning of duty hours. Designated persons from the staff offices of the organization would report to work fifteen to thirty minutes early so they could pick up, process, and route the mail and messages for intraoffice purposes. Thus, when the regular work force arrived, messages and correspondence would be ready for their review and action.

means of delivery

"Means of delivery" refers to the methods, devices, and equipment used to transport paperwork from one location to another. At present there are relatively efficient means of delivery from one base to another. Especially noteworthy is the Automatic Digital Network (AUTODIN), which is the primary network for electrical message transmission. AUTODIN is certainly responsive to the need for rapid delivery of information, and further development of communications satellites is expected to increase this capability even more. The problem is that AUTODIN terminates at the base communications center. From that point, manual means of delivery is usually employed. Some units have had "pony" circuits installed con-

necting them with the base communications center, but these units are the exception. Air Force policy discourages installing such circuits because of their cost.[2] Pneumatic tubes have sometimes been constructed between a unit's message distribution center and the base communications center to allow rapid message delivery. This, too, is the exception, and again cost is the usual inhibiting factor. When pony circuits and pneumatic tubes are not available, personnel acting as couriers perform the delivery. The cost of these human couriers is not as easy to tabulate as that of the hardware delivery systems, and they do not have to compete with other base installation and engineering projects. As a result, we perpetuate manual methods of delivering intrabase messages and correspondence.

It is quite possible that automated equipment could be obtained if administrators made a more determined effort to acquire it. This is usually difficult to do, primarily because administrative functions usually hold a low priority and administrative personnel are usually among the lowest-ranking members of a unit's staff. Another reason administrators are not inclined to make a strong effort to obtain automated systems is their lack of orientation towards automation. Since administrators usually inherit a manual delivery system from a predecessor and have always worked with manual systems in the past, they tend to remain manually oriented. I observed an interesting departure from manual orientation at the Air Force Academy. Persons assigned responsibility for operation of the base supply activity looked over the plans for their quarter-mile-long building and specified that they needed a pneumatic tube system for intrabuilding paperwork distribution. As a result a pneumatic tube system was installed, which has proved to be highly useful for rapid paperwork processing and delivery. On the other hand, in the main administrative building and in adjacent buildings in the cadet area, which housed the superintendent and key staff, no provisions were made for a pneumatic tube system. There manually pushed distribution carts and couriers provide the means of delivering paperwork. I do not mean to infer that the adminis-

trators at the Academy were remiss in not obtaining a pneumatic tube system as their supply brethren did; that would be unfair. But this example does point up a difference in orientation towards automated equipment by these two groups and also shows what can be obtained in the way of automated equipment with a little determined effort.

coordination process

Another major roadblock to rapid paperwork processing is the coordination or staffing process. This is the common procedure of circulating outgoing letters and messages through other offices and staff directorates for their coordination and approval prior to dispatch. Although considered essential by most units, the coordination process is usually excessively time consuming. This is true even when communications are hand-carried through the coordination process.

In 1962 a study of Army paperwork processing procedures was made by the Franklin Institute of Philadelphia.[3] The study revealed that it took an average of 8.5 hours to coordinate and process an outgoing message and 15.5 hours for an outgoing item of correspondence. Significantly, the study also revealed that over 92 percent of all the outgoing communications were not changed during the coordination process. In those that were changed, over half the changes were considered nonessential. Only 3.4 percent needed essential changes.

The Franklin Institute study proposed a remedy for the slow processing of paperwork caused by the coordination process. The proposal was to dispatch the original copy of the outgoing communication direct from the office having authority to release the communication to a transmission agency for mail or electrical dispatch. Coordination would be accomplished by *ex post facto* review of copies distributed by the preparing office. In the few cases requiring essential changes, a follow-up message could be sent. Likewise, incoming messages would be sent direct to the action office indicated in the address element, and information copies forwarded to other interested agencies. The Franklin Institute study pointed out

another roadblock to rapid paperwork processing: the organizational arrangement in the Air Force (and the Army, but not in the Navy) whereby administrative services are responsible for processing and mail services, and communications services are responsible for the electrical transmission of messages. This division of responsibility impedes rapid processing by causing the duplication of record keeping, handling, and delivery. The remedy suggested by the Franklin Institute is to establish a single agency on an installation to accomplish all interbase transmission actions. This transmission agency, called the Unified Transmission Management (UTM) in the study, would control both electrical communications and mail facilities. Units and staff activities serviced by the UTM would be required to prepare communications in a single format. On receipt of the action copy, the UTM would scan its contents to determine its importance (precedence), check the electrical transmission networks to determine saturation, and then select either mail or electrical means as the medium of transmission.

These and other recommendations of the Franklin Institute study have interesting possibilities for speeding paperwork processing, but unfortunately neither the Army nor the Air Force has tested the concepts and they remain untried proposals.[4]

Other roadblocks to rapid paperwork processing include such matters as preparing classified document receipt forms (AF Form 310); reproduction of letters, messages, and other documents, which often holds up paperwork several days; distance of units and offices from mail facilities, message centers, communications centers, and similar distribution activities; number of addressees; length of communication; selection of the proper action office and the offices requiring information copies; and other similar matters. All of them play a significant role in paperwork processing, and all are time-consuming activities.

automation the answer

One fact should be rather obvious at this point: manual methods of paperwork process-

ing have very limited capabilities for providing rapid service. Radical improvements in speed of processing can be achieved only by automating the process. Other agencies of the Air Force and the government have realized the need for and value of automation. Personnel has automated record keeping; supply agencies are able to do business on a worldwide basis using automation; electrical communications processing and transmission are largely automated; pay, reports control, and other comptroller activities depend on automation; missiles are launched with automated equipment; and even aerial warfare takes advantage of automation to perform intercepts and bomb runs. The list of activities using automated systems and devices is almost endless. Yet administrative activities are still almost wholly dependent on manual methods and procedures.

A number of commercially produced devices offer potential for use in paperwork processing. For example, several companies manufacture an electronic device designed to transmit handwritten messages instantly from one location to one or more other locations by use of a wiring circuit. The message is written with a metal stylus on the transcribing machine and is recorded at the receiving location on a paper roll or special form. This system offers the advantage of high-speed delivery of written communications, provides a permanent record, eliminates work interruption since receivers can be left unattended, allows two-way communication, and reduces the need for a pickup and delivery service. Civilian concerns are using the device, and Air Force ground-controlled approach units use it as a medium of communication between equipment components.

Another type of device with potential for speeding paperwork processing is facsimile. As one example, Western Union Telegraph Company offers two facsimile services. One is called Desk-Fax, a facsimile machine on the desk of a subscriber that gives him direct connection to the nearest telegraph office. This device makes it possible to send and receive telegrams in picture form. A second service, called Intrafax, is a two-way facsimile communications system that enables subscribers to transmit letters, pictures, charts, and similar material and have them exactly reproduced at a distant receiving point. Similar services are available from a number of other companies that use telephone lines for facsimile transmission. Facsimile systems are being used by the U.S. Weather Bureau, Air Force Weather Service, National Aeronautics and Space Administration, and many other public and private organizations.

With these devices speed of paperwork processing is principally aided by a direct sender-to-receiver procedure, thus bypassing the manual processing points. This method is one way of expediting processing, although it would have only limited application in the Air Force. A more practical approach to Air Force needs is to automate processing in distribution centers. Fortunately, development and testing of systems that perform this task are currently taking place. Two such developments are worthy of discussion.

Automatic Message Processing System. The first is a practical test of a futuristic communications processing system presently being conducted at the National Military Command Center (NMCC) in the Washington, D.C., area. A test system known as the Automatic Message Processing System (AMPS) has been installed which provides expeditious message processing and delivery. The system was developed under the direction of the Defense Communications Agency (DCA) by the Burroughs Corporation and is designed to (1) expedite teletype and data communications, (2) give priority to high-precedence communications, (3) insure against degradation of security or internal control of messages, (4) be compatible with existing systems and operations, (5) be capable of subsequent expansion, and (6) interface with AUTODIN.[5]

The Automatic Message Processing System allows completely automatic handling from the time a message initially enters the system until it arrives at the point of final delivery. Incoming messages are routed automatically to all internal addressees of a headquarters, provided internal routing instructions are in-

cluded in the message by the originator. When routing instructions are not included, the message is sent to one of several operators stationed at message display consoles. A console operator can view the message, displayed on a cathode-ray tube, and determine from its contents who the action and information addressees should be. By depressing keys on the console, the operator can indicate on the message the routing instructions and other annotations desired. After this action, the message is released from the console and returned to the system for automatic distribution. Messages that had internal distribution instructions and were automatically distributed are given *ex post facto* review by console operators to check the correctness and completeness of the distribution. If changes are required, the console operator makes additional distribution or advises an office if a message was erroneously dispatched to it.

Outgoing messages are also automatically processed. When a message is typed on a DD Form 173, *Joint Messageform*, by the originator, it is simultaneously transmitted to the AMPS and stored. When the AMPS recognizes the electrical signature of an authorized releasing authority, the message is automatically converted to an electrical communications format and dispatched.

Other features of the AMPS include a capability for message file and retrieval, message edit by console operators, intercept of messages not prepared in the proper format, maintenance of accountability for classified messages, compilation of a variety of statistical data concerning the operation of the system, and extremely high dependability—only a fraction of an hour of downtime per year. The system also has the capability of accepting messages from an optical scanning device in lieu of a typewriter. Needless to say, AMPS is a major step towards reducing message processing time.

On Base Data Processing and Distribution System. A second development to automate processing procedures is a promising effort initiated by Air Force Logistics Command (AFLC). On 1 July 1964 AFLC submitted a pro-

posal to Headquarters USAF to develop an On Base Data Processing and Distribution System (OBDDS) that would use data-processing procedures to reduce the manual processing and delivery of intrabase data. AFLC reported in its initial proposal that studies had revealed that duplicate orders and lost data records were inevitably traced to clerical and administrative errors in manual processing. The OBDDS proposal would eliminate manual processing by having a data system interfaced with the common user system of the base (AUTODIN) that would accept incoming messages and, by examining the routing information within the message, process the message to all on-base addressees. The system would also provide an intrabase routing and transmission service for all data generated by base activities. In its ultimate configuration, the OBDDS was expected to be able to process and transmit all types of administrative traffic, such as forms, letters, memorandums, and similar paperwork, both interbase and intrabase. The study was vague as to how the latter type of traffic would be carried, but it was optimistic that no insurmountable problems would develop.

This proposal has received Air Force approval for study, and Air Force Communications Service has been working jointly with AFLC on the system. If On Base Data Processing and Distribution System is given final approval for development, it could be expected to be operational on AFLC bases sometime in the early 1970's.[6]

These two examples give a glimpse of the potential improvements that automation can contribute to paperwork processing. The AMPS tests and the feasibility studies of OBDDS indicate that high-speed ultrasophisticated processing is well within the bounds of today's technology. There appears to be considerable promise that paperwork processing can and will ultimately be automated and improved to the extent that it will no longer be considered the major impediment to speed of communications.

One final matter deserves mention, and that is the cost of obtaining automated processing systems. There is no denying that automated processing devices will be costly to

procure, just as other automated systems used in the Air Force have been. AUTODIN, for example, is an expensive system. In fact, the principal complaint heard by the Defense Communications Agency concerning this system is its high cost. Officials of DCA are actively negotiating to reduce AUTODIN charges.[7] It is important to note, however, that the military is still willing to pay a large fee to obtain the advantages offered by a real-time transmission system. This is because the cost, even though high, is not unreasonable in relation to the need and the increased efficiency. This same rationale, therefore, makes it inconceivable that the real-time benefits provided by AUTODIN would be allowed to expire at the base communications center when comparatively modest additions to the system would allow the real-time advantage to be extended over the entire communications path, i.e., from the originator to the ultimate recipient.

ONLY ONE conclusion can be drawn from this presentation: there is a clear need for imaginative, practical, and energetic actions to radically update and improve paperwork processing procedures so that this phase of the communications chain will be as responsive to the need for real time as is the transmission phase of the chain. This cannot be accomplished by further refinements to the present manual systems; it must encompass dramatic breakthroughs that make optimum use of automation and new concepts in communications. Hopefully, rapid progress will be made to realize these improvements and thereby remove the primary cause of the paperwork processing dilemma.

Hq United States Air Force

Notes

1. *History of the Directorate of Administrative Services, 1 January 1961 to 30 June 1961* (Washington: Headquarters United States Air Force, undated), p. 10.
2. Air Force Manual 100-21, *Management and Use of USAF Communications* (Washington: Department of the Air Force, 20 November 1964, as amended), paragraph 2112.5e.
3. Joel N. Bloom, Clifton E. Mayfield, and Richard M. Williams, *Modern Army Communications*, Final Report of an Operation's Research Study of Army Communications (Philadelphia: The Franklin Institute, 1962).
4. This fact was confirmed by the Directorate of Communications, Department of the Army, Washington, which is the office that initiated the study.

5. *Technical System Plan for Phase II Automatic Message Processing System (AMPS) (U)* (Washington: Department of Defense, Defense Communications Agency, 26 October 1965).
6. "Feasibility Study of the On Base Data Processing and Distribution System Concept," prepared jointly by Air Force Logistics Command, Wright-Patterson AFB, Ohio, and Air Force Communications Service, Scott AFB, Illinois, with forwarding letter to Hq USAF (AFAAC), subject: "On Base Data Processing and Distribution System (OBDDS)," 22 Oct 1965.
7. Colonel Lee M. Paschall, USAF, "AUTODIN and AUTOVON: Management and Implementation," *Signal*, March 1966, pp. 29-30.

Books and Ideas

UNEQUAL NEIGHBORS AND NATIONAL SENSITIVITY

Dr. Stanley W. Dziuban

FORMER Ambassador to Canada Livingston T. Merchant must have had trouble choosing an appropriate title for his recently published collection of essays on United States–Canadian relations. I have puzzled over a more suitable alternate and produced the one borne by this review. *Neighbors Taken for Granted*† as a title seems hardly even half correct. Indeed the United States may in some areas take Canada for granted, but the reverse is not often true. Large portions of the book discuss the cultural and economic invasions and other problems which generate continuing Canadian concern.

The reasons for this "taken-for-granted" attitude and for others which characterize U.S.–Canadian relations have been extensively analyzed by writers on history, geography, demography, politics, commerce, and so on almost ad infinitum. It seems to me that perhaps the attitudes remain now only to be psychoanalyzed.

Many of these attitudes can be found in the Merchant book. "Americans, then, are un-informed about Canadians, but infinitely well disposed, and, too often, infuriatingly patronizing." Accordingly, most American writers feel impelled to engage in some breast-beating after they confess that the principal solid fact held by Americans about Canada is that it is the source of all our cold fronts. America is said to be indifferent to Canadian sensibilities; Canada to be fearful of her national identity, economic integrity, and political independence. ". . . America's closest neighbors . . . apparently feel that there has been a failure of communication across the border." The list of virtual clichés can easily be extended.

The American attitudes are viewed as unnatural, if not somehow sinful, and as reserved exclusively for Canadians and none other. The Canadian concerns are accepted as historically indisputable. Take, for example, fear for Canadian political independence. Looking back 100 years to the time of Canadian Confederation in 1867, one can indeed find a few expressions of American ambitions in that direction. But there is only a handful of them. Most fre-

quently quoted is House Speaker Champ Clark's 1911 hope that he would one day see all North America under the American flag. We surely must know on both sides of the border that, under our democratic processes, isolated aberrations of this kind are not only inevitable but without significance. Furthermore U.S. politicians have no monopoly on them.

As to Americans' failure to understand Canada and Canadians, the trend may get worse before it gets better. With the increasing tempo and complexity of our personal and official lives and environments, an individual's attention must be measured out by priorities. Call it management by exception, or greasing the squeaky wheel, or whatever you will, an individual will look first at his personal problems and those public problems which most affect him. In world events, it is unfortunate but true that the situation in a remote, newly emerged African state whose location, capital, or ruler the average American (or Canadian) cannot identify may have implications for world peace and security more significant than events in Canada.

In international dealings, the United States will be the usual major focus of Canadian attention. This is the inevitable result of the disparity in size and the facts of North American economic and geographic life. The United States on the other hand in scanning a 360° horizon will more often than not find its priority problems in directions other than the north. The best we can hope for is that there be adequate channels of communication for our official dialogues as well as competent personnel familiar with the background of U.S.–Canadian relations to participate in them. On both counts the picture today appears good.

From this brief essay at do-it-yourself psychoanalysis, I conclude that we might well stop flogging Champ Clark and beating our breasts about the casual American attitude toward Canada. Both the government officer officially concerned with U.S.–Canadian relations and the private citizen wishing to be better informed should devote their energies to study of current problems and their backgrounds. The Merchant book is an excellent vehicle for this purpose.

It is in fact a series of essays by selected Canadians and Americans. Canadians Bruce Hutchison and I. Norman Smith contribute background on the border and diplomatic histories and on the domestic development of Canadian nationhood. Michael Barkway and Ivan B. White present the Canadian and American viewpoints, respectively, on some of the current major economics problems troubling the two governments, particularly American investment in Canada and the balance of payments. James Reston of the *New York Times* discusses briefly the impact of American communications media on Canada.

The remaining two essays will be of greatest interest to armed forces readers of the *Air University Review*. Former Secretary of State Dean Acheson issues a no-punches-pulled, but quite gentlemanly, indictment of what he sees as a schizophrenic Canadian approach to its international security policy. General Charles Foulkes, Chairman of the Canadian Chiefs of Staff from 1951 until 1960, looks at some of the problems of joint defense.

Many aspects of Canada's international security policy since World War II have been little more than disappointing to the United States. Despite Canada's having played a leading role in the development of the NATO concept, her heart has never been in it as primarily a security system against Soviet aggression. Her interest in NATO apparently centered mainly in its potential for political and cultural growth of an Atlantic community. This potential never developed significantly. Compared to her post-World War II capabilities, the Canadian contributions to Free World security efforts, particularly in land forces for NATO, have been modest. Although Canadian participation would have been welcome in the 1948–49 Berlin Airlift, none was forthcoming. In the U.N. as well, Canadian support of that organization's war effort in Korea was disappointing to the United States; a larger contribution to the U.N. Command seemed compatible with Canadian resources. The share of economic and military assistance borne by Canada after World War II has been considered even by Canadians as scanty.

The power vacuum in western Europe and

Canadian resources at the end of World War II—her substantial armed forces and production capabilities—made her a leading middle power. She saw a role for herself as leader of the unaligned middle and smaller powers. The ambivalence of this Canadian third-force mystique alongside ostensible adherence to NATO has often vexed Washington policy-makers. Since the storage of American nuclear warheads in Canada would prejudice this Canadian role, U.S. and Canadian forces in Canada had to do without them until the new Liberal Government, which had committed itself to their acceptance, took over in 1963.

The hoped-for third-force role did not materialize. The resurgence of western Europe moved Canada down several notches in the ranks of the middle powers. The unaligned and newly emerged states of Africa and Asia found their leadership elsewhere. In general, the United States has rarely been able to take for granted the Canadian view in this and in other foreign-policy problem areas like the Vietnam war, recognition of Communist China, East-West trade, and intercourse with Cuba.

In the defense arena, General Foulkes has pointed out some new and hard facts of life for Canadians. Heretofore the air defense of the two countries has been in fact a single continental problem. On the military level there has been general agreement on the nature of the threat, with sufficient agreement at the political level to permit the establishment of the NORAD system. Since the NORAD radar systems and interceptor and missile deployments in Canada were essential to U.S. as well as Canadian defenses, the U.S. has shared substantially in the cost of the systems and has deployed defense forces in Canada and elsewhere in northern North America.

As the Soviet strategic capability shifts to a predominantly ICBM force, however, the present systems will need to be replaced. ICBM trajectory characteristics and new radar technology eliminate the need for deploying to Canada the Nike-X elements for AICBM defense of the U.S. If Canada is to have AICBM defenses like the Nike-X, she will have to provide them herself instead of sharing the high cost of such a system with the U.S.

The physical separation of the systems may alleviate another problem that has troubled Canadians: the combined command arrangements under NORAD. Concern over the possible dangers of combined command has been a virtual obsession of the Canadian government for 25 years. Admittedly Canada had some unhappy experiences in this regard in World War I (even as did the U.S.), but there has really been none of consequence since the start of World War II. Nevertheless questions of combined command have necessitated extensive deliberations, for reasons that are not apparent. I would be hard put to recall a case since 1940 of a commander who under orders of an allied senior was made to take some action which he or his government opposed. It would be easy to recall a number of cases in which the commander took with impunity an action opposed by his allied senior but desired by his government. The Canadian concern has thus seemed unwarranted.

Whatever the defense complication pointed out by General Foulkes, I am confident the Canadians can cope with it. They need only to use the vigor and common sense shown in the solution to other recent Canadian forces problems, like the unification program and the purchase of the F-5 as the Canadian tactical support aircraft.

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The Contributors

THE HONORABLE HAROLD BROWN (Ph.D., Columbia University) has been Secretary of the Air Force since October 1965 and had been Director of Defense Research and Engineering, Department of Defense, from May 1961 to September 1965. During the period 1947–52 Dr. Brown lectured in physics at Columbia University and Stevens Institute of Technology; spent a year in postdoctoral research at Columbia; and in 1950 joined the University of California Radiation Laboratory at Berkeley as research scientist. In 1952 he joined the staff of Lawrence Radiation Laboratory, Livermore, California, and in 1960 became its Director. He was a consultant to the Air Force Scientific Advisory Board, 1956–57, and a member of the Board, 1958–61. He was a member of the Polaris Steering Committee, 1956–58. He was Senior Scientific Advisor to the U.S. Delegation to the Conference on Discontinuance of Nuclear Weapons Tests, November 1958–February 1959; and a member of the Scientific Advisory Committee on Ballistic Missiles to the Secretary of Defense, 1958–61. After serving as consultant to several panels of the President's Science Advisory Committee, 1958–60, he was appointed a member of the Committee in 1961. Dr. Brown's research interests have included nuclear explosive design and application. He has conducted research and analysis in the detection of nuclear explosions and has participated in studies of arms limitation and control.

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DR. STANLEY W. DZIUBAN, Colonel, USA (Ret), (USMA; Ph.D., Columbia University) has been with the Institute for Defense Analyses, Arlington, Virginia, since 1964. His last military assignment was as Chief, Strategic Planning Group, Department of the Army, 1962–64. During much of his Army career he was engaged in engineering assignments; he was also U.S. Member, NATO Standing Group Logistics Staff, 1960–62. He is a graduate of the Army-Navy Staff College, the Army Management School, and the National War College. Dr. Dziuban is author of *Military Relations Between the United States and Canada, 1939–45* in the *US Army in World War II* series, and his articles have appeared in military and professional journals.

AWARD

The Air University Review Awards Committee has selected "Why Military Assistance for Latin America?" by Colonel Frank R. Pancake, USAF (Ret), as the outstanding article in the November-December 1966 issue of the *Review*.

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