

GERMAN WARTIME INDUSTRIAL CONTROLS

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GERMAN
WARTIME INDUSTRIAL CONTROLS
AN ANALOGY TO RECOVERY FROM
NUCLEAR ATTACK

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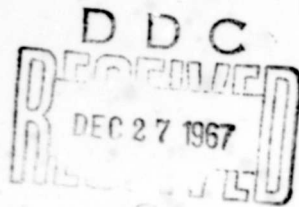


MENLO PARK
CALIFORNIA

Prepared for:

OFFICE OF CIVIL DEFENSE
DEPARTMENT OF THE ARMY
Washington, D.C.

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I SUMMARY AND CONCLUSIONS

Industrial rigidity and lack of planning brought about by dictatorship limited German armament production capacity in 1939 to the support of brief campaigns called "Blitzkrieg" or "lightning wars". Reverses in Russia, the survival of Great Britain, and the entrance of the United States into a general war brought about a production crisis in early 1942. Germany was the last major combatant to reorder completely its economy for total war--a process that began in the spring of 1942 and continued throughout that year.

The reordering of the economy was undertaken by the Armament Minister, Albert Speer, with the constraints that no large new capital plant could be constructed and that a vast armament production would have to be obtained through scrupulous attention to increased production efficiencies and the most effective use of fixed supplies of essential materials and skilled labor. Speer developed a unique variant of conventional economic planning for a controlled economy and applied it successfully until the overwhelming military superiority of the Allies brought about collapse in 1945.

The German experience in reordering an industrial economy for total war in the midst of conflict offers insights into planning for nuclear postattack conditions.

Hitler's tardy recognition of the magnitude of the struggle to which he had committed Germany forced Speer to plan an economy that would function in the intermediate run period, since the creation of long lead time capital plant was out of the question.* This constraint is foreign to

* For purposes of analysis, economists identify short, intermediate, and long run market periods within which economic activities occur. In the short run period, available inventories are cleared by the market mechanism through the interaction of supply and demand. In the intermediate period, additional supply to meet market demands is generated through increased efficiencies in the use of existing capital plant. A long run period is identified as one in which continuing demand is sufficient to justify the creation of a new plant capacity. In times of nominal peace in both controlled and market economies, all three phenomena are operating concurrently, and the distinction between them is made for purposes of analysis. The significant and unique exception is the German war economy under the direction of Albert Speer.

U. S. experience in controlled (wartime) economies in which the flexibility of the long run period always has been available for creating synthetic rubber plants, shipbuilding industries, and other necessary capital plant.

In a nuclear situation, intact surviving areas also would be operating in an intermediate run period (between emergence from shelter and commencement of recovery on a national scale) in which large new accretions of capital plant could not be counted on. This situation fits the constraints of the German war economy more closely than it does the regnant assumptions and past experience of U.S. economic planning. The German constraints forced input-oriented planning; it was necessary to proceed from the availability of plant, materials, and labor to the achievement of the highest possible production.

U. S. experience in two world wars and the Korean conflict has led to emergency production planning approaches that are output oriented. Time and resources must be available so that a central bureaucracy can be organized (1) to use an intact communication system for collecting an immense body of data for postulating desired output schedules, (2) to check these for feasibility, and (3) to proceed with production. Under early nuclear postattack conditions (as now conceived), such a procedure is improbable.

The results of this study strongly suggest that the most realistic expectation of an early and aggressive economic recovery from nuclear war lies in the preparation of input-oriented regional recovery plans for surviving fragments of the economy

The research developed strong inferences from German wartime experience, which bear on the conduct and organization of early postattack recovery:

1. The assumption that national recovery should proceed only with a centrally planned and controlled economy should be reexamined thoroughly; e.g., it may be possible to pass from fragmented regional economies directly to a national market economy as the Bonn Republic has done with evident success.
2. Direct damage assessment for economic recovery would have to be conducted by informed technical-industrial personnel from private industry; and the best hope for its early commencement would lie with the activities of such individuals, working outward from the intact areas into the zone of recoverable assets, with or without central direction.
3. The German experience demonstrates that an advanced industrial-capitalist economy possesses significant reserves of productivity.

Recent changes in the U.S. economic structure appear to promise a degree of autonomous productive capacity for the surviving fragments, which must be the basis of recovery.

4. Although good data exist for specific studies of German wartime experience of interest to Civil Defense planning (e.g., civil and industrial reconstruction programs and certain essential recovery operations and techniques, such as rubble clearance, refugee assimilation, and emergency public finance), such studies can best be undertaken with information from the postwar period in Germany.

II METHODOLOGY

This report on certain aspects of recent German history has been undertaken as a contribution to public policy formation. As such, it is an extension of John Dewey's proposition that "all historical construction is necessarily selective" and that "everything in the writing of history depends on the principle used to control selection". Dewey concludes "all history is necessarily written from the standpoint of the present and is, in an inescapable sense, the history not only of the present but of that which is contemporaneously judged to be important in the present."*

While believing that the products of disciplined historical research are indispensable to the formation of public policy, historians generally disapprove of Dewey's proposition and are reluctant to conduct research specifically for that purpose.† They argue that analogies drawn from the past use events taken out of contexts that are essentially unique and therefore unrepeatable, thus making historical analogies deceptive.

Another objection to Dewey's proposition is that it encourages the constant revision of interpretations of the past, thus imparting an unsettling anarchy of belief. A past that has been interpreted coherently on the basis of well-established evidence is an essential element of organized human life--from the individual through the national and international levels--and wholesale revision is not welcomed by organized societies. What is intended here is not a revision of the past but a re-ordering of existing evidence--a function that must be performed whenever society is faced with a new or unprecedented problem.

This report does not seek to establish new facts--a task frequently believed to be the principal occupation of the historian. Rather, it is

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a narrative account of past events synthesized as a record of one neglected aspect of history. The narrative is not arranged to answer current questions; rather, it shows how people behaved under certain unique conditions.

In making inferences for public policy formation, the possibilities for error become obvious. The problems may be only those of the historian and not those of his society. The historian may have "rigged" history to support his private notions of the problems of his time. Unlike studies in operations analysis, which classically have dealt with determinate problems to which optimum answers are possible, this report is an exercise in the identification of problems to which such analysis might be applied.*

For reasons of taste and the unconscious operation of Dewey's proposition, contemporary historians have neglected the recent economic history of Germany, preferring either to chronicle the sorry record of Nazi horror or, more frequently, to abandon the subject to journalists and moral philosophers. This report deliberately ignores this fact of German wartime experience and is undertaken as an effort to broaden the understanding of economic systems under massive stress. Future studies of the postwar German economy can reveal important differences in the dynamics of a recovery economy as opposed to a war economy./

The present effort may offend the historical purist. The body of evidence is as yet too small to satisfy all of the classic standards of demonstration. In the nuclear age, there is little critically evaluated history that will serve as a guide for future action except that of the recent past (which is still, for the most part, in men's minds and in

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collections of as yet unread and uninterpreted documents). There would seem to be no alternative but to create such a history and to draw what we can from it. The process of "learning by doing" in the nuclear age is unthinkable.

The objective of this report is to examine German economic planning in World War II for inferences that would be useful in planning for the recovery of a modern industrial nation after a nuclear war.

The period 1934-58 was surveyed to establish the relevance of German history to Civil Defense planning. A narrative history is developed, treating (1) the industrial-government structure of Germany in 1939, (2) the efforts made in 1942 to convert that structure to effective war production, and (3) the reaction of leadership to stresses that brought about collapse in 1945. Inferences developed from the narrative are related to Civil Defense planning.

III NOTE ON SOURCES

The portions of this report that treat the history of the Third Reich rely principally on primary sources; among the most useful is the micro-film collection of captured German records held by the National Archives. Particular reliance has been placed on the records of the Ministry of Armament and War Production, the Ministry of Economics, and the Economics and Armament Office of the High Command of the Armed Forces. These records are held by the National Archives, and the proper designator and finding aid for their recovery is given wherever they are cited in the text.

A second series of documents are the interrogation reports of Reichsminister Albert Speer and his staff, produced by the Technical Branch of the Field Information Agency (FIAT) of the Allied Army of Occupation. The most valuable records are the essays prepared by Speer and his associates. The formal questioning is heavily biased by the questioners' preconceptions and the general desire to confirm the efficiency of strategic bombing. The written essays have withstood rigorous internal and external criticism and are quite reliable for matters of policy.

The reports of the U. S. Strategic Bombing Survey (USSBS) contain valuable statistics, although limitations of the survey charter tend to focus the reports on the effects of bombing, thus obscuring a more general understanding of the wartime economy. For USSBS citations, the report number is given in the footnote. The documents from which the printed survey reports were drawn are of more general interest and are also available in the World War II section of the National Archives. Among these is a manuscript copy of the work Aufstieg und Niedergang der Deutschen Rüstung (Rise and Fall of German Armament), by Rolf Wagenführ. As head of the Statistics Office of the Planning Department in the Armament Ministry, Wagenführ was well qualified to treat the subject, and his work has stood the test of postwar criticism.

Occasional use has been made of material drawn from the Trial of the Major War Criminals before the International Military Tribunal. Since they are readily available at the National Archives in Washington, D.C., original documents were consulted.

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Prepared by:

Terence G. Jackson, Jr.

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III THE GERMAN EXPERIENCE: AN ANALOGY TO RECOVERY FROM NUCLEAR WAR

In the 20 years since the appearance of nuclear weapons, the world has been busy digesting their implications for the institution of war. Research in nonmilitary or civil defense has been limited by the body of construed history that could be relied on to provide even gross analogies for planning. It has been possible to proceed with some confidence with respect to weapon yields and effects as revealed by the physical and biological sciences, engineering, and testing. Such subjects as the characteristics of shelter, radiation detection and effects, medicine, and nutrition have received continuous and rewarding research attention. It has been difficult to combine these aspects of knowledge about the probable components of nuclear disaster into a plausible model incorporating the social and economic characteristics of a large industrial nation-state after a nuclear attack.

It might be expected, in any case, that an air of unreality would surround the description of this nation, or any other, after a nuclear disaster. In most such dismal postulations and prophecies, confusion is compounded by our inability to draw on historical experience for guidance. This report indicates that the recent history of modern Germany offers a basis for responsible speculation about the probable economic and industrial behavior of a large industrial nation-state after a nuclear exchange. In no other recorded instance has a highly organized, modern industrial society been visited by massive destructive blows from the air, deliberately patterned to produce a condition of national collapse.* In the end, the loss of national territory through invasion, combined with strategic air bombardment and other factors, reduced Germany to a state of helplessness and destruction that has no parallel in modern history. In the 12 years following World War II, a portion of the former Reich was able to unite as a republic and to promote and sustain a recovery program that has resulted in the most powerful economy in Europe.

* While the Japanese experience in and following World War II can provide some useful instances, the parallels are less meaningful because of the unique development of Japanese industrial and social organization.

The history of modern Germany from 1933 through 1958 offers a picture of buildup, destruction, and recovery containing many striking parallels to what are envisioned as the outstanding characteristics accompanying and following a nuclear war. From the standpoint of the economy, these 25 years can be divided conveniently into five identifiable periods.

1933-1939; Economic Recovery--Hjalmar Schacht

Until recently it was popularly supposed that this period was one of rearmament. Reexamination by economists reveal that what, in fact, was happening in Germany under the economic guidance of Schacht was an industrial recovery similar to U.S. efforts in the New Deal period, when armament actually played a small part and then only in the last few years before the war.* Unlike the American and British experience, the civilian recovery program was undertaken with financial conservatism. Although total German government expenditures increased from 15 billion RM in 1933 to 39 billion RM in 1938, almost all funds expended were raised by taxation, whereas in the same period in the United States, over half of the government expenditures were deficit-financed.† The result was a Germany that experienced a considerable measure of industrial recovery and accumulated a substantial military force in being and in ready reserve but with extremely shallow reserves in armament, mineral fuels, strategic raw materials, industrial capacity, and other requirements for an economy capable of fighting a prolonged and large scale war. These conditions established the characteristic of the next identifiable phase.

1939-1942; Blitzkrieg-Military Adventurism

With the conditions of the recovery period outlined above, the recklessly irresponsible intuition of Adolf Hitler committed the nation to a series of military engagements in which early success rested heavily on the superior effectiveness of German arms and the psychological advantage of political demoralization among the nations of Europe. As in the recovery period, recent scholarship has shown that the Germans, in fact, did not possess a war economy in depth but were relying on the skill and shock value of their highly effective army to produce quick victories from extremely shallow reserves of material, produced to order in the months before each campaign by an economy that had no massive reallocation of resources for sustained warfare.

* B. H. Klein, "Germany's Preparation for War, a Reexamination," American Economic Review, December 1948, p. 60.

† Ibid., p. 61.

1942-1945; The Rationalized War Economy--Albert Speer

The period of successful but reckless high risk military adventures ended with the Russian counterattacks in November of 1941 and their recapture of Rostov-on-the-Don in December. This event led to the encirclement and capture of an entire German field army in Stalingrad in 1942, which was characterized as Germany's "Pearl Harbor" and forced the decision to reorganize the German economy for total war in the midst of conflict. The period was dominated by the efforts of a newly-created Ministry for Armament and War Production under the aggressive leadership of Fritz Todt and Albert Speer.

Rapid adjustments were made in the tardy reallocation of national resources to serve a war economy that would be faced with a death struggle against the most powerful industrial nations of the world--a situation in which it was known that the productive capacity of the Allies could rise to meet, and eventually exceed, that of Germany by a ratio of 9:2. Victory then was rationalized by the expectation that the Allies could not quickly mount a force large enough or of sufficient quality to match local German superiority at arms and that somehow the demoralization that characterized the Allies earlier in the war would persist and would lead to disunity and separate peace.

In this period, the new armament minister, Albert Speer, organized German industry into self-governing "rings" and "committees" that planned and regulated production increases. Control and compliance were assured through the reorganization of existing regional and local military armament authorities. The structure of this control authority bears a resemblance to the organizations postulated for postnuclear industrial recovery by recent research in the United States.* The alignment of German industry from self-governing, technical-production management groups was unique, and the results were spectacular.

The task of reallocation of economic resources for total war was undertaken under the continuing and growing harassment of massive strategic air bombardment, which was fatefully successful on transport, coal, and the synthetic oil industry. In the case of tanks and aircraft, it was successfully countered by ingenious improvisation under fire, and production continued to rise almost to the end of the war.

* F. Dresch, Resource Management for Economic Recovery Following Nuclear Attack, Stanford Research Institute, Menlo Park, Calif., 1964, p. 61 ff

While the situation in this period of German war experience differs from our perception of postnuclear strike recovery (the destruction visited on Germany was cumulative over three years and limited to the power of conventional explosives), the expedients adopted for rapidly rationalizing a peacetime economy under fire represent the only example in modern times of improvisation by gifted industrialists driven to the limits of their power and imagination.

1945-1948; Defeat, Paralysis, and Shock

In these years, a defeated Germany, divided and occupied by the United Nations, lived amid the ruins of its shattered industry under conditions of Allied economic control that were substantially more rigorous extensions of the wage, price, and rationing measures of the previous German government. This period offers the Civil Defense planner a larger field of analogies to the expected results of a general nuclear exchange. While considerable industrial capacity remained untouched or slightly damaged, the mechanisms of economic exchange had broken down almost completely; inflation was firmly repressed by severe control measures; capital formation was not only at a standstill, but plant capacity was being actively dismantled by the victors.

In the vital matter of food, the defeated nation suffered severe shortages; recent crops had not been good, and major food-producing areas in the East were lost. What had been an adequate diet of 2,400 calories per day for the normal consumer before the war was reduced in 1947 to an unbalanced intake of 1,218 calories per day.* While starvation was avoided by emergency shipments from allied stocks, the food production outlook for a future West German government was grim. The situation in the United States following a thermonuclear war might not be the same since major food-producing areas might be outside enemy targets, but many consequences might be similar if our petroleum-based transportation system were to break down. But for the absence of radiation damage, the condition of German society in the French, German, and English zones bears many striking resemblances to our contemporary speculations about the aftermath of nuclear warfare. A striking and unexamined example may be seen in the flood of some 10 million refugees from the Eastern zone, which swelled the population of the stricken territories and created staggering problems of employment, housing, sanitation, education, and relief in general.

It is interesting to note that, without reference to the German experience, an American author (Herman Kahn), speculating on specific postnuclear

* Deutschland Jahrbuch, 1949, Essen: West Verlag, p. 137

conditions, hypothesized a "Country A" and a "Country B" that would emerge from a severely stricken United States. Kahn sees "Country A" as being those target areas that would bear the brunt of attack (i.e., metropolitan centers, military complexes, and contiguous areas) and territory made untenable by fallout. "Country B" would consist of the remaining territory not directly affected by the enemy's targeting. From this analogy, Kahn reasons that such a diversified industrial economy as ours might retain a very considerable fraction of untouched or lightly affected strength in "Country B," with a potential for a gross national product that would place the United States well down the list but still among the powerful industrial nations of the world.

The parallel with the German experience (and its attractiveness for study) lies in the close similarity between this theoretical construct and recent German history. "Country B" also would be flooded with refugees possessing a variety of skills; in need of physical, mental, and economic rehabilitation; homeless and destitute--a task for assimilation in the postwar economy.

While the fractions of industry and agriculture remaining in the American, British, and French zones of occupation could differ markedly from those available to the United States under the "Country B" assumption, there is much to be learned about the realignments necessary in a highly interdependent economy deprived of a third of the territory in which it originally functioned.

1948-1958; Recovery - Capital Formation, the Social Market Economy

The period of paralysis came to a close with the Currency Reform of 1948 and the formation of the Bonn Republic in 1949. Widespread financial disruption had resulted in a huge and complex oversupply of money, which, it was generally agreed, could be resolved only by a complete currency reform. The need for such a reform had been entertained by Germans before the close of the war, and postwar study by allied authorities included a review of over 30 other formal plans before the adoption of the final "Plan for the Liquidation of War Finances and the Financial Rehabilitation of Germany." This reform, which came to be known as the Dodge-Colm-Goldsmith plan after its authors, was substantially successful, although not without some serious and, in some cases, avoidable inequities. Through miscalculations in administration, over 30 percent of small savings accounts were wiped out. Seventy percent of the funds in blocked accounts were declared

void, thus forcing larger depositors to convert at a ratio of 1:16. The reform also tended to favor hoarders among businessmen and farmers.*

Since such a currency reform measure almost certainly would become a requirement for the United States following a nuclear war, a careful review of the German plan and its consequences could be invaluable for industrial recovery planning and will be the subject of research work to be proposed.

The decade of industrial recovery in Western Germany represented one of the most striking periods of capital formation known to modern economic history. In the small but growing literature describing this "economic miracle," various authors emphasize market forces, fiscal control, voluntary restraints by capital and labor under government leadership, together with other elements of policy, both public and private, as explanations for the rapid recovery of Western Germany.

The gross dimensions of this decade of recovery may be seen in the spectacular growth of the West German GNP (gross national product). In current (1961) prices, GNP nearly tripled, rising from 97.2 billion DM in 1950 to 275.8 billion in 1960. In constant 1954 prices, the total real GNP doubled with 113.1 billion DM for 1950 and 233.8 billion DM for 1960. Real per capita income did not quite double with 2,361 DM for 1950 and 4,378 DM in 1960.†

The problems encountered by the Germans in this period are richly suggestive analogies to the problems anticipated for recovery following a nuclear war. In addressing the overwhelming tasks of refugee assimilation, capital formation, war asset equalization, industrial and residential housing, finance, and construction, the Germans constantly sought to create a conservative market economy, which, in many respects, was similar to economic ideals widely entertained in the United States.

From the very beginning, the Bonn Republic designed its social and economic legislation so as to take the widest possible advantage of individual entrepreneurial energies. State controls, essential at first, were designed deliberately to give way to local regulation and private initiative with the freest possible market as the arbiter of economic activity.

The idea of a "soziale Marktwirtschaft" (Social Market Economy) took shape during the war in the minds of a group of German economists opposed

* Fritz Grotius, "Die Europäischen Geldreformen nach dem Zweiten Weltkrieg," Weltwirtschaftliches Archiv, Band 63, 1949, pp. 277-279; K. W. Roskamp, Capital Formation in West Germany, Wayne State University Press, Detroit, 1965, pp. 39-46.

† Statistisches Jahrbuch für die Bundesrepublik Deutschland, 1961, p. 544.

to the Nationalist Socialist regime and was a reaction to the then excessive intervention of the state. The central theme of the Social Market Economy is the establishment and maintenance of free markets that are expected to yield widest distribution of goods and services, lowest possible prices, high rates of capital formation, high personal savings, minimum unemployment, and realization of many other economic and social ideals. Existing regulation is "social" in nature, designed to raise elements of living standards, such as housing and education, and to protect the market against monopoly. The design of regulatory policies is viewed primarily from the standpoint of their effects on market performance.

The system as postulated represents a strong endorsement of a very "pure" form of capitalism, rejecting Keynesian measures for the control of unemployment as "artificial" government intervention, which cannot alter the "real" problems of the market place and can lead only to price increases.*

Like all economic systems postulated in the abstract, the Social Market Economy met many obstacles when attempts were made to put it into practice, and today (1967) it is beset with problems of price-wage spirals and other ills of the industrial state.

From the very beginning, economic and social legislation designed to deal with problems of refugee assimilation, housing, and capital formation had as their objective the widest possible release of individual initiative. Every effort was, and is being, made to prevent federal regulation and subsidy from hardening into permanent domination by the central government.

The general outlines of these broad policy intentions may be seen in the residential housing programs in West Germany. The problem facing the Germans in 1949 was the reconstruction of dwelling units destroyed or damaged by the war, with the concurrent burden of refugee accommodations, also present in many other recovery programs.

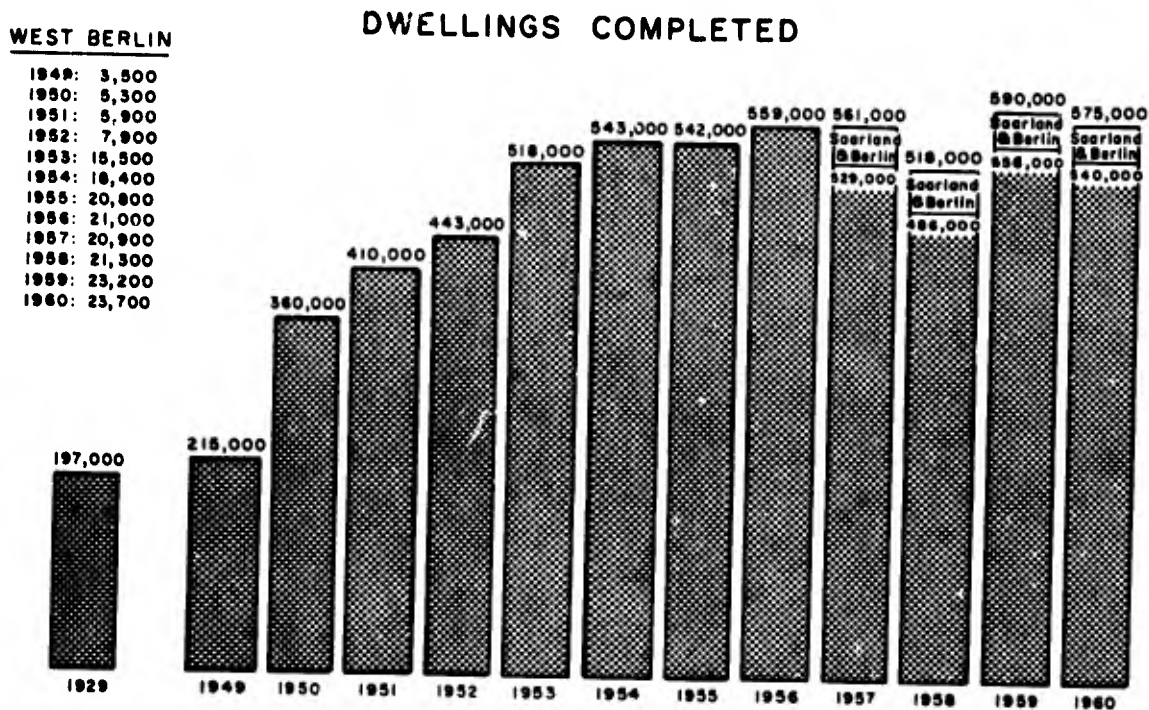
Of the some 10 million homes existing in the area of the Republic before the war, over 2.3 million were lost. The task was to replace these with a factor added for population increase and to accommodate refugees, numbering over 13 million by 1960. The problem was complicated further by the fact that, from the beginning, the largest cities were covered with more than 500 million cubic meters of rubble.†

* K. W. Roskamp, op. cit., p. 46 ff; Bruno Molitor, "Soziale Marktwirtschaft," Hamburger Jahrbuch für Wirtschafts und Gesellschaftspolitik., Tübingen, V. C. B. Mohr, Paul Siebeck, 1958.

† Federal Ministry of Housing, "Housing and Urban Development in the Federal Republic of Germany," Bonn, 1961, p. 4 ff.

Postwar residential construction in the Republic was regulated by a housing act of 1950, which served with amendment until 1956, when a second housing act was passed. These two instruments and many special programs of public housing assistance for miners, refugees, and other special groups provided the framework for a period of remarkable achievement. The Federal Ministry of Housing reports that, in the years 1948-60, approximately 5.5 million housing units were completed.

In the decade 1950-60, over 100 billion DM was spent for housing with over one-third of this amount provided by the government. In the two years following the Currency Reform in 1948, almost half (47 percent) of the capital for housing was provided by the government and, by 1960, this figure had dropped to 20 percent. At the end of this period, it was possible for the government to set the conditions for the eventual integration of the existing housing units into the market economy through the "Decontrol Act of 1960." While the process is far from complete, the entire program experience, with its many novel taxation, subsidy, and other incentive features, is richly suggestive of recovery problems to be expected in a highly urbanized society following a nuclear war.



Federal territory except the Saarland and West Berlin, since 1957 inclusive of both.

*Federal Ministry of Housing, "Housing and Urban Development in the Federal Republic of Germany", Bonn, 1961, p. 4 ff.

The war production system of the Third Reich in World War II reached the peak of performance in the activities of the Ministry of Armaments and War Production under the leadership of Dr. Fritz Todt and Albert Speer. In the final war years, the Ministry (under Speer) controlled almost all of the important sectors of the economy. This study described the evolution and operation of the Ministry for Armaments and War Production and some of its outstanding achievements. The research has been conducted in the United States, using captured German government records and postwar literature produced in Germany, Great Britain, and the United States. The research provides reason to believe that the performance of the Ministry in organizing private industrial leaders into a management instrument for the national economy and rationalizing the conduct of the production effort had important consequences for the subsequent rapid recovery of West Germany under the Bonn Republic.

More detailed work of value in this context could be undertaken in Germany by that nation's civil defense authorities and private research organizations. Contacts made in Germany indicate that this possibility will receive strong encouragement in that country.

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IV THE NAZI PATTERN OF INDUSTRIAL CONTROL

The Allied victory over Germany in the spring of 1945 permitted an unprecedented opportunity for the detailed examination of the inner workings of the most highly organized dictatorship of modern times. Since the surrender was unconditional, the sovereignty of the German people was exercised for a time by foreign powers. The historical record in both public and private files was fully revealed, and it was possible to minutely interrogate the surviving senior officials of a modern government, administer standardized instruments of psychological evaluation, and call them to detailed account for their actions, with the assistance of intercontinental powers of subpoena for witnesses and with evidential material from their own contemporary documents.

The implications of these revelations for the study of history and social sciences have yet to be realized fully by Western scholarship. A leading scholar of the period, Professor Arthur Schweitzer of the University of Indiana, has pointed out that many of the problems that arose within the Nazi regime are surprisingly modern:*

"Although the solutions adapted by the dictators are completely unacceptable to us, we can obtain a not insignificant insight into the nature of contemporary issues when we know about the mistakes made in another economic system. Lessons can be learned not only from our friends but also from our enemies."

As seen by its enemies before its final defeat, the German National Socialist State appeared to be a great political, economic, and military monolith, in which the decisions of war and peace, production, and consumption were taken with ruthless rationality in consonance with carefully developed plans. Like all stereotypes, this one had an outward appearance of fact in the early successes of the Blitzkrieg, the unquestioned efficiency of the German Army, and the Four-Year Plan of September 1936; also, it seemed to fit popular expectations derived from German history.

* A. Schweitzer, Big Business and the Third Reich, Indiana Univ. Press, Bloomington, 1964, Pref. vii.

Recent research revealed that the rigidities of dictatorship created problems of internal efficiency for Germany that seriously impaired its capacity to function as a total war economy and that the structure of the National Socialist Party, while well adapted for the military episodes of the early Blitzkrieg, was unfitted for the prosecution of total war. Allied investigators and later research revealed that Adolf Hitler tended to operate a massive patronage system. He sought the solution of outstanding problems through the ad hoc appointment of powerful individuals and the establishment of quasi-governmental groups with broad powers to act in parallel with the formal ministerial structure of government and the economic system inherited from the Weimar Republic.

The National Socialist seizure of power in 1933 was total. Hitler made himself and his party independent of election funds and the ballot box and came into possession of the machinery of the state and its police. Power was exercised with caution, however, since Hitler's ambitions for Germany could not be realized without the performance and cooperation of the army and of industry. Other possible irritants, such as organized labor, the churches, the arts, and the professions, were dispensed with by the creation of National "Chambers," "Fronts," and "Estates," which steadily delivered leadership in these sectors into the hands of the Party members.

The shape of ultimate power for the Party was foreshadowed by the reorganization of local and district government. Not unlike other revolutionists, the early street-fighting Nazis--rising through opposition and unembarrassed by public responsibility--were thoroughly radical in the peculiar sense of the Nazi politico-economic ideology. In its early opposition phase, one major portion of the Party stood for a form of regional socialism that envisaged the decentralized direction of the means of production at the regional government level and the consequent curtailment of "big business." It is largely from the ranks of these individuals that the "Gauleiters" or district leaders were drawn. These officials, jealous of their absolute powers within their districts and mindful of their early roles in the Party and their access to Hitler, were predisposed to frustrate any efforts to develop a centralized economy and persisted in obstruction until the very end of the war.

In seizing control of agriculture, labor, and the professions, the National Socialists used the police power of the state for direct coercion. Leaders were personally threatened with physical violence and often imprisoned through the action of "Party Courts." It was assumed by the early Party stalwarts that similar measures would be taken against big business and military leaders once Party power was secured; but the Party did not reckon with the private plans and perceptions of Hitler, who recognized that the industrial and military leadership depended more on

technical competence than ideological purity and that both groups were essential to the performance of a revived Germany in both peace and war. Hitler gave little public indication of these views, preferring to consolidate his power through the competitive emergence of leaders who could demonstrate their ability to govern.* The prewar period saw the emergence of three power blocs in Germany. The Party, with control of the police and the population at large, permitted the army a measure of autonomy as the external power of the state. Big business gained a measure of autonomy for its operations by deference to the goals of rearmament and political dictatorship. Professor Schweitzer summarizes the modifications of capitalist institutions that were brought about in the prewar years under six main points:†

1. Suppression of trade unions and the restoring of the employers' managerial prerogative in industrial relations.
2. Acceptance of the principle of compulsion in private organizations for market control, whether for the purpose of eliminating all outsiders or of imposing cartels of big business.

* Throughout his prewar career, Hitler gave little indication of his long range motives. In his leadership of Germany from 1942-45, his intentions at least can be inferred with some confidence from the records of his conferences on naval and armament matters that have survived the war. His view of the period of power consolidation must be inferred from the writing of old comrades, such as Otto Strasser, and from his instructions to judges of the Party Courts.

When Otto Strasser asked him what he would do with Krupp if he came to power, Hitler at once replied: "Of course, I would leave him alone. Do you think I would be so mad as to destroy Germany's economy?" (cited in Allen Bullock, Hitler - A Study in Tyranny, New York, Harper Bros., 1952, p. 141). In 1933 Hitler instructed a Major Buch in his duties as a judge of the then new Party courts: "The reason why some revolutions were destroyed or otherwise suffocated by reactionary's forces lay in the unrestrained claims of the revolutionaries themselves. It is your task as the highest judge within the Party to put a brake on the revolution." (cited in a speech by Buch to officers of the regular army in 1937, WI/IF 5.2738, roll 380, T-73). (Such citations refer to microfilmed records held by the National Archives. The letter designation is the responsible office, the number is that of the microfilm frame, followed by its roll number and finally the 'T' number or finding aid through which the roll can be retrieved.)

† A. Schweitzer, op. cit., p. 455.

3. The use of inducements by which governmental agencies, using direct controls, could channel favors to particular business groups with a view to invigorating particular institutions of capitalism.
4. Replacement of voluntary trade associations with compulsory economic groups.
5. Expansion of the noncapitalistic institution of public investment with a view to facilitating rearmament.
6. Acceptance and intensification of specific direct controls in a few markets, through the use of which funds and essential raw materials for rearmament were allocated by government decisions.

The first three modifications generally were favored by conservative business interests of the 1930s and were possible in Germany through the intervention of a political dictatorship. The last three were industrial consequences of the military goals of the Party and the army. In the following section, the roles of big business and the army will be summarized as an aid to the understanding of the war economy.*

The National Socialist Organization of Industry

The economic system taken over by the Nazis in 1933 was a highly organized form of capitalism, still suffering from the losses of World War I and the prolonged economic disruption that followed in the 1920s. A ruinous inflation effectively destroyed the economic and psychological security of the German middle class in the early 1920s, and chronic unemployment throughout the period reached its most serious point in the post-1929 depression with over 6 million persons out of work. When the Nazis took over in 1933, the depression was at its worst, and the new regime immediately began plans for the creation of state and private organizations for all aspects of economic and social activity.

German industry had a long tradition of combination for the organization of markets, the exertion of political influence by particular industries, and the expression of collective national business power. On 27 February 1934, the new Minister of Economics, Hjalmar Schacht, established the "Estate of Industry and Commerce."[†] This supra-organization

* A. Schweitzer, op. cit.

† The two previous ministers of economics, Alfred Hugenberg and Kurt Schmidt, clashed with Party politicians and were unable to command the allegiance of big business.

was a government-sanctioned extension of the private industrial and trade associations that functioned in Germany under the Weimar Republic.*

The Estate of Industry and Commerce was a classic example of an attempt to organize a diversified, interdependent, high technology, capitalist economy in such a way that it could be made to serve the ends of the state. The early announced intent did not stress control of the economic system. The publicly expressed rationale for the organization of the Estate of Industry and Commerce was that the ills of private industry were to be healed by the establishment of "fair competition." "Efficiency" was the basis for necessary and desirable competition that would be of service to the consumer and the nation, whereas "degenerate" and "speculative" competition were to be eliminated. The market place was to be regulated with rules of sound practice so that the competitive struggle would yield maximum benefits to the individual and to the state. Such rules would ensure that goods would be sold at set and nondiscriminatory prices, which would not be below reasonable cost or unduly advanced; commercial credit would be extended to all customers without discrimination in rates of interest or length of the credit period; and uniform conditions of sales and delivery would be assured. In all of this, the rights of private property, freedom of contract, and individual initiative were not to be affected seriously. The existing forms of combines, cartels, corporations, and trade organizations were to continue functioning.

The National Socialist State did not intend to relinquish a government link with the economy, but declared on 23 March 1933 that it would further private initiative and would not impose the experiment of a government economic bureaucracy on the national economic leadership in the interests of the German people. A year later Adolf Hitler reaffirmed this position in his address to the First German Work Congress in May 1934.†

* The detailed history of government relations with industry and commerce in this period have been minutely revealed by the War Crimes Tribunal after the close of World War II. The sparring of German industrialists with the new government and their eventual capture by the state are an instructive chapter of German economic history but largely beyond the scope of this report. The Tribunal records and postwar scholarship have profound implications for capitalist democracies of the present and future. Possibly the best account in English may be found in the meticulous work of Arthur Schweitzer (cited above).

† H. Kannapin, Wirtschaft Unter Zwang, Deutsche Industrie-Verlag, Köln, 1966, p. 33.

"The Führer affirmed the rights of ownership, rejected measures of state socialization, but expressed himself as opposed to the assumption by the economy of principles which had been found to be valuable in state administration."

The object, as further expressed by Hitler and his Economic Minister Schacht, was to create a link that would bring the constituent elements of the economic system into formal contact with one another, with the expectation that codes of behavior would be developed that would govern important economic activities on the basis of enlightened self-interest--the process being aided by the Ministry of Economics in the role of a benign referee.*

The new supra-organization was to function at the national level through a National Economic Chamber. The Chamber was composed of leaders of the national groups into which the entire field of industry and trade was divided. Other members of the National Chamber were drawn from the leaders of Provincial Economic Chambers and from the cooperative Council of Industry and Commerce. The latter were the permanent working groups of the regional German Chambers of Industry and Commerce, and, to round out the membership of the National Chamber, there were representatives of the other "Estates" for Food and Transportation.

The leader of the National Economic Chamber, one Albert Pietsch, was also the leader of the Cooperative Council of Chambers of Industry and Commerce, and, while fulfilling this national role, he retained his position as the President of the Economic Chamber of Bavaria and the local Chamber of Industry and Commerce at the City of Munich. Pietsch reported to the Minister of Economics, Hjalmar Schacht, who in turn was responsible

* Although the German organization was far more elaborate, a program with a similar philosophy was launched in the United States at this time. The National Industrial Recovery Act of 1933 suspended antitrust laws and permitted industry to organize representative associations and to frame codes of "fair competition," which, after Presidential approval, were binding on the entire industry. Significantly, the President had the power to impose codes on reluctant industries and to punish violators. Over the short life of the NRA (1933-1935), 677 codes were filed for activities ranging from steel production to pants pressing. The U.S. and German actions are apparently only coincidental and reflect the spirit of the depression period, in which it was generally felt that capitalist institutions were "sick" and in need of revitalizing.

to the Chief of State, Adolf Hitler. The main lines of the new economic organization are outlined in Figure 1. It is unnecessary to give a detailed description of the ponderous apparatus that resulted, but an appreciation of its nature and complexity is needed for an understanding of the German economy as it finally was committed to total war in the years following 1942.

While the terms of the public dialog were set by Adolf Hitler's rejection of socialism and his affirmation of capitalist institutions, the actual operation of the new "Estate" clearly demonstrated a design for control of the economy, although this was not completely clear to the business community in 1934.

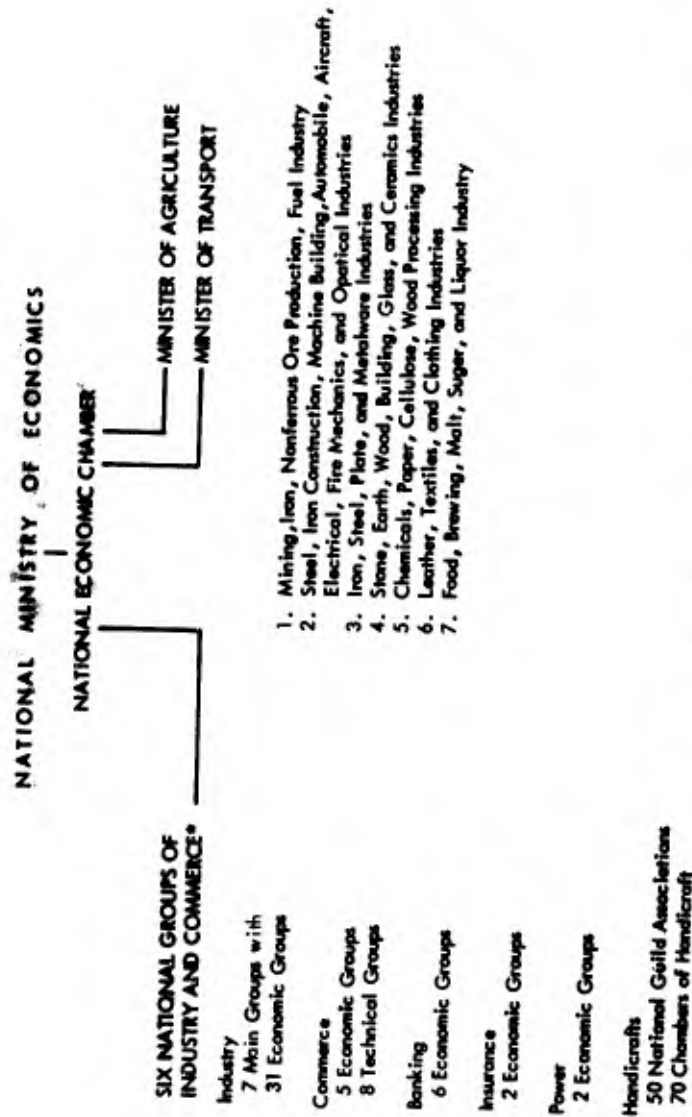
In practice, the combines, cartels, corporations, and other enterprises would meet and develop codes of fair competition; set prices and levels of production, market quotas, wages, and hours; and set restrictions on new capital plant construction and hours of operation for existing plant. This material would be submitted to the various subordinate organizations of the National Chamber where the many Groups (National, Main, Economic, Technical, and Branch) would engage in discussion, compromise, and revision. In this activity, the Groups were joined by the provincial Economic Chambers, and final programs were consolidated in the National Chamber and presented to the Ministry of Economics. The Minister and his staff would approve, reject, or modify the program elements and finally give them the force of law.

The German leader in industry or commerce often served in the first phase of this program development cycle as a private association member and, later, in the capacity of a member of his National, Main, or other Group of the Estate of Industry and Commerce, as the entire apparatus was called. In both capacities, he was the captive of the state, since the powers of the Minister of Economics over the National Economic Chamber and the functional and regional organizations were absolute. He had the power of nomination and removal of all leaders and members; he could change the composition and membership of cartels, veto marketing arrangements, forbid or sanction expansion of existing plant or the founding of new enterprises. His instrument for exercise of these and many other powers of control was the Cooperative Council of Chambers of Industry and Trade and the local Chambers of Industry and Trade. These organizations were established as public corporations and as legal representatives of the state; they could levy taxes on their members and hold them legally responsible for compliance with the regulations.

In the first three years of operation, Hitler and other leaders gradually let it be known in public speeches that the requirements of the state

Figure 1

PREWAR PATTERN OF NAZI INDUSTRIAL CONTROL**



* In addition to the Economic and Technical Groups listed, there were 328 Branch Groups and 327 Sub Branch Groups for the 6 National Groups of Industry and Trade

** This chart assembled from: Hans-Eckhardt Kannopin, Wirtschaft Unter Zwang: Deutsche Industrie Verlag-GmbH, Köln, 1966, p. 29 ff.
 M. Y. Sweezy, The Structure of the Nazi Economy: Harvard University Press, Cambridge, 1941, p. 40 ff.
 A comprehensive listing may be found in: Friedrich Homan, Die Deutsche Wirtschaftsorganisation: Kommentar zur Organisationsgesetzgebung, Berlin, 1943, p. 24 ff.

were paramount, and that he had in mind a new and unprecedented form of economic system. Hitler expressed the philosophy for the new system in one of those inscrutable, but appealingly quotable, statements for which he was noted:*

"The people do not live for the economy, and the economy does not exist for capital; rather, capital serves the economy and the economy serves the people."

Since Hitler considered himself to be the supreme expression of the will of the German people, it becomes clear in retrospect whom everyone in Germany served, but this was not completely clear to business leaders in the early days of the regime.

The Role of Public Investment - The Four-Year Plan

The general intent behind Hitler's enigmatic statement became clearer to business leaders after 1936. The actions taken under the Four-Year Plan of 1936 and the public investment activities of the Labor Front showed that the probable goal of National Socialism was to create a mixed economy of centrally controlled, privately and publicly owned enterprises, with the latter under the operating management of industry. Economists have characterized such a system as "state capitalism," since the forms of capitalism were maintained, but the government assumed the role of entrepreneur for the sake of ends thought desirable for the state.

The Four-Year Plan was in part the result of army dissatisfaction with the progress of rearmament. Shortages of raw materials and foreign exchange levels became acute in 1936, and Hitler appointed Göring to head a commission of investigation. Agreements between Göring, representing the Party, and the army, represented by Minister of War Von Blomberg, resulted in the recommendation to Hitler of a Four-Year Plan to strengthen the rearmament economy.† The implementing directive from Hitler to Göring closed with the charge that "...the German economy must be on a war footing in four years." The belligerence of the declared intent was belied by its content. The plan did not call for the organization of the entire economy but was limited to the development of certain sectors thought to be important for rearmament.

* Ibid., p. 18.

† WI/IF 5.203, Roll 35.

The economic decisions taken under the plan were so at variance with the rational desires of industry that it is difficult to escape the conclusion that the extension of Party control over the private sector was not a major but a hidden objective in the first instance.

Steel

Germany was to be made more self-sufficient in three critical areas of raw material shortage. The plan called for the increased use of low grade, domestic iron ores to ease the nation's dependence on Sweden, and large scale domestic production of synthetic oil and rubber was to be undertaken. The construction of costly synthetic industries and the low efficiency steel capacity were an affront to Minister Schacht's notions of comparative advantage; and, more important for the short and intermediate run periods, these expensive undertakings would have the effect of increasing the potential inflation that had been suppressed by wage, price, and other controls established through the Ministry of Economics. The dispute grew bitter and eventually led Hitler to replace Schacht with Walter Funk as Minister of Economics in 1938.

The community of German iron and steel producers agreed with Schacht and pointed to the 1936 steel capacity of 2.3 million tons per month, of which only 1.9 million tons were then produced. Further, the industrialists pointed out that the army allotments had not exceeded 18 percent of the monthly production. Businessmen granted that planned naval production and the needs of the Four Year Plan would require more than the existing capacity for a short time, but expansion to meet those demands fully would leave the industry with idle plants when the programs were completed. Even more repugnant to the producers was the fact that the new capacity would be based on costly processing of domestic ores yielding a product that could not compete in price or quality with the higher grade steels available in the world market.*

After his appointment as leader of the Four-Year Plan, Herman Göring began to compete with Dr. Schacht for the role of economic dictator of Germany. Göring was aided by Schacht's opposition to the Four-Year Plan and by his own personal standing with Hitler. The steel industrialists

* Document NI-090, the minutes of a meeting of steel industrialists with Herman Göring on March 17, 1937. (The NI designation stands for Nürnberg Industrialists Documents and refers to evidence presented in the three trials of Nazi industrialists. The originals are on file and available in National Archives.)

engaged in a series of complex negotiations and compromises with Göring on the construction of new capacity and agreed to some increases but held firm on the large scale development of inefficient domestic ores.* Their opposition took the form of asking first for an experimental program and insisting on a price increase to cover the more costly production. Göring was outraged at such temporizing, and his answer was the surprise establishment of a government-owned steel corporation on 23 July 1937, the new concern to be known as the Herman Göring Werke A.G.

Although the executives of the seven vertically-integrated steel and coal concerns tried to agree privately that they would not sell patents or machines or provide skilled labor for the new enterprise, they were unable to enforce their resolve because two of their members, Krupp and Flick, saw advantage to themselves in the collaboration with the government.†

The situation has been summarized succinctly by Schweitzer:‡

"The Nazis, with the assistance of the collaborators, established the principle of public ownership and management for those projects that private concerns were not willing to undertake but which the government believed to be indispensable. The principles of private profit as well as public ownership and management of unprofitable enterprises became two significant features of the developing state capitalism."

Schacht and the iron and steel industrialists were vindicated by history in ways significant to this study. Germany entered World War II with less than half of the target steel production of the Four-Year Plan, although the picture was somewhat improved by the acquisition of 3 million tons capacity from Austria and Czechoslovakia in the immediate pre-war years.

After the war, Dr. Walter Rohland declared:§

* NI-954; NI-1231, p. 76; and NI-053.

† NI-353.

‡ Arthur Schweitzer, "Business Power under the Nazi Regime," Zeitschrift für Nationalökonomie, Springer Verlag in Wien, Band XX, Heft 3-4, 1960, p. 429.

§ Speer Report No. 98. These are reports of the interrogation of Albert Speer and members of his Ministry for Armament and War Production by a combined Allied Intelligence Team in 1945. The numbered reports are available at the National Archives, World War II Division, in Alexandria, Virginia.

"With things as they are today it can be said that the German steel industry would have produced more and better steel if the Herman Göring Works had never been founded."

Oil and Rubber

The task of the regime was easier with respect to the creation of synthetic oil capacity. I. G. Farben owned about 90 percent of the chemical industrial facilities of Germany and controlled an even higher percentage of patents and processes. In addition to its formal position in the Estate of Industry and Trade, I. G. Farben negotiated directly with the government through representatives in Berlin.

The plants that eventually were built for the production of synthetic fuel were marvels of advanced and innovative industrial design, and their construction was negotiated and accomplished by I. G. Farben without difficulty. By 1938, the oil production goals of 1936 were discovered to be below requirements, and Göring instituted the "Karin Hall Plan," which relaxed the original goals for 1940 (4.3 million tons per year) and aimed at a capacity of 11 million tons for 1944.* In spite of this intention, Germany began World War II in 1939 with a shortfall of 45 percent of the goals of the Four-Year Plan.

The plan was more successful in the case of rubber. The output of the new synthetic Buna-s rubber was increased to 22,000 tons in 1939 and to 69,000 tons in 1942 by the accelerated production of new plant. This output was sufficient for both civilian and military requirements in the war years.

A second major government action in bringing about the new economic order was the operation of state-owned enterprises by the Labor Front. Among 68 such corporations in 1936 were insurance companies and publishing houses of sufficient size to cause discomfort to the established private industries. Although it never reached significant production levels in the prewar years, the Volkswagen plant was also begun at this time by the Labor Front.†

* B. H. Klein, Germany's Economic Preparations for War, Harvard University Press, Cambridge, 1959, p. 39 ff.

† F. Neuman, Behemoth, the Structure and Practice of National Socialism, Harper and Row, New York, 1966, p. 304.

The Army and the Industrial System

After the Treaty of Versailles, the rearmament of Germany became a major goal of its miniature but highly professional army. Although there is little to indicate that the army planned or desired war in the 1920s, it did take every possible public and clandestine action to prepare for eventual German rearmament.* Part of the program was the planning and the establishment of a "shadow" armament capacity in plants devoted to civilian production, which was carried out by the Armaments Branch of the Army General Staff (Heeres Waffenamts [HWA]). In addition to its weapon design, development test, and procurement responsibilities, the Armament Branch conducted national economic planning for war production. In the former function, the Armament Branch actually performed detailed design of weapons and later, under the Nazis, the military performed detailed supervision of weapon production until 1942. In the area of economic planning, the army relied on uncritical extrapolations of World War I experience, with results that were sometimes ludicrous. (In one famous instance, the expressed quarterly Wehrmacht copper requirements exceeded the then available world production of that metal.) In spite of some undeniably superior weapons that appeared early in the war, the Armament Branch was a rigid bureaucracy staffed with career officers, often with some technical training but no experience in economic planning or industrial production.

Throughout the prewar and wartime periods, this branch (and its successors) was led by General Georg Thomas. Since the army was the senior service, this officer exerted a very considerable influence on Hitler through the Minister of War and, later, through the joint high command of the armed forces (Oberkommando der Wehrmacht [OKW]). The influence was not decisive, however, since Hitler distrusted generals, and Thomas consistently advocated a policy of armament in depth, calling for vastly greater production capacity and civilian sacrifice than Hitler was willing to sanction.

It was through memoranda prepared by Thomas and presented to Hitler or Göring that the rearmament rolls of the Estate of Industry and Trade were developed.† Thomas' office was also a major contributor to the basic directive establishing the Four-Year Plan.‡ In April of 1937, Thomas, acting through the War Ministry, succeeded in working military rearmament tasks into the Estate of Industry and Trade.

* WI/IF, 5.23 IV, 1, Gen. G. Thomas, Grundlage für eine Geschichte der Deutschen Wehr- und Rüstungswirtschaft (Foundations for a History of the German Defense and Armament Economy).

† WI/IF 5.406, Roll 92, T-77.

‡ WI/IF 5.433, Roll 101, T-77.

Elaborate instructions were formulated for regional Armament Inspectorates, each with a net of subordinate Armament Commands in the major industrial cities. These military organizations were to work with the 31 Economic Groups of the National Economic Chamber.* This vertical linkage of the military armament and economic planning branch was accompanied by a general reorganization of the National Industry Groups under the Estate of Industry and Trade.

The reorganization eliminated the Main Groups and made their subordinate Economic Groups responsible to the Minister of Economics.* The Minister of Economics retained his title of "Plenipotentiary General for the War Economy," with the authority to direct all war preparations in time of peace; the Minister of War was to have this responsibility in time of war. A major change in this arrangement was made in the closing months of 1937 when Hitler abolished the position of Minister of War and assumed the post of Supreme Commander of the Armed Forces. In this position, he could dictate his policies directly to the OKW.

Later in 1939, the economic planning group of the Army Armaments Branch was assigned to the OKW, where it was known as the War Economy and Armaments Branch (Wehrwirtschafts und Rüstungsamt [WiRüAmt]). This office remained in the staff of the OKW throughout the war, and many of its captured records have been microfilmed and are available at the National Archives, Washington, D.C.). In addition, an "organization stop" was decreed, freezing all of the member industries in the Industrial Group to which they happened to belong at the time.

Throughout the prewar period, this military staff group and its predecessors had sought to bring about a coordinated planning and control authority that would prepare the nation for the kind of war the army feared most--a continuation of World War I. It had been able to affect the design of the Estate of Industry and Trade under the Ministry of Economics, and it had been able to influence the content of the Four-Year Plan. These actions had been taken through the Ministry of War and, in each case, had resulted in less than success. The Minister of Economics, Schacht, had clashed unsuccessfully with the head of the Four-Year Plan, Göring, and had finally been replaced by the almost completely ineffectual Funk. Göring, on the other hand, presided over a four-year economic development plan with the official objective of preparation for war. In practice, the plan resulted in an attempt to gain Party control of important segments of industry through the creation of inefficient domestic steel and synthetic industries. In the final prewar years, WiRüAmt spoke to Hitler through the subservient chief of staff, General Keitel. In

* WI/IF 5.315 Roll 64, T-77.

military economic matters, it had strong competition in Göring, who spoke to Hitler not only as leader of the Four-Year Plan, but also as the Commander of the Air Force.

The Commanders in Chief of the three armed forces acted separately through their Ordnance Boards and procurement staffs to obtain the total amounts of weapons personally sanctioned or directed by Hitler as the Supreme Commander. The Commanders then dealt separately with their segments of industry through the Armament Inspections and Commands. At the OKW level, Thomas was left to adjust the economic consequences of these actions, which were ordered without regard to raw materials conservation or rational design and production practice.

In the case of the army, the Ordnance Board actually designed weapons and was resistant to innovative ideas or economies. Since Hitler was interested in army weapons, he personally insisted on some specific advances. The navy had unsuccessfully experimented with government-produced designs and government-owned yards and had jealously guarded its procurement activities against the other services. The air force had the disadvantage of having Herman Göring as Commander-in-Chief. Göring and his air staff were endlessly fascinated with development efforts and frequent changes in specifications. These crippling confusions resulted in production that consistently fell below the objectives. A planned output of 2,000 planes per month for 1940 was raised twice in the course of that year, but in December, the production was only 779.*

To orderly minds such as General Thomas', the apparent confusion at the level of the high command was intolerable. In September of 1939 in a final peacetime effort to secure a nationally coordinated rearmament, he complained to his chief, General Keitel, that:†

"At the moment in Germany there rages a war of all against all...The result is that it is demanded on all sides that no reserves should be held back but that the total amount of raw materials should be consumed...So long as Their Lordships, the Commanders-in-Chief are allowed to do everything they please without contradiction, we shall never arrive at any clear solution."

* Speer Report No. 18, Appendix No. 2, p. 18.

† FD 1434/46, No. 168, OKW/WiRüAmt, pp. 15-16, cited in A. Milward, The German Economy at War, Athlone Press, Univ. of London, 1965.

Armament for Blitzkrieg

Postwar research seems to indicate that no clear solution to the rearmament problem for a second world war was intended by Hitler. In the words of the U.S. Strategic Bombing Survey, Germany achieved "armament in width" by 1939 but no "armament in depth." Germany created an armed posture through the use of idle civilian capacity and through government subsidy of a comparatively small number of aircraft and other plants. Hitler created an economy designed for war, but it was for his own special concept of war, the Blitzkrieg, and not for the full scale confrontation of the great mass production economies of the Western World.

From its beginning in 1933, the National Socialist regime was cautious in the pursuit of its three goals: economic recovery, establishment of National Party control, and the rearmament of Germany. The first two goals were highly interdependent. Although the Party owned the police, Hitler went so far as to betray his early revolutionary comrades rather than to unduly coerce industry and the armed services. These two power blocs were attracted by the promise of preferential treatment in the case of business and rearmament for the army. The support of the German people for the regime was purchased by economic recovery in exchange for their freedom. Hitler pursued a policy of "guns and butter." Only professionals like General Thomas worried that the army of 70 divisions and the air force of 2,000 planes lacked the logistic and industrial backup for sustained warfare. Objections of the professionals were silenced by the political success in the acquisition of Austria and Czechoslovakia and later, in the first years of the war, by the military success of the Polish, Norwegian, and French campaigns.

The result was that Western leaders misread the strength of the German economy, imagining it to be geared for total war when this was not the case. The point is made in gross terms by an examination of German government expenditures as a percentage of total expenditures and of GNP for the years 1933-38:*

* S. P. Audic and J. Veverka, "The Growth of Government Expenditure in Germany since Unification," Finanzarchiv, Vol. xxiii, 1964, cited in A. Milward, op. cit.

<u>Year</u>	<u>Percent of Total Expenditure</u>	<u>Percent of GNP</u>
1933	8.7%	3.2%
1934	8.8	3.4
1935	15.8	5.5
1936	22.6	7.6
1937	28.2	9.6
1938	42.7	18.1

Seymour Harris estimated that:*

"An industrial nation can, if it so wills, devote over 50% of its product to a survival effort. Britain devoted between 50 and 55% from 1941 to VE day and Germany devoted as much as 50% in the latter part of World War II. The U.S. devoted no more than 42% of its product to the war."

While it might not be expected that the armament effort of the prewar years would equal or approach the all-out survival levels of 1943-44, the discrepancy between 1938 and the final effort points up the reserves left untouched in the German prewar economy.†

Rearmament created a military sector in six industries, within which military suppliers were required to deal directly with the procurement agencies of the three armed services. These segments of the six industries represented the military equivalent of consumer goods, such as food, uniforms, and quarters.‡ These concerns provided the materials for weaponry through increased use of idle plant capacity. The government entered these markets and, although it regulated the quality of the product through specifications of the three armed service procurement agencies, it paid prices determined by the seller. This generous concession to manufacturers avoided the problems of a market-determined price and allowed the seller his cost plus a 3 to 6 percent profit based on total expenditures.

* Seymour Harris (ed.), American Economic History, McGraw Hill, New York, 1961, p. 229.

† This position is carefully and extensively developed by B. H. Klein in "Germany's Preparation for War, a Reexamination," op. cit., and in Germany's Economic Preparation for War, op. cit.

‡ WI/IF 5.2149, Roll 339, T-77. In 1937, a year of rising military expenditures, WiRüAmt estimates that 78 percent of the 4 billion marks spent went to this class of supplier.

Since the frozen prices for materials and labor represented the demand relationships of 1936, these prices grew increasingly unrealistic, and there was no incentive to reduce them because they were originally designed to ensure high profits to industry.* The production of armament and military equipment was in the hands of private industry, but operations were closely regulated by WiRüAmt through regional Armament Inspectors and local Armament Commands. Military security measures applied to employers and employees, and what might ordinarily have been trade secrets became military secrets.†

By the summer of 1939, the armament sector of the economy was indeed, as General Thomas had complained, "a war of all against all," but only from the standpoint of a total war effort. The very complexity Thomas complained of acted to simplify the authority of Adolf Hitler and was ideally suited to his personal conduct of a strategy of Blitzkrieg.

From the accumulated production of his relatively narrow armament base, augmented by such prizes as Steyer in Austria and Skoda in Czechoslovakia, it was possible for Hitler to mount a series of successful campaigns against weaker neighboring countries in 1939.

Orders were placed shortly before each campaign for the additional armament and munitions required.‡

"The attack on France was preceded by an abnormally heavy production of vehicles and mobile armour, that on Britain by an increased production of naval equipment and aeroplanes. The attack on Russia was preceded by an all-out production effort in the field of general army equipment. None of these increases in output involved an overall increase in the output of that sector of the economy committed to war production."

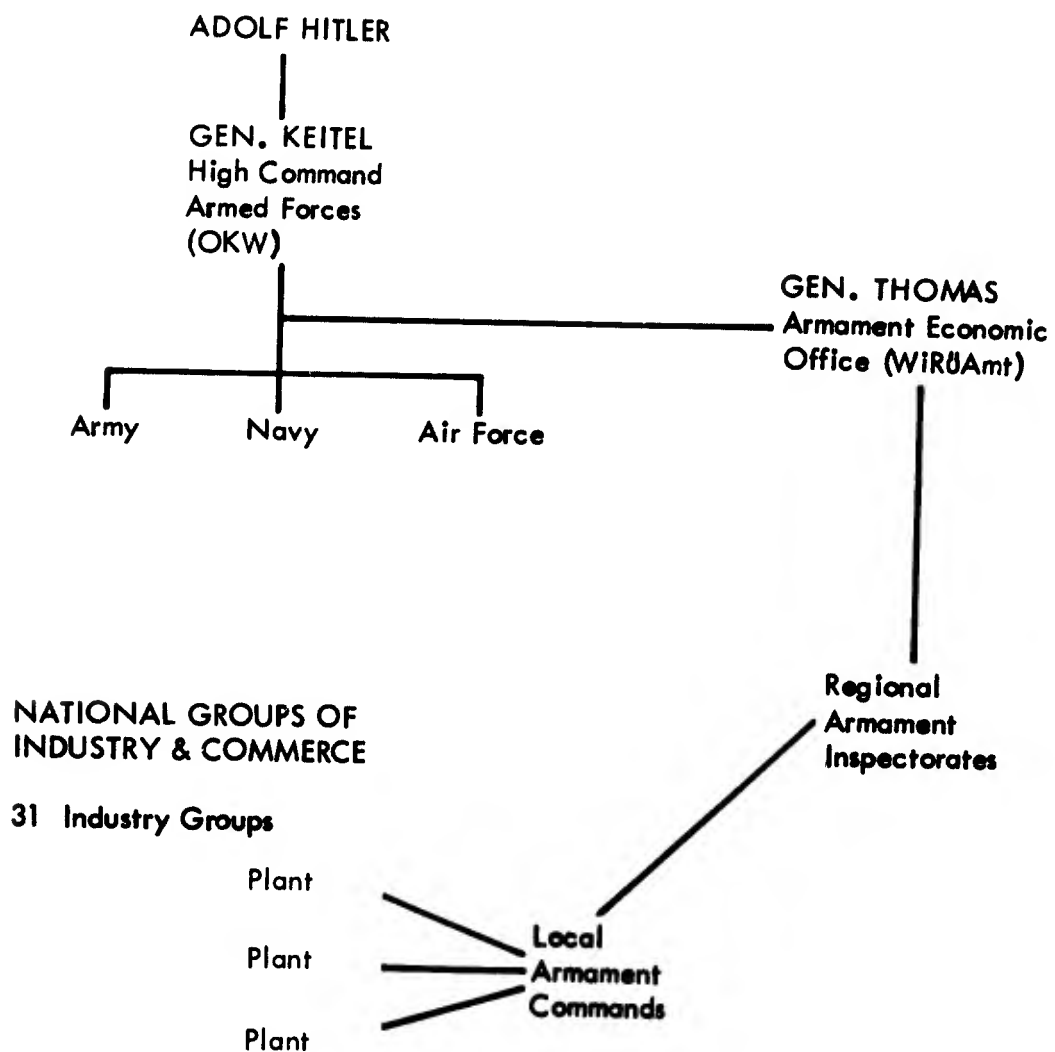
What appeared to be a haphazard, stop-and-go, armament procurement policy to General Thomas was, in fact, a sensitive and effective instrument for what now appears to have been Hitler's purposes. The essentials of this system as it functioned in the Blitzkrieg period may be seen in Figure 2.

* Speer Interrogation Report No. 90, Testimony of Karl Otto Saur, p. 3.

† WI/IF 5.1276, Roll 266, T-77.

‡ The most concise account in English of the political economic concept and operation of the Blitzkrieg appears in S. Milward, op. cit., p. 11.

Figure 2
BLITZKRIEG ARMAMENT CONTROL



In 1939, Hitler was in a position to decide personally on an attack on Poland; he secretly ordered Keitel to prepare the plan of campaign and Thomas to alter the mix of armament production in consonance with the campaign plan and, when all was in readiness, to give the order to strike. In all of this, Hitler could and did bypass the ineffectual Economic Minister Funk. This could be accomplished by a Führer Command, an order that, as it was elaborated in the form of plans for action by subordinates, had the force of law. In the case of the Polish campaign, as well as those of Norway and France, little change was made in the domestic economy, and the production of consumer goods continued. The listing shows the output of consumer goods for 1940 and 1941.*

<u>Industry Groups</u>	<u>Net Production Value</u> <u>(in million Marks)</u>	
	<u>1940</u>	<u>1941</u>
Glass	440	466
Ceramic	361	383
Printing	917	927
Foodstuffs	3,203	3,241
Brewing and malting	1,098	1,183
Sugar-producing	444	482

Despite the widely publicized plans for the economic integration of Europe, the fruits of the successful Blitzkrieg were treated as booty, and raw materials flowed into Germany from the occupied territories to sustain the industrial economy of Greater Germany, with little thought to rational allocation of production on a continent-wide basis. Even with increased availability of raw materials, the rate of consumption with respect to supply turned out to be more than enough to justify the fears of General Thomas that no reserves would be held back and that the total amounts of raw materials would be consumed. The listing shows the supply and consumption of nonferrous and ferroalloy metal for 1939-41 (metal content in thousands of metric tons).†

* Rolf Wagenführ, Aufstieg und Niedergang der Deutschen Rüstung, (unpublished manuscript). This history of the "rise and fall of German armament" was prepared by Dr. Wagenführ, the head of the Statistical Office of the Ministry for Armament and War Production in 1945. The document may be found in the Documents of the Strategic Bombing Survey held by the National Archives in Washington, D.C. This manuscript was the basis for a book entitled Die Deutsche Industrie im Kriege 1939-45, Deutsches Institut für Wirtschaftsforschung, Berlin, 1954.

† U.S. Strategic Bombing Survey, The Effects of Strategic Bombing on the German Economy, p. 264.

<u>Metal</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>
Copper			
Annual addition to stock	312.0	318.0	329.0
Consumption	324.0	292.0	372.0
Tungsten			
Annual addition to stock	2.7	0.9	1.0
Consumption	4.2	3.7	3.4
Lead			
Annual addition to stock	216.0	248.0	224.0
Consumption	248.4	224.0	277.0
Nickel			
Annual addition to stock	8.5	13.7	8.8
Consumption	10.1	11.6	9.2
Molybdenum			
Annual addition to stock	1.4	0.3	0.5
Consumption	3.4	2.2	1.8
Chrome			
Annual addition to stock	58.1	13.8	11.2
Consumption	48.1	35.3	43.3

Limitations of Blitzkrieg

Blitzkrieg was an institution as well as a military strategy for National Socialism in the early war years. In the former context, it suited Hitler and his dictatorship in several ways. It permitted him to gain the fruits of warfare as an instrument of policy without endangering the popularity of the Party with the German people. It did not threaten the fiefdoms of the Gauleiters through national economic planning. It permitted Germany to act internationally like the great power she no longer was, and lastly, it allowed Hitler to select personally and secretly the timing and objectives of a series of discrete military campaigns.

In the context of a strategy, the Blitzkrieg would function ideally as long as nations more powerful than Germany were reluctant to mobilize fully the superior economic potential for war. A further requirement for success was that basically weaker or less well-prepared nations were attacked. Lastly, there were limitations of scale.

By the fall of 1941, all of these limitations had been exceeded. Limitations of scale were encountered in the Russian campaign. The stubbornness and numbers of the Russian soldier, the size of the country, the severity of its winter, and an unexpected economic vitality brought the Germans to a halt. Russian counterattacks in November resulted in recapture of Rostov-on-the-Don in December. Britain had reorganized her economy for total war and, in December 1941, the United States entered the war. Blitzkrieg was no longer feasible.

V THE ORGANIZATION OF A RATIONALIZED WAR ECONOMY

On 28 September 1940, Adolf Hitler issued a secret Führer Command setting forth the economic requirements for a Blitzkrieg campaign against Soviet Russia, to take place in the spring of the following year. The command was translated dutifully into detailed orders by the army, navy, and air force staffs and relayed through the military armament procurement organization to the appropriate plant managers. The managers by now were accustomed to sudden changes in production, and few if any knew that the objective this time was the Soviet Union. In keeping with the usual economic operation of the Blitzkrieg, the changes were sudden and drastic. Aircraft and naval production for the Battle of Britain were to be continued, but ground forces were to be augmented from 120 to more than 180 divisions for the coming invasion.

The additional requirements strained the Blitzkrieg economy to the limit. Industrial labor was released on short term leave from the army to work in army-controlled factories, and large numbers of foreign workers were recruited to work in Germany. Although the invasion of Great Britain was postponed, naval and air battles continued in the West. In March 1941 just before the invasion, Hitler demonstrated his confidence in the "five-month war" he planned with Russia by reducing the ground armament production goals for the fall of 1941.*

The invasion, slightly delayed by weather, began on 22 June 1941. Initial success in the first months appeared to justify Hitler's strategy, and the planned reductions were carried out to prepare the way for further aircraft and naval production. The listing shows the German armament production before and during the Russian campaign.†

* WI/IF 5.899, Roll 194, T-77

† Die Deutsche Industrie im Kriege 1939-45, op. cit., p. 32.

<u>Weapons Group</u>	<u>Month in which 1941 Maximum Reached</u>	<u>Percent Decline from Maximum by December</u>
Light infantry arms	April	-38%
Heavy infantry arms	August	-49
Army artillery	April	-67
A/C armament	August	-36
Tank guns	December	-0
Flak	November	-17
Total weapons	July	-29

In late November, the Russians showed unexpected vitality and mounted a series of counteroffensives, managing to recapture Rostov-on-the-Don in December. The German economy, which had been supplying both guns and butter, was strained to the limit and now was faced with a totally realigned and growing British war economy and the distant threat of the United States.

On 13 December, Hitler made his last effort to secure greater military performance from the Blitzkrieg economy by calling for an increase of production in ground equipment and the concurrent call-up of 508,000 men. Aircraft and submarine production were already below planned rates, and this action further endangered these programs by reductions in the skilled labor force. The details of the bankruptcy of Blitzkrieg were assembled by WiRüAmt and presented to Hitler by General Thomas on 23 December 1941. Thomas concluded that:*

"...small scale measures are no longer sufficient to meet the needs of the present situation. New incisive directions are therefore necessary to define clearly the armament tasks for the year 1942."

Thomas' holiday timing did nothing to improve Hitler's fondness for generals.

On many occasions dating back through the late 1930s, General Thomas had predicted the dire consequences of a two-front war, both in the form

* WI/IF 5.899, Roll 194, "Umstellung der Rüstung," (conversion of armament).

of memoranda to Hitler and in speeches to industrialists.* Now with the Blitzkrieg no longer a military, economic, or political possibility, the army again offered its services as the controlling agent for a total war economy.

There is no clear record of Hitler's intentions in this period, but the logic of events and the reports presented appear to have convinced him that Blitzkrieg would have to be abandoned. The solution that eventually emerged was the creation of a new Ministry for Armament and War Production. This organization was the successor to a small Ministry for Armament and Munitions, which had been in operation since March 1940 under Dr. Fritz Todt. The original Todt Ministry was subordinate to the army and had been formed to expedite production of ground armament (it had no control over the economy). In almost two years of quiet operation, Dr. Todt had devised and tested several measures that were to become central features of the German war economy from 1942 until its collapse in 1945.

The Ministry for Armaments and War Production

Todt owed his appointment to a successful career as the director of construction for the high-speed motor road grid (Autobahnen) in prewar Germany. As a result of his ability to attract and employ technical expertise, he was given a position as troubleshooter in the office of the Four-Year Plan. At the beginning of 1940, the uncoordinated consumption of raw materials led to a short supply of copper. Todt was able to correct this by supervising the crash development of a process for substituting iron for copper driving bands in projectiles.

Early in 1940 it was discovered that the overall munitions production was lagging, and Hitler sought a remedy through the creation of a Ministry for Armaments and Munitions to serve the needs of the army. Todt's solution was the organization of a Main Committee for Munitions in which the technical executives, plant managers, and production engineers could meet to consider the total munitions needs for the army, scaling the orders to the available materials and manufacturing capacity. The Main Committee for Munitions worked so well that another was organized for Tanks and Armored Vehicles.

* WI/IF 5.23, Roll 5. Thomas prepared a history of army experience in economic planning entitled "Grundlage für eine Geschichte der Deutschen Wehr- und Rüstungswirtschaft" (Foundation for a History of the German Defense and Armament Economy). The manuscript appears in microfilmed records of WiRüAmt and documents of the USSBS.

Proposals were made by the Henschel Works of Kassel and by Dr. Ferdinand Porsche for what was to become the "Tiger" tank. As Karl Otto Saur, an assistant to Dr. Todt, said,*

"Porsche was somewhat of an outsider; hitherto the Army Ordnance Board had considered that in matters of tank development it had to lay down the specifications in greatest detail itself--even though it did not actually construct the tanks itself--and in consequence firms were under so strong a compulsion to build according to the ideas of the Board that there could hitherto have been no thought of free development."

Unlike the practice of the prewar rearmament years, the managing heads of industry did not merely accept orders from the Armament Inspectorates and commands for bureaucratically specified weapons but now had an opportunity to meet and consider the total impact of army orders on their collective capacity and resources.

Under prodding from Todt, they went farther and began to consider refinement of production methods and pricing. These two areas provided the basic devices for securing the rationalization of German industry that later resulted in vast increases in production without a conspicuous increase in materials consumed.

A moving spirit in the production refinement field was Dr. Heynen, the Director of the Gustloff (Steel and Munitions) Combine. In the summer of 1941, Heynen presented the results of his rationalization study to a meeting of armament engineers in Berlin. His method was to break down the manufacture of a machine gun into 30 different processes and compare time and costs for each process as it was performed in the various production firms. "Previously," says Saur "it had been the custom to say 'such and such factory is best,' and other factories were adjusted accordingly." In Heynen's analysis it was seen that:†

"The best factory produced at least 10% of the steps in the most expensive way, and the most expensive factory, on the other hand, produced 10% of the processes in the best way, so that it was not correct to compare factory with factory but only the individual process of one factory with the corresponding process of another."

* Speer Report No. 45, pp. 3-4.

† Speer Report No. 90, p. 4.

Inspection showed that the most expensive factories owed their cost in part to distance from transportation or the use of special equipment, as opposed to other plants that might be less expensive because they were part of a larger steel works and received their material at cost.

Todt immediately established a Weapons Engineering Office to make a rapid intensive investigation of existing weapons and equipment for similar economies in material and labor. The office, although located in the Army Armament Staff, was supplemented by teams of professional production engineers from the civil sector, who were paid the going civilian salaries and per diem expenses.

The rationalization studies for labor and materials assisted the cause of fixed price contracting, which had been urged without effect in early 1940. The worst effects of individual profiteering through the cost-plus-fee could now be countered.

An even more important effect was the creation of standards of value in a directed economy that had frozen its prices and had steadily lost the capacity for rational planning as the demand relationships of labor and materials changed.

Without the allocative mechanism of a reasonably free market, the erratic orders for various mixes of armament and general use commodities (food, shoes, clothing, barracks, etc.) by the three military branches were more in the nature of arbitrary levies on the economy than exchanges in the market place.* In October 1941, the office of the Four-Year Plan, which had superseded the Ministry of Economics as dictator of the economy, approved a fixed price system that gave contractors three options in the form of contract they signed. In the first price group conforming closely to the established norm, the contractor was forgiven his excess profits tax. In the second price group, he paid the taxes and, in a third, he had to provide evidence of special circumstances contributing to high costs,

* In addition to freezes on prices and wages in 1936, large pseudo-tax payments were levied by the Nazi Party in the form of "voluntary" donations from all sectors of the economy. Dividends and prices for corporate securities were frozen, profits were taxed or frozen, and no new capital investments could be made without permission. The resulting oversupply of money in the economy presented problems of currency reform in the postwar period that will be discussed in a later investigation.

such as lack of transport, unusually high loan interest burden, and other unusual expenditures.*

These developments had been taking place on a limited scale as the armament economy reached its limits in the fall of 1941; although no record remains, it is fairly certain that they were confidentially reported to Hitler by Todt. A decree by Hitler on 3 December 1941 laid the basis for further developments in a three-point program:

1. The weapons and equipment under production were to be manufactured rationally under the most modern principles of production.
2. The weapons and equipment under production were to be examined with respect to their functions to abolish all unnecessary expenditure of material and labor, especially with regard to excessively high standards of longevity and orders in greater than necessary quantity.
3. Manufacturing specialists and practical industrialists were to be consulted before the development of a new construction and to share the actual growth of the construction.†

All through the month of December, as the bad news from the Russian Front developed and General Thomas urged greater coordination of the economy, Todt labored to increase the number of Main Committees under his small Army Ministry and to extend his rationalization studies and fixed price policy to other classes of army armament and equipment. On 10 January 1942, a Führer Command entitled "Armament 42" set forth the need for large increases in troops and equipment of all arms, the belated stepping up of capital investments in the raw material base of the war economy, and the extension of the fixed price to all war industry.‡ The decree did not specify administrative machinery for these reforms, and the month of January was devoted to meetings in Berlin at which Todt, for his civilian army ministry and General Thomas for OKW, together with Göring and the Ministry of Economics, all vied for control.§ In these debates, Todt had

* Speer Report No. 90, p. 3.

† Speer Report No. 45, p. 3.

‡ WI/IF 5.900, Roll 194, T-77.

§ WI/IF 5.102, Roll III. Close perusal of the surviving documents of the Nazi regime and the postwar testimony of its senior officials indicate that Hitler's style in complex policy matters was to name a goal and then allow the details of execution to form in his mind from the ensuing debates of senior officials.

a triple advantage--he was a loyal Nazi party member, an able administrator, and he was not a soldier.

* The leader of the Tank Committee, Walter Rohland, claimed after the war:

"Dr. Todt had already recognized the necessity for centralizing all branches of industry directly or indirectly necessary for war production and had paved the way for this by discussion with Hitler. The actual decisions for the creation of a sort of War Ministry under the leadership of Dr. Todt were taken shortly before his death."

On 6 February, Todt met with all of his staff and the chairmen of the new armament committees to plan far reaching changes in the war economy. Since these changes would involve the transfer of equipment, labor, and contracts all over Germany, a speech was planned for delivery to the Gauleiters to enlist their cooperation. On 8 February, Todt was killed in an aircraft accident, and it fell to Hitler to select another leader for his war economy.

Organization of the Ministry for Armament and War Production

With the death of Dr. Todt, Hitler lost one of his most important administrators. For a successor, he turned to Albert Speer, his personal architect. Speer had been an assistant to Todt and, since the beginning of the war, had been in charge of air force plant construction. He knew of Todt's plans for the war economy and was prepared to carry them forward. Ten days were spent in discussions and meetings, with Speer emerging not only as the new minister, but also as "Commissioner General for Armament Tasks in the Four-Year Plan," thus opening the way for broader powers in the economy.† On 19 February, he had his first formal conference with Hitler on armament policy, a practice that continued to the end of the war. Records of these meetings provide one of the few bodies of reliable material about the high level decision process in the Third Reich.

In the first conference, Hitler made it plain that postwar planning by industry must cease. Speer obtained approval for more production committees and the wider extension of fixed price contracts. A program of capital plant construction and the conversion of production space from

* Speer Report No. 66, p. 5.

† Speer Report No. I.

civil industry raised the question of labor availability. Changes in conscription were approved that would protect key workers in several critical industries.*

Speer had received the mandate, but the confused machinery of power in Germany still was not under his control. From February to May of 1942, he worked steadily to perfect his control over the war economy. An arrangement with the navy brought shipbuilding into the new ministry through the creation of another production committee. He sought and obtained a decree from Hitler establishing a Central Planning Group, composed of a representative of Göring, a Dr. Körner, and Air Marshal Milch. Central Planning had the mission of allocating raw materials for the three armed forces. This step eliminated the link between the Ministry of Economics and the High Command of the Armed Forces. With the control of raw materials went the control of prices and rationing for both consumers and producers goods, thus subordinating the Ministry of Economics to the Ministry of Armaments. By installing production committees in control of manufacturing, the national network of Armament Inspectorates and Commands were left without their former directive authority over industry. In May, WiRüAmt, complete with General Thomas, was placed under the Armament Ministry. Hitler also confirmed to Speer:†

"Any changes in the requisitions which reached us from the General Staff or other centers are not binding on us, and I am authorized to refuse such requisitions."

Two areas remained outside of Speer's control. In the matter of labor, the ever suspicious Party chieftains, Bormann and Göring, managed to secure the appointment of Fritz Saukel, the Gauleiter of Thuringia, as Commissioner General for Labor in the Four-Year Plan, with labor procurement powers outside of Speer's control. This was to hamper Speer

* WI/IF 5.68, Roll 10, T-77, Führerkonferenz 19 Feb. 42. Microfilmed records in the National Archives contain Speer's own notes and those of his Deputy, Otto Saur, for these conferences, which occurred at roughly two-week intervals for the rest of the war. In them, Hitler indulges in detailed discussions of ground weapons, occasionally influencing design as in the case of the Tiger tanks. They show Hitler to be impatient with the constraints of long range planning, to seek constantly to return to the improvisation of Blitzkrieg, and, failing this, to lose himself in details of weaponry. They stand as classic evidences of his personal retreat from military realities into a military dream world.

† WI/IF 5.68, Roll 10, T-77, Führerkonferenz 21-22 March 1942.

throughout the war since, over his objections, Saukel insisted on herding foreign workers and prisoners of war into Germany without regard to skill or incentive.* A second defeat was the failure to gain direct control over aircraft design and production, which remained a responsibility of the Air Staff (with the exceptions of air munitions and armament). Although this power came late in the war through the creation of a "fighter staff" to expedite production, it was too late for serious military effect, since fuel and pilots were not then available.

With the acquisition of WiRüAmt, the Armaments Ministry began to assume the shape it was to retain throughout the war. The Main Committees were devoted to finished products such as armored vehicles, rail vehicles, and shipbuilding, with Special Committees under each for specific models of the item, such as tanks, locomotives, and submarines. For components in general use, such as ball bearings, horizontal organizations called Industrial Rings were formed. All of these organizations were staffed with technical executives and practicing engineers. Lawyers, administrators, and financial experts were deliberately excluded. It was specified by Speer that chairmen who were over 55 years of age were to have deputies not over 40.

Committees and Rings met to consider gross requirements for the product or component for which they were responsible. The orders were prepared and priced according to the principles of process analysis begun under Todt and issued to the factories through the Regional Commission or intermediate authority of the Ministry. Rings and Committees had representatives at each regional commission who, with the assistance of other supporting staff members, supervised construction, monitored quality, and assured the flow of raw materials and labor.† Each Main Committee was matched with a Development Committee charged with the design, development, and rationalization of new products. The number of Main Committees varied during the war, reaching as many as 21 Main Committees and 12 Rings, comprising more than 6,000 engineers and technicians. The following list is representative.‡

* Speer Report No. 19, p. 19. Speer's administrative defeat and his continued protests probably saved his life at Nürnberg, where it was shown that he was not responsible for the forced labor abuses for which Saukel was executed.

† The Regional Commission could expedite the flow and control of the utilization of available labor. The supply varied with the arbitrary inefficient methods of Saukel.

‡ F. Neuman, op. cit., p. 592.

Armed Forces and General Equipment
Armored Vehicles and Tractors
Shipbuilding
Munitions
Engines
Machine Tools
Rail Vehicles
Wood Construction and Barracks
Electrical Installations
Powder and Explosives

With vertical cognizance and control through the Main, Special, and Development Committees and horizontal control through the Rings, the Speer ministry effectively had replaced the design, development, and directive authority of the armed services. Since the Committees and Rings were staffed with many members of Schacht's old Economic and Technical Groups from the Estate of Industry, the entire apparatus may be seen as a return of some measure of the industrialists' former power. Speer had secured a promise from Hitler to forego party loyalty as a criterion for selection of the staffs of Committees and Rings. Although this agreement occasionally failed in practice, it was generally adhered to and was responsible for the unusually high morale created in the Ministry and throughout industry. Speer, conscious of the shortcomings of an authoritarian system, deliberately sought to free up the old rigidities and to "democratize" the industrial sector while tightening controls over the worse abuses of self-interest.*

The Committees, Rings, and their regional organizations made up one of the three main sections of the Ministry for Armament and War Production. It was called the "Organization for Self-Administration and Responsibility of German Industry" and was based in the Armaments office of the Ministry (Organisation für die Selbstverantwortung und die Verantwortlichkeit der Deutschen Industrie). The former military procurement organizations became responsible for staff support and contractual matters through their national net of inspectorates and commands and also reported to the Armaments Office of the Ministry. The general organizational structure

* Speer Report No. 40. This report is a powerful indictment of the inefficiencies of bureaucracy and dictatorship in industry. Although written after the war, there is corroborating evidence that Speer felt and acted in this spirit during the war, declaring on one occasion, "It is enough for me to belong to the Party."

retained by the Ministry for Armament and War Production throughout the war is shown in Figure 3.*

The Committees and Rings were successful in releasing the abilities of German industrialists for increased war production. The system did run counter to the deeply held political convictions of senior Party members, notably Borman, Saukel, Goebbels, and Göring. Fritz Saukel, with whom Speer had to contend for labor, had once been Gauleiter of Thuringia and, as a state official, had managed the Gustloff combine, an enterprise made up of six old corporations that had been expropriated from Jewish owners by the National Socialists. When Committees and Rings began to integrate the national economy, they created national vertical and horizontal relationships that transcended the notion of autonomous district or "Gau" socialism. Real frictions arose with the Gauleiters when Committees and Rings sought and obtained the transfer of plants, labor, machines, and orders for war materials across district lines.

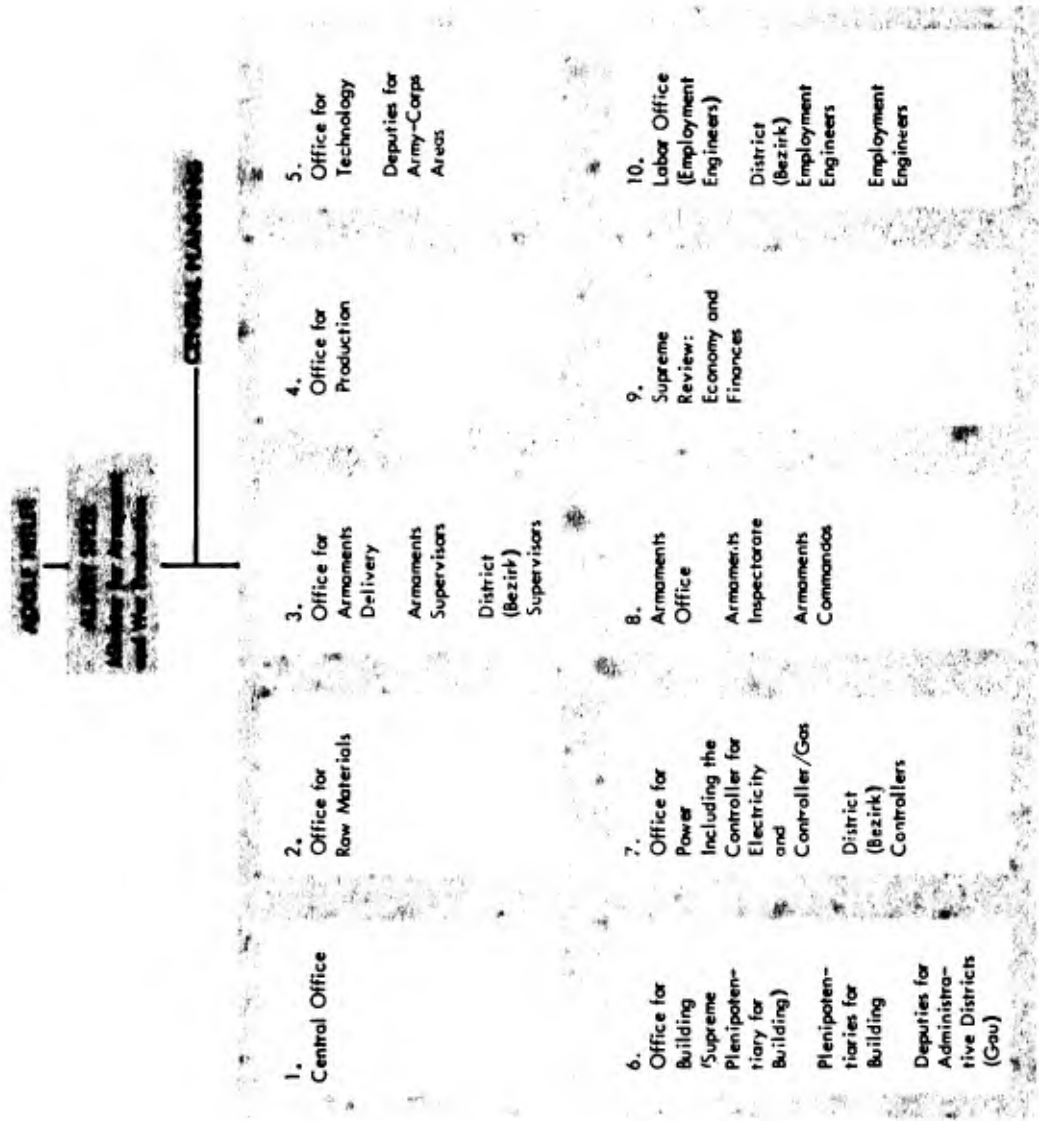
Along with their disturbing effect on National Socialist regionalism, there was the constant suspicion that the chairmen of Committees and Rings, who served as German equivalents to "dollar-a-year-men," were favoring their own parent firms with orders for war materiel. There can be little doubt that such favoritism existed, but it was not widespread or conspicuous enough to be a major issue.

A more telling criticism of the system was made by the U.S. Strategic Bombing Survey in a careful investigation of the machine tool industry. Here an old (1892) industrial association had moved into the compulsory groups formed by Schacht in 1934, and later a section had been part of the Office of the Four-Year Plan. When Speer organized a Committee for Machine Tools, the same group of manufacturers simply changed their group name. The Main Committee for Machine Tools resisted the development of new mass production tools, the standardization of their prewar export lines, and generally dragged their feet in the war effort in spite of all threats and pressures.† While the number of tools available were generally sufficient, the Speer Ministry never was able to secure the kinds and numbers of mass production tools needed to fully exploit the production potential of their industrial base.

* The title was changed from "Armaments and Munitions" to "Armament and War Production" later in the war, and the Armaments Delivery Office, the original control for the Committees and Rings, was later merged with the Armaments Office.

† USSBS Interrogation Report on the German Machine Tool Industry.

Figure 3
 STRUCTURE OF THE REICH MINISTRY FOR ARMAMENTS
 AND WAR PRODUCTION WITH SUBDIVISIONS



In the years of National Socialist power before 1942, a Party ideal had been the gradual displacement of the old German provincial organization of Länder or states with Gaue or Party district divisions. For most of the war years, there were 42 Gaue, each with its Gauleiter, all of whom were responsible to Adolf Hitler through Martin Bormann, who carried the title of Reichsleiter.*

As political subdivisions, the Gause did not qualify as economically coherent units, and prewar and Blitzkrieg arms procurement by the armed services had been based in larger military districts. By November 1942, the defeat at Stalingrad destroyed all thought of anything but a total war economy, and Speer began to fashion regional organizations that would act as the executive agent for his control of the German economy. The regional units were known as Armament Commissions and, as the pressures for production increased and damage from air raids mounted, their number was reduced to seven with some regional subcommissions added for complete coverage.†

<u>Region</u>	<u>Location</u>
I Rhein-Ruhr	Kettewich
II Southwest	Heidelberg
III Southeast	Kapfenberg
IV Oder-Moldau	Prague
V North	Hamburg
VI Center	Harz
VII Bavaria	Munich

The organization of Armament Commission VII, headquartered in Munich, is typical and is shown in Figure 4, together with its higher and subordinate authorities. The numbered columns show the distribution of duties. The 12 numbered functions all report to their ultimate senior agency through the Ministry of Armament and War Production, with the exception of Nos. 7 and 8, which represented the Party and reported through the offices of the local Gauleiters and their economic advisors, and Nos. 5

* F. Neuman, op. cit., pp. 534-6

† Speer Report No. 83, App. 1.

Figure 4

STRUCTURE AND PURVIEW: ARMAMENTS COMMISSION VII
(MUNICH AND SURROUNDING AREA) OF THE MINISTER
FOR ARMAMENTS AND WAR PRODUCTION

HIGHER AUTHORITY	Ministry for Armaments and War Production; Armaments Office	Ministry for Armaments and War Production; Technology Office	Ministry for Armaments and War Production; Armaments Office	Economics Ministry	Labor Ministry; Plenipotentiary; ment
INTERMEDIATE AUTHORITY	1. Armaments Inspectorate VII with Army, Navy, Air Force, Administration, Central, Technical Assistance and Delivery Departments	2. Deputy for Army-Corps Area VII	3. Armaments Supervisor VII	4. Chief of the State Economics Office, Munich	5 and 6 Presidents of Administrative Districts; Labor Offices Bavaria and Sw
LOCAL AUTHORITY	Armaments Commando Munich Armaments Commando Augsburg	N. S. D. A. P. Administrative District (Gau) Offices for Technology, N. S. B. D. T. House of Technology (Haus der Technik)	District (Bezirk) Supervisors; District (Bezirk) Deputies and Trustees of the Committees and Rings of the Ministry for Armaments and War Production in Armaments District VII (Bezirk)	Economics Offices; State Magistrates (Landrat)	Labor Offices
DUTIES	Control of all Armaments Firms; Regulation of Contract Expiration; Provision of Production Materiel; Employment; Machine Utilization; Housing Provision; Priorities; Displacements	Use of Technology; Plant Construction and Repair; Chief Commission for Machinery Act as Representative for the Supreme Inspectorate for Water and Power in Plan Region XVIII (Bavaria and Tyrol-Voralberg); Employment Engineers	Represent the Interests of the Committees and Rings; Supervision of the Final Stage of Armaments Production; Production Increases; Rationalization; Exchange of Information; Participation in Contract Regulation; Factory Management; Address: Administrative-District Economics Council (Gauwirtschaftskammer) Munich-Upper Bavaria, Industry Department	Departments I. State-Economics-Office Factories Control II. Provision and Consumption III. Power and Transportation IV. Employment V. Chemicals	Assessment of Requirements of Labor; Workment; Labor T (Reichstreuhau Arbeit)

THE ARMAMENTS COMMISSION:

- Coordinates the work of all authorities in Armament Production
- Prevents redundancy
- Reconciles the interests of armaments production and the general war economy
- Issues binding directives to all authorities in the war economy
- Arbitrates disputes
- Maintains close ties with the Defense Commissars (Gauleiter)
- Directs employment
- Continuously supervises the flow of armaments production
- Maintains a "convocation committee" (Einberufungs-Ausschuss)

A

Economics Ministry	Labor Ministry; Plenipotentiary for Employment	Party Chancellery; Administrative-District (Gau) Leaders of the N.S.D.A.P.	Ministry for Armaments and War Production; Economics Ministry; Economics Council (Reichwirtschaftskammer); Administrative - District Leaders	Plenipotentiary for the Regulation of Building	Controllers for Power
4. Chief of the State Economics Office, Munich	5 and 6 Presidents of the Administrative District (Gau) Labor Offices in Upper Bavaria and Swabia	7 and 8 Administrative-District Plan Economics Advisor of the N.S.D.A.P. for the Administrative Districts (Gau) Bavaria and Swabia	9 and 10 Presidents of the Administrative-District (Gau) Economics Councils for Upper Bavaria and Swabia including Industry, Handicrafts, and Trade Departments	11. Plenipotentiary for Building in Armaments District VII	12. District Controllers for Power
Economics Offices; State Magistrates (Landrat)	Labor Offices	Army-Corps-Area Economics Advisor of the N.S.D.A.P.	District Professional Associations (Agencies of the Economics Groups (Wirtschaftsgruppen))	Administrative-District Deputies	
Departments I. State-Economics-Office Factories Control II. Provision and Consumption III. Power and Transportation IV. Employment V. Chemicals	Assessment of Labor Requirements and Provision of Labor; Worker Displacement; Labor Trustee (Reichstreuhaender der Arbeit)	Maintenance of the Influence of the Party; Creation of Close Liaison between the Armaments Commission and the Political Leadership as well as with the Defense Commissions	Representation of the Economy as a Whole and General Care and Control of the Firms; Planning for the Firms; Employment; Commerce; Management; Provision of Coal, Power, and Fuel; Counter-espionage; Regulation of the Contracts; Support of the State Direction of the Economy and Support of the Administrative-District Leaders (Gauleiter) of the N.S.D.A.P.	Regulation of the Building Industry and the Expansion of Armaments Production, Management and Transportation of Building Materials; Engineer in Charge of Economizing	Provision of Power in Close Liaison with Army-Corps-Area Deputies and Administrative-District Economics Councils

B

directs employment
continuously supervises
the flow of armaments
production
maintains a "convention
committee"
(Berufungs-Ausschuss)

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and 6, which depended on Saukel for supplies of labor. Thus for functions of the Economic Ministry (No. 4), a representative of that agency would sit in the Armament Ministry under Speer's jurisdiction. The title of Plenipotentiary for the Regulation of Building (No. 11) was one of Speer's early jobs inherited from Todt and one that he regulated from the Ministry in Berlin, together with the Power Controller function (No. 12).

The Commissions elected their own chairman who was charged with:*

1. Coordinating the work of all authorities in armament production.
2. Preventing redundancy.
3. Reconciling the interests of armament production and the general war economy.
4. Issuing binding directives to all authorities in the war economy.
5. Arbitrating disputes.
6. Maintaining close ties with Defense Commissars (an old title given Gauleiters at the beginning of the war).
7. Directly remedying unemployment.
8. Supervising continuously the flow of armaments production.

Representatives of the entire economic apparatus of the National Socialist State were seen in the organization and functions of the Armament Commission. Regional groups of Schacht's old Estate of Industry and Trade (Nos. 9 and 10) and the civilian rationing and price control (No. 4), were all united. The Commissions were supplied with sufficient program guidance so they could function with a minimum of direction from Berlin. The broadly diversified nature of the German economy permitted production to rise through the reallocation of tasks, plant, and labor among the Commissions even as Allied Armies began to occupy German territory.

The regional Commissions were staffed with the most effective technical personnel that could be drawn from the local industries. Like the Main Committees and Rings of the Armament Ministry, these men tended to come from the large, vertically integrated, industrial combines, and there was a conspicuous absence of the small businessman. Furthermore, there was a reluctance and inability on the part of the staff, both at the Commission level and in Berlin, to come to grips with the small manufacturers'

* Ibid.

problems. This weakness never was overcome completely, and it was particularly important since, in many cases, the hundreds of small manufacturers accounted for the sole source of vital components.

To tighten up control and support for these many small component suppliers, Speer turned to the Gauleiters, in the hope that their political authority and attention could be made to serve. In a speech to the Gauleiters in Berlin in 1943, he said:^{*}

"The component industry forms a bottleneck for us. If we cannot increase the component industry which consists of small tiny concerns, after working unnoticed in the district, in small workshops with 20 or 30 men; if we cannot increase this industry to the necessary large scale, then all of our exertions will be absolutely useless.

"I will send each Gauleiter a list of those firms which are component suppliers in that sense in his districts, and I would be grateful if he would see to it that he receives reports every 14 days from the various firm managers and responsible officials in his district as to whether the component manufacturer is furnished with the necessary power, with the necessary gas, and with the necessary labor forces."

To maintain government control with a minimum of inflexible bureaucracy, the Ministry formed several corporations. The most important of these were the Rüstungskontor (Armament Clearing Corporation) and the Heeres-Rüstungskredit A.G. (Army Armament Credit Corporation). The former acted as a clearing house for the allocation of steel and other critical materials, keeping a running balance of the utilization and transfer of kinds and quantities in the armament economy. Plant expansion was financed through the Rüstungskredit. Prices had been controlled with varying success since 1936. A revision of the price and profit control system had tightened up regulation so that the accounting tasks of Rüstungskredit were demanding and complex, but the availability of funds was never a practical problem to the Armament Ministry. Had the National Socialist government emerged intact from World War II, however, its national accounts would have presented a chaotic problem--as indeed they did to the Allied occupiers and to the Bonn Republic.

* RMf/RüK 2096, Roll 132 (Speech to the Gauleiters in Berlin, 6 October 1943).

The government corporation device was used for other special purposes; for example, Generator Power Corporation (Generatorkraft A.G.) and Solid Fuel Corporation (Festkraftstoff A.G.), designed to speed the conversion of motor vehicles for solid fuel. These enterprises were only partly successful, although some thousands of vehicles were so converted.

In the organization and operation of the Ministry for Armament and War Production, Speer consciously had sought to free German industry from the excessively rigid and impractical control of the military high command's Office of the Staff for War Economy on the one hand and to avoid the worst effects of technologically unsophisticated Nazi mystics and primitives on the other. In midwar he made this clear to a meeting of the industrial leaders of the aircraft industry and members of its Main Committees and Rings:*

"I should like to add something fundamental on this occasion. In 1942 and 1943 we were often derided when we were establishing the systems of committees, commissions, and syndicates. To counteract this we were frequently rather inclined to laugh at ourselves and said that we were about to bring back the parliamentary state...I am convinced that such varied matters (as armament production) cannot be settled by rigid military procedure and this also applies to our organization. We must provide the necessary safeguards in these sectors so that the errors which can arise in a system such as this can be immediately eliminated. Thus the system which we have established in industry provides one of the principal prerequisites which will make it possible to counteract the defects which can occur in an authoritarian system--and this also applies to the Wehrmacht system."

Speer's claims for his system were not idle boasts. With January-February 1942 production index = 100, German armament production climbed to 153 by July 1942, and to 229 in July 1943, and reached its all time high of 322 in July 1944, thereafter leveling off and falling to 263 in December and to 227 in January 1945, the last month for which reliable figures are available. In two categories, an all time high was reached in December 1944 with weapons at 408 and tanks at 598. With aircraft production hampered by bombing and planes immobilized through lack of fuel, the production index declined from a high of 367 in July to 224 in December.†

* N. Frankin and C. Webster, The Strategic Air Offensive Against Germany, 1939-45, Vol. IV, HMSO, 1961, p. 344

† Die Deutsche Industrie im Kriege, 1939-45, op. cit., pp. 178-81, Planungsamt: Index ziffern der Deutschen Rüstungs Endfertigung

Reckoned in another way, a study conducted by Speer in 1944 showed that, in that year alone, the German armament production was sufficient to completely equip 250 infantry divisions and 40 panzer divisions, while Germany had only the equivalent of 150 12,000-man divisions in the field.* In all of the war, sufficient equipment was produced to rearm the Wehrmacht several times. The army consumption figures reflected an inefficient distribution system and extensive materiel losses in Russia and Africa.

Rationalization

In material terms alone, the production refinement efforts of the Technical Office of the Ministry, working through the Committees and Rings, are noteworthy. These rationalization measures as they were called were undertaken by many separate groups, acting vertically through the Main and Special Committees and horizontally through the Rings.

The head of the Technical Office and Deputy to Minister Speer, Karl Otto Saur, described the rationalization effort in the locomotive field to Allied interrogators after the war.†

"The locomotive program of 1942 demanded one of the greatest expansions of capacity in any one field. Formerly only nine locomotive firms had made an average of 117 locomotives in a month, and this also only with very strong support. It was consequently believed that this figure could not be exceeded. To be sure, 117 locomotives a month was the highest production figure in the world. But in order to govern the great areas of the occupied territories, especially in the East, there was need for double that number. At the beginning of our task, we succeeded in getting a real expert in that field, Director Degenkolb of Demag. In fifteen months he raised the production from 117 to 500 machines. Because of his training he was especially qualified for such work. He first examined the locomotives and considered what might be left off (the disencumbering action). Then he set about constructing a war locomotive. This conversion succeeded in retaining their basic form and numerous parts. The Special Committee for Locomotives organized three exchanges in Germany, as well as

* USSBS Interrogation Report, 30 May 1945.

† Speer Report No. 45, p. 4.

in Danzig, Vienna, and the West. He laid out all the individual parts of a locomotive, radius rod, cylinder, piston, steel construction parts, etc., and gave out through the exchanges all the individual parts, 600 pieces in all. Since priorities had been established, the various works were ready to undertake these contracts, since they then had draft-deferred laborers provided, and power placed at their disposal, etc."

In the process Saur describes, it was possible to make important material savings. The locomotives of 1942 required 2.3 metric tons of copper. The nationalized model of 1943, however, required only 237 kilograms of copper, with the result that the 500 locomotives produced in June of 1943 required only half as much copper as the previous 117. A similar reallocation of the construction tasks among existing plants made it possible to reduce the locomotive capital plant construction program from 200 to 26 million marks.*

In the field of armament and munitions, the establishment of a "best process" for industrial items through time-study and operations analysis made it possible to reduce ratios of difference in production time and materials between plants from 1:5 to about 1:1.5 and, in some cases, Saur reports the average of all factories was better than the previous performance of the "best" factory.† For these categories, the Ministry took the intake (in tons of steel) in relation to the weight (in tons of the finished product or output) as a criterion of success. In armaments, the allocation of steel remained at a constant 100,000 tons per month until mid-1944. Through development of the best process for weapons, enforced by fixed prices administered through the Main and Special Committees, it was possible to raise the output figures from 10,000 tons of weapons per month in 1942 to 40,000 tons per month with the same input of steel.

In the shipbuilding industry, Germany was known for the fabrication of ships of high quality, using expensive and laborious hand finishing processes. When Speer acquired the responsibility for shipbuilding in mid-1943, he appointed a production expert from the auto industry, Otto Merkers, with a production staff drawn from shipbuilding, motor vehicle, iron and steel, and aircraft works. Merkers has described the changes brought about in submarine production.‡

* Ibid.

† Ibid, p. 2.

‡ Speer Report No. 90, p. 31.

"Whereas formerly, completed U-boats were built in small numbers in each individual yard in such a way that the hull was finished first and then the rest of the craft was laboriously assembled within the narrow area, the separate parts, apparatus and machines being drawn into the interior through small openings, meaning that it lay around on the slips for anything up to forty-two weeks. With sectional building they were built in 8 separate parts (sections). Each section was assembled in the local yard and delivered fully assembled, when they were finally put together. The time taken was 4-8 weeks for the section, with 8 weeks for assembly on the slips. Each yard was given part of the work to do and reached an output of up to one section a day. Above all, work on the outboard sides was much easier and lighter, even with superstructure. The result was that the 460,000 productive working hours hitherto needed for the construction of large craft were reduced to more than half with the sectional construction method and given perfect production conditions this would almost certainly have been further reduced to 165,000 hours. Through continual exchange of views regarding working practices and by employing personnel from the production planning office at Blankenburg to act in an advisory capacity in the yards, the results continually improved."

Shortages in materials also were eased through rationalized design. The shortage of copper had caused a reduction in the submarine building program, but after rationalization, the previous requirement of 56 tons of copper for each boat was reduced to 26 tons.*

Rationalization efforts were extended to some civilian industry to release plant capacity for armament. It was discovered that of 117 tapestry factories, five produced about 90 percent of the civilian demand, and as a consequence, the remaining 112 firms were shut down or transferred to war production.

The German pharmaceutical and medical supply industry was highly vulnerable to bombing. The Hamburg raids completely wiped out the largest manufacturers of dextrose solution and baby foods, requiring the rapid improvisation of new plants. After the war, Dr. Brandt, the senior National Public Health official, told Allied interrogators that in 1942 Germany produced over 37,000 pharmaceutical products. By 1944 critical materials

* Speer Report No 45, p. 4.

were authorized and allocated for only 600 products, with an additional 350 on an uncontrolled list; 40 types of x-ray equipment were reduced to nine basic types, 137 types of hemostats were reduced to six types, and only one type of operating table was produced after 1943. In addition to simplification and reduction of unneeded variety in equipment, a cadre of 8,500 highly skilled pharmaceutical workers was exempted from conscription in 1943 and set to work producing a six-month supply of basic drugs and medicines as a strategic reserve.* To accomplish these measures, Brandt used a committee of medical faculty men, industrial technicians, and representatives of the Speer Ministry--specialists in each instance for the material or item to be considered.

Planning

When Albert Speer succeeded Dr. Todt in February 1942, he was faced with four major tasks common to every director of the war economy of a modern industrial state. He needed to secure control of the economy, to produce as much war material as possible, to organize the development and production effort in the most efficient manner possible, and to prepare overall plans that would ensure the most effective buildup and reorganization of the national economic potential for war. Although Germany had been the longest at war, she was the last of the major combatants to undertake this effort. The propaganda of "total war" produced by Germany since the mid-thirties had not been accompanied by a national commitment from Hitler to the economic consequences of total war production. The German propaganda and the consequences of the early Blitzkrieg episodes had produced such a decision in Great Britain, and Pearl Harbor had accomplished the same for the United States.

A series of adroit political moves by Speer between February and May 1942 had secured control of the German economy (with the exception of labor, which went to Saukel, and aircraft development and production, which remained with the air staff). The results of intensive operations analysis and fixed price contracting brought about needed increases in production. The formation of the Ministry for Armament and War Production, with its Armament Committees for Rings acting through Regional Commissions, provided the organizational form for efficient control. The fourth requirement, that of rational planning on a national scale, was never satisfactorily accomplished on a basis that would allow the confident economic expectation of victory after 1942. The literature of German war memoirs abound

* USSBS, Enemy Interrogation Document No. 64, dated 17-18 June 1945.

with examples of individuals, military and civilian, who, at almost all stages of the struggle, recognized the dangers of defeat and advanced promising schemes for victory. The tardy achievements of skilled political control, brilliantly improvised organization, and the sharp increases in the production of armaments were accomplished by short range decisions, based on sheer expediency and grossly inadequate knowledge of the state of the economy. The task of developing an overall industrial economic plan in midwar under pressure from the enemy proved impossible for a nation in which the dynamics of the market economy had been distorted by a decade of price, profit, wage, and other industrial controls.

Speer was acutely aware of the danger of delay and, in 1942, he secured authority from Hitler for the creation of the body called "Central Planning" to act as an interministerial government economic authority under his personal control.

In this group, with the support of information developed by his Ministry, he personally supervised the allocation of raw materials and made decisions on development, production, the balance of finished armaments, and other goods and services to be produced for the armed services and the civilian economy. In addition and concurrently, he set part of his Ministry to work on the development of an overall economic plan for industrial requirements. The overall plan, it was hoped, would remedy the defects of the essentially intuitive short run decisions he was forced to take as the chairman of Central Planning. The planning performance of the German war economy must be judged in the light of this dual effort.

Operations of Central Planning. Central Planning meetings were called by Speer and two senior members (Dr. Körner, representing Göring, and Air Marshal Milch, representing the air force) to consider top level economic decisions. The representatives of industry and claimant agencies attended as their interests were affected. The main task of the group was to control the quarterly allocations of iron, steel, aluminum, and coal, applying principles of priority decided on by Hitler and Speer in private conferences. In reaching his decisions, Speer depended on the support of the Planning Department in his Ministry. This organization contained five branches; one was the Statistical Branch headed by Dr. Rolf Wagenführ, a capable administrator and an extremely able statistician.* In his postwar testimony to Allied officials, Wagenführ presented a general outline of the planning cycle for raw materials.†

* Wagenführ has written extensively about the central management of the German war economy, and his writings have stood the test of critical analysis in postwar Germany. He is currently (1967) head of the Statistical Office of the European Economic Community.

† Speer Report No. 49, p. 12.

1. The services informed the Main Committees of their requirements.
2. The Main Committees reviewed these requirements in terms of the capacity of the member firms, agreed on a program with the services, translated production into the raw materials required, and forwarded both the program and the estimated raw materials requirements to the Planning Department of the Armament Ministry.
3. The Trade Groups forwarded their requirements for nonservice production.
4. Official public claimants, e.g., the Ministries, Reichsbahn, and Building Services, similarly produced their demands for material used in their own plants.
5. The Planning Department received demands 2-4, examined them for reliability, related them to previous production and allocation, examined the raw material production and stock position, and made proposals to Central Planning.
6. The Central Planning Office, together with representatives of the Agencies concerned and of the government office responsible for the material under consideration, decided on the final allocations. The Central Planning Office did not attempt to coordinate the planning of raw materials. As a rule, only one question was dealt with at a time ("today coal, tomorrow iron, the day after tomorrow U-boats").

Allocation of steel, coal, and aluminum were considered to be the most important controls of the planning cycle. In this reasoning, the Germans appear to have arrived at a variant of the "Controlled Materials Plan" developed in the United States in World War II after the failure of an elaborate priority system.

In the German practice, iron and steel users were issued vouchers for the amount of material deemed necessary by the Committees and approved by Central Planning. With balances being cleared through the Armament Clearing Corporation, each contractor issued vouchers for appropriate amounts to his subcontractors. To avoid hoarding, the vouchers carried expiration dates; they also might be predated to allow anticipatory purchases.

The work of the Planning Department was not limited to control of an allocatable margin above the needs of the ongoing production. The Department used the operations analysis capabilities of the Technical

Department and the raw material balances kept by the Armament Clearing Corporation to scrutinize the entire demand. Not only were previous allocations and resulting production examined, but the actual quota weights laid down as standard for specific items were subject to reduction. In addition, the Department kept track of stocks held in industrial inventories and in the delivery and production pipelines.

Main Committees were required to report the weight of critical materials per product, the previous quarters' production, planned production, the planned gestation period, and the planned rates of intake of materials. Detailed plans were submitted by the Committees for three months, and exceptions were treated separately by predating vouchers.

The effect of these and other control measures was to cut into the reserves created by hoarding and inefficient operations. As late as 1944, an investigation revealed a year's supply of iron in producers' stocks and pipelines.

The planning of each Main Committee was undertaken independently, but a Contracts Directing Section of the ministry monitored conflicts in demand. Where an increase in U-boat production threatened to deprive the tank program of steel, the matter was either locally arbitrated among the Main Committees or referred to Central Planning for a decision by Speer.

Control of the basic critical materials--steel, coal, and aluminum--was based on the principle of producing as much as possible without long lead time investment in new capital plant.

Items supplied to several services were kept in balance by Special Committees; for example, the Powder and Explosives Group would start with the basic program and calculate (1) what quantities of powder, explosives, and dilutants were required for the munitions program; (2) what quantities of intermediate chemicals were required to make (1); and (3) what quantities of basic chemicals were required to make (2); and what percentage of total demand for each chemical these quantities represented.

In other cases, items in joint supply were kept in harmony by unofficial contact among Committees. Speer's own account of the procedure reflects the use of intuitive factors and the stress under which his central planning decisions were made.*

* USSBS Interrogation Report No. 65, dated 13 July 1945.

"We ourselves ascertained what maximum production capacity we had in the different armament sectors and out of that we computed our industrial program. From this program we deducted a certain safety margin (say 20%) and presented that to the army as a preview for the coming months. The army had to distribute these quantities and see how they could get along on those. It was impossible to do it as the general staff imagined it at first, to stop for instance the production of rifles today and start making guns instead. Especially with our strained industries, the capacities could not be changed very easily. We were not able to draw from plenty as you were. We could not afford to leave a factory idle for months because of conversion. We had to run in the beaten track as much as possible.

"The allocations of the raw materials were not made according to the armed forces requirements but according to the available capacity of the industry and according to the program that was calculated on the basis of that capacity."

It is interesting to note here that Wagenführ's description of the planning process (p. 63) starts with the requirements of the armed forces, whereas Speer reveals that the program was calculated on the basis of the available capacity of industry. Wagenführ missed an important point of political and economic control: in Hitler's original charter to Speer, the latter was not bound by the requirements of the military; instead, he drove the economy to greater achievement, deriving all production possible from the inputs available to him.

The Overall Industrial Requirements Plan. As head of the Statistical Branch of the Planning Department, Wagenführ also was charged with devising an Overall Industrial Requirements Plan, Gesamtauswandtsplan. It is noteworthy that it was felt this would not be possible as an internal government effort, and the task was given to the German Institute for Economic Research under Wagenführ's direction and under the cognizance of the Planning Department of the Ministry. The overall plan was to make explicit the connections existing among the various branches of industry and commerce and to show how a change of plan in one limited branch would affect other branches.

As a point of departure for the creation of an Overall Industrial Requirement Plan, Wagenführ was forced to develop a base year in which mutual inter-industrial relationships could be identified and studied; 1943 was selected and the work was begun. The problems were immense. It was known, for instance, how much iron and steel had been distributed to individual

quota holders, but there was no knowledge of how much labor these holders were employing or the proportion of iron consumption to the consumption of other resources, such as electricity.

The work done to identify such interrelations had been stopped at the beginning of the war. All that remained were statistics kept by various industrial groups for their own purposes. As an example, the problems of gathering manpower statistics were cited by Dr. Roman Baudisch of the Planning Department, whose task it was to develop the base year figures.*

"The sources from which I had to get material were various; the manpower figures came from the manpower balance sheets of the Reichs office for statistics, supplemented by details from the 'Reichsgruppe Industrie,' (the still functioning remnant of Dr. Schacht's industrial organization), and the individual Trade Groups. These were collected separately.

"The distribution of manpower among the different branches of production included in the overall planning was compiled from substantiated estimates; the figures were taken from various statistical files.... The majority of data depended on such estimates. For individual questions such as the allocation of manpower they were too global and not sufficiently accurate but the first thing was to make a general survey."

The difficulties cited by Dr. Baudisch also were experienced by the United States in its war production planning. There is a remarkable similarity between Baudisch's account and the troubles experienced by the wartime U.S. Office of Civilian Supply in trying to establish a pattern for the use of steel in the United States for a base period, the year 1940.†

"In the absence of any systematic reporting by industry, sources were many and varied, requiring different types of analysis. For a few products, the Industry Branches (of the War Production Board) concerned with them had many of the needed data from questionnaires or otherwise. In others, standardization of product made it possible to obtain a figure for steel input per unit, and multiplying by the number of units produced, to get the total consumption of steel for

* Speer Report No. 82, p. 2.

† History of the Office of Civilian Supply, published in Hearings on Senate Bill 885, p. 86, cited in J. Backman, et al., War and Defense Economics, Rinehart and Co., New York, 1952, p. 63.

a commodity. Where reliable trade-association or trade-journal data existed, they were utilized. In a few cases one producer or one user so dominated the field that its figures were really those for the industry.

"But all these sources gave only a fraction of steel consumption in 1940, or of the conversion factors needed to translate volume or value of goods produced into tons of steel used."

A major difficulty, inherent in the problem of German planning in midwar, was the effect of wartime changes in industrial organization. In 1938 an order from the Economics Ministry prevented firms from changing their membership from one industry group to another. This meant that factories converted to armament production remained in the old Trade Groups. The manufacture of munition packing cases in plants of the piano industry appeared under the old heading of the Trade Group for the Piano Industry; the manufacture of munitions in a chocolate factory was carried in the reporting of the Trade Group for Confectionery.

A further organizational problem was that the new Committees and Rings formed by the Armament Ministry had no historical statistics corresponding to those kept by the older industrial groups. These defects were remedied in part by a census of manufacturing, conducted in the autumn of 1943, which showed some of these interrelationships.

An additional problem was encountered in that figures of production could not be related to specific articles. An unsuccessful effort to classify production according to National Commodity Numbers (Reichswarennumerierung) resulted in articles in common use by the army and industry receiving two numbers. An improved system of commodity numbers was not developed until late in 1944. Wagenführ considered that this new system, "War Commodity Numbering" (Kriegswarennumerierung), if used with the National Employment returns and the reports of the Trade Groups, would have provided the Planning Department of the Ministry with the first opportunity to link the activity of factories with specific products and thus furnish a basis for studying labor utilization. The system also would be neutral to overlapping and competing controls, since it would furnish data simultaneously to the committees controlling specific products and to the economic groups controlling trades.

In actual practice, pending the development of the overall industrial requirements plan, Speer's Deputy, Saur, received teleprint or telephone totals of armaments deliveries from the heads of the Main Committees and Rings on the last day of each month. These figures, which had been relayed

from the Regional Commissions, were used to produce graphs of production, wastage, and inventories for use by Speer in Central Planning and were of value in the construction of the overall plan.

In the development of the overall plan, it was decided to use value and prices as the common measure of production statistics, since man-hour coefficients could not be devised because of differing subcontracting procedures. Wagenführ cites several instances of this.*

"Opel manufactured almost the complete truck in its own works; Ford was mainly an assembly plant. The output of trucks per man-month derived from a coefficient multiplied by the number of persons employed during the month in both works, would yield an answer twice as large in the case of Ford as Opel. Locomotive production methods were common throughout the industry-- weapons showed great disparity between firms. For tanks the Bayrische Motoren Werke (BMW) making the Tiger Tank had been taken as a model on the ground that it made more of a complete tank than other firms."

In establishing prices for finished armaments, carefully controlled prices for components needed to be combined into a price for the complete item. This was complicated further by the fraction of final value accounted for by government-furnished equipment issued to assembly plants. (In the case of tanks, government-furnished equipment accounted for 70 percent of the value of the tank.†)

The choice of format for the Overall Industrial Requirements Plan was subject to the limitations of data and overlapping organization. The object was to identify the purposes for which the important elements of production were to be used. The elements selected were: the amount of manpower, the most important raw-materials, power supply, investments, and traffic/communication.

The device selected was an industrial production input table with the breakdown of the means of production carried in the horizontal axis as shown in Appendix A. In the arrangement of the production branches on a vertical axis, the German planners collided solidly with the overlapping organization of industry. The old classification of Industrial and Trade Groups remaining from the Schacht period was contaminated by the organizational freeze of 1939 and, in 1943-44, member firms often were making quite

* Speer Report No. 49, p. 6.

† Ibid., p. 8.

different articles than their group name implied. The newer groupings of Industrial Committees and Rings made up only part of the total industry, although, from the standpoint of the war effort, they were the most important. A further difficulty was that the division selected had to be one for which reliable statistics were available.

The selection was a compromise that placed war production in categories represented by the Committees and Rings and placed the civil sector under the categories described by the still functioning Trade Groups. The vertical axis of the plan is shown in Appendix A.

Such an arrangement could show only the use of the various elements of production in the ultimate stage of production. Unlike the more sophisticated input-output matrix, the German format could not be made to show simultaneously the use of a resource, such as iron, at each stage of production without becoming hopelessly bogged down in double counting. The ubiquity of the role of components in complex manufacture made it necessary to adopt the rule that components were to be included with the completed article (with respect to manpower and materials) and not separately identified. Wagenführ provides an example, stating:*

"The precision and optical instrument industry figured in the overall expenditure plan only insofar as it figured in final production; fittings which were destined for tanks would appear under tanks, precision and optical fittings for aircraft would appear under the aircraft industry."

For all its limitations, the plan was of service as a retrospective device for 1943 and of limited service for 1944 because of the rapid deterioration of the economy under allied military pressures. A more detailed plan was begun for the first half of 1945, which was to feature extensive further breakdowns of the Trade Groups (e.g., Food Industry, which was to have 20 to 30 branches). The collapse of the economy also stopped efforts to subdivide the total plan by regions.

Stresses and Problems

In actual operation throughout the war, Central Planning, the Ministry for Armament and War Production, and the German war economy worked at a frantic pace from 1942 until the collapse in the first quarter of 1945.

* Speer Report, Statistical Report No. 1, p. 3.

By far the worst pressures were those of the enemy, but the system also was beset with internal difficulties. Curiously, the shortages of critical raw materials, which were considered to be Germany's greatest weakness before the war, were not as serious as the Allies supposed. Rationalization, substitutes, and captured stocks sufficed for the war effort once Speer was given central direction in 1942.* This is not to say that certain high quality weapons did not suffer in development but, in the end, material shortages were not decisive. Antitank artillery remained adequate despite the fact that tungsten carbide core ammunition had to be recalled and disassembled to re-edge metal-cutting machine tools. The success of other advanced weaponry, such as the ballistic rocket V-2 and pioneer ground-to-air guided missiles, also was inhibited in part by the scarcity of materials.

To meet production emergencies, the railroads were supplemented with an organization known as "Transport Corps Speer." The corps was used for specially expedited shipments of industrial equipment and components and for shuttling highly skilled workers across the nation. At its peak strength in 1944, this organization had 52,000 motor vehicles, of which 32,000 were trucks with a total capacity of 130,000 tons. Its personnel numbered 58,000, exclusive of the marine division with 4,000 ships (including 60 coastal vessels built of concrete). Transport Corps Speer, under the direction of the Ministry, gave the heads of Main Committees and Rings and the special commissioners a means for making rapid remedial adjustments where large or critical enterprises were immobilized for the lack of relatively small shipments of people or goods.

Such a supplement to the railway system was essential. The records of local armament commands abound with requests for the emergency shipment of materials and components. However, by far the greatest number of action items dealt with the subject of labor--its procurement, training, conscription, exemptions, and transfer.

Labor. The failure of the labor supply played an important part in the final collapse of the German economy in May 1945. While enemy action through bombing aggravated labor problems by requiring large numbers of men for rubble clearance and repair work, the root causes of failure lay in faulty administration and policy and in the fact that Germany was industrially overcommitted in World War II. The overall employment figures for the armament industry show a decline in numbers but conceal qualitative problems that were chronic and that steadily worsened throughout the

* Speer Report No. 31, Speer estimates that without bombing, German production would have leveled off and declined in 1946.

war. The listing shows the number of Germans in the industrial labor force for the years 1939-44 (in thousands).*

	<u>Total Force</u>	<u>Number of Women</u>
31 July 1939	10,405	2,620
31 May 1940	9,415	2,565
30 November 1940	9,401	2,615
31 May 1941	9,057	2,613
30 November 1941	8,861	2,626
31 May 1942	8,378	2,580
30 November 1942	8,011	2,493
31 March 1943	7,893	2,576
31 July 1943	8,099	2,808
30 November 1943	7,948	2,787
31 January 1944	7,782	2,781
31 March 1944	7,720	2,745
31 May 1944	7,715	2,737
31 July 1944	7,515	2,678

The United States and Great Britain made far better use of women in war industries. Germany's failure in this area was a result of Hitler's personal views about the importance of women remaining in the home. So persistent was this view in the Party hierarchy that female employment remained constant throughout the war.

In the opinions of the Nazi Party primitives, such as Saukel, Himmler, and Bormann, the labor problem could be alleviated with foreigners. The policies of Saukel were counterproductive in that workers were herded into Germany and assigned to tasks without regard to their skills and, once so assigned, they could not be recovered.†

Work in Germany became increasingly unpopular with foreigners as the war progressed. Although wages and treatment were gradually brought up to the level of German workers, early discriminatory taxes and Party restrictions were self-defeating. Recruitment methods were increasingly coercive, and the numbers of new workers from abroad fell off rapidly later in the war.

* USSBS The Effects of Strategic Bombing on the German Economy, op. cit., p. 209.

† Speer Report No. 39, Part 1, p. 3.

Although most foreign armament workers were paid employees in the early years, word spread rapidly about the Party brutality with conscripted labor for the SS and agriculture. U.S. Strategic Bombing Survey figures show 2.1 million workers coming to Germany during the period May 1942 to May 1943. In the period May 1943 to May 1944, the number had decreased to 0.9 million; the losses to the Wehrmacht were well over 3 million men each year, with the result that, by the fall of 1944, skilled labor was no longer available. The Germans had been successful with a program of releasing members of the armed forces on short leaves to work at their old jobs in armament, but this practice grew less practical as Wehrmacht losses mounted. Older workers were less effective than regular employees and, according to Saur, piecework--though popular--was not universally successful.*

"The worker is generally very willing to do piecework. The basis of piecework, however, is preponderantly the most unfair thing in heavy industry, as there is much too little skilled labor to determine the rates justly. If the basis is low and in no relation to the true working capacity of the worker, he will not do more than necessary to fill his quota, as the ceiling for piecework was limited. His full working capacity is therefore curtailed for years, because he did not have any possibility of being compensated for his higher efficiency. Efforts were therefore made to determine just wages on a broader basis; they were not entirely successful, however, because of the lack of skilled workers."

Late in the war, special incentives in the form of consumer goods, liquor, and food were offered aircraft and other critical workers who put in 12-hour shifts. Results were good, but the numbers were too small to matter.

Increases in production after 1942 were probably a result of rationalization, improved management, and conservation of materials, and, as such, offer only an indication of the potential of the economy had the labor supply been assured.

Symptomatic of the deeper problem of national over-commitment was the shortage of skilled workers and supervisors. This condition prevented multiple shifts, and the use factor of machines was surprisingly low by U.S. or British standards. Deputy Saur described the situation after the war.†

* Speer Report No. 45, p. 13.

† Ibid., p. 10.

"If one considers that up to 1942 approximately 91 percent of all factories operated on one shift, 7 percent on two shifts, and only 1 percent on three shifts, it is clear that the available machines were in no sense fully utilized. We reported to the Führer in the spring of 1942 that machinery was on the average still not utilized to more than 40 percent of capacity. When we determined on a purely theoretical basis how many machines were operated in one factory, the conclusions were very depressing. During a visit to the BMW (Bayrische Motoren Werke) in Allach in March 1944, we determined in a survey of four machine shops that only 25 percent of all machines were in operation and 75 percent were idle (aircraft engine production). This was, however, an extreme case, and not typical."

In September 1940 after the economic order for the attack on Russia, the conscription classification of "indispensable" (UK) was limited to armament workers of the most essential grades. From February 1942 to January 1945, 687,000 men with this classification were drafted into the armed forces. Of these, 254,000 were drafted after 1 August 1944, together with 1.5 million apprentices who were about to be qualified as skilled workers.

These losses were the work of Goebbels, who in July had been appointed "Plenipotentiary General for Total War" with the task of mobilizing all possible manpower reserves. The call-up of UK-graded men was strongly opposed by Speer but to no avail. In the final drafts of October 1944, he was forced to meet his quotas from UK men and, in addition, give up equal numbers of skilled workers who had been returned from the armed forces on special leaves to work in the armament industry.* These actions left 448,000 UK-classified men of military age in the work force.

Further efforts to secure the effectiveness of the armament industry were doomed by a directive from Hitler establishing the "Volksturm" or militia, which made all males from 16 to 60 a part of the armed forces.

The Volksturm conscription program was administered by the Wehrmacht and the Gauleiters. Local Armament Inspectorates could obtain conditional deferments for absolutely essential workers through the use of a special new classification (Z-Cards), but even these workers were subject to training and intermittent duties in uniform.† Continued planned production

* RMf/RüK 1773, Roll 181, T-73.

† Ibid., p. 13.

under these unreliable conditions of labor availability was impossible, and output that had been declining throughout the fall of 1944 fell rapidly after January 1945.

Civilian Production. Throughout the war, efforts were made to shut down nonessential civilian production, but the Armament Ministry was frustrated by the Party officials at the local or Gauleiter level.

Political interference and unauthorized purchases at the local level had the effect of continuing the production of many civilian items, and the armed forces procurement agencies continued to acquire and hoard minor items right up to the end of the war. The situation is reflected in Speer's complaint to a meeting of the Gauleiters at Posen in October 1943.*

"For example, we still produce in a year 120,000 typewriters, 13,000 duplicating machines, 50,000 address machines, 30,000 calculating machines and accounting machines, 200,000 wireless receivers, 150,000 electrical bedwarmers, 3,600 electrical refrigerators, 300,000 electricity meters.

"At present there are still being made for the Wehrmacht 512,000 pairs of riding boots a year, 312,000 pairs of officers' boots a year, 360,000 service bags for women signal assistants, 364,000 spur straps, 250,000 rucksacks...I really don't know what they use them for. The Wehrmacht needs 440 millions of the total yearly new production of bottles of 730 millions. The Wehrmacht needs 620,000 of the new production of closets which reaches a figure of one million yearly. Out of the production of stamping surfaces for ink-pads the Wehrmacht needs 6,200,000. The scissors production is reserved entirely for the Wehrmacht, they receive 4,400,000 a year."

The records of the local Armament Commands contain many references to unauthorized machinery exchanges and the use of a portion of an armament or equipment factory for civilian goods. Much of this activity was privately condoned by the Armament Ministry because it represented the only way many firms could obtain ubiquitous common-use components, such as screws, nuts, and bolts, needed to meet their contract obligations. It simply was not possible for the Technical Office of the Ministry and the Committees and Rings to acquire accurate bills of materials to include

* RMf/Rük 1924, Roll 193, T-73, p. 11a.

in their costing for complex items of equipment. Speer adopted the expedient of "deducting a certain safety margin, (say 20%), from his (the Ministry's) estimates of capacity." *

In calling for increases in production, Saur candidly admits to the opposite practice:†

"One simply had to have the knack of setting the limit high enough but not too high; to establish the possible production that could be reached independently from the announced possibility."

That "one simply had to have the knack" was apparent also in U.S. war production programming. The Joint Chiefs of Staff deliberately overstated their needs to such an extent that:‡

"It soon became evident to everybody and the policy tended to defeat itself and it is possible that less was actually produced than might otherwise have been got out with more realistic incentive planning."

So-called "black" transactions of industrial and consumer goods were privately tolerated--as they must be in all centrally directed economies because of the manifold interrelationships existing in complex roundabout production.

The most severe pressures on the direction of the war economy resulted from enemy actions. The selective bombing attacks directed at aircraft, ball bearings, tanks, transport, and oil each provided special threats to production. With the exception of the attacks on oil and transport, which ultimately proved fateful, Speer was able to counter these threats. Aircraft and tank production were too dispersed to yield to air bombardment, but ball bearings and oil were another matter.

Ball Bearings. Half the German capacity for ball and roller bearings was concentrated at the small town of Schweinfurt. Another quarter came from widely dispersed plants in Germany, and the remaining supply was imported from Sweden and Italy. The Allies had not reckoned with the distributed reserves, which amounted to a 6- to 12-month supply.

* See page 62.

† Speer Report No. 45, p. 7.

‡ J. Backman, et al., op. cit., p. 53.

users. Even with this cushion, it was clear that emergency measures were needed. Speer's response was to appoint one of his senior officials, Phillip Kessler, as Special Commissioner for reconstruction. Kessler was an outstanding administrator and, armed with his special authority, he set about dispersing production and reconstructing the damaged plants. Special machine tools were ordered to increase domestic production of the less specialized types of bearings, and the mix of Swedish imports was changed to include more of the scarce and specialized products. A massive redesign effort effected savings of up to 60 percent in the use of special bearings in some items of equipment.* A special motor truck delivery program cut delivery time to the consumer from months to days. Although total production fell slowly from October 1943 to February 1944, Kessler was able to report to Speer in April that the March output was back to 70 percent of the average output of 1943.

Oil. The most serious enemy pressures exerted on a single industry were the systematic attacks (beginning in May 1944) on the synthetic oil plants. This industry was particularly vulnerable, since much of its most important production was concentrated in a few large plants, which, unlike refineries, were difficult to conceal from the air.

The synthetic oil plants required large pressure vessels and miles of piping, much of it underground and subject to fracture from ground shock. As in all complex, continuous process industries, startup and shutdown procedures were costly and time consuming. Local storage capacity for the output was limited, and transportation had to be available continuously. One-third of the hydrogenation process capacity was concentrated in two large plants at Leuna and Pölitiz, and another third was produced by five other plants. The total production accounted for 90 percent of the German supply of aviation fuel; its products and byproducts provided vital input to a wide range of essential industries.† This interdependence was made dramatically clear in Speer's reports to Hitler on the mounting damage.‡

The seriousness of these attacks was recognized immediately by Speer, who lost no time in appointing another Special Commissioner with a special

* Speer Report No. 26, p. 13.

† The most comprehensive account of the development, operation, and economics of this unique chemical-industrial complex is that of Wolfgang Birkenfeld, Der Synthetische Treibstoff 1933-45, Müsterschmidt Verlag, Göttingen, 1964.

‡ An excerpt from one such report is included as Appendix B.

staff for the repair of damaged plants. The man chosen was Edmond Geilenberg, who had been very successful as the head of the Main Committee for Munitions. The atmosphere of urgency for this program is reflected in Speer's instructions.*

"It is a question here of helping with everything that is necessary, and getting these works going again in the shortest time. Though otherwise we must be thrifty with the allocation of labour, we must supply a surplus of building strength for these construction sites. We must, in contrast to the Building Chief's desires, insist that he has 30 to 40 per cent more strength, and the Building Chief is responsible for finding ways and means of employing these people adequately."

Geilenberg was given sweeping powers to confiscate materials, divert equipment, and requisition labor. In addition to the repair program for damaged plants, a series of small scale underground plants were to be constructed. Geilenberg was assisted in repair and building by Karl Krauch, the Director of I. G. Farben, who also headed a quasi-government organization of Farben construction specialists. Since the plants had been built originally by Farben, technical direction was competent and responsive.

Geilenberg's method was to inspect damaged plants personally right after bombing and to order on-the-spot measures for the procurement of materials and personnel. He appointed a deputy, usually the plant engineer, who was made personally responsible for repairs and was provided with technical guidance by Krauch's chemical engineering staff. Pipe welders were taken from locomotive works and heavy machine assembly people from the tank factories. Replacement equipment was drawn from production destined for new plants. The most serious bottleneck was in pressure vessels and valves.

Geilenberg stipulated that no written communication was to be used and insisted on the use of telephone and telegraph. A translation of one of his infrequent written orders is reproduced as Appendix C.

The plants were repaired and in operation in six to eight weeks--a much shorter time than the Allied air staffs expected. Throughout the fall of 1944 and until the winter weather afforded a respite, Speer hoped to realize some production from each plant before the next bombing.

The fourteen plants were struck several times but not before short periods of operation yielded a small flow of product. Speer ironically

* RMf/Rük 1702, Roll 180, T-73.

claimed that Germany had an ally in the enemy air staff. The winter respite was not sufficient, however, and in the fifth and last of a series of "Oil Memoranda" to Hitler, Speer closed with what amounted to a concession of defeat.*

"Since production from underground and other dispersed plants cannot be reckoned with during the next months, the fuel supply must depend entirely on above ground installations; the unhampered repair and operation of the above ground plants is therefore an essential for further supply. The last few months have shown that this is impossible under present conditions of plant protection."

Repeated bombing had so damaged the foundation structure and underground piping that repair was no longer possible for the largest plants without long lead time reconstruction.

Of the several major visible causes of the collapse of the German economy, the shortage of fuel brought about by Allied bombing was probably the most important. The ultimate failure of synthetic fuel production resulted from the raids that began in May 1944.

After securing the appointment of Geilenberg as special commissioner for repair measures in June 1944, Speer began some calculations; the unwelcome results were presented to Hitler in a special report at the end of the month.†

The narrow supply margin for aviation fuel is reflected in the figures for April 1944, in which the air force consumed 165,000 tons and the plant production was 175,000 tons. As a result of attacks in May, only 156,000 tons were produced. Due to further attacks in June, Speer reported that production would be only 53,000 tons out of a forecast of 126,000 tons. The figures concealed even worse news in that, in the second half of June, production was at a rate of 42,000 tons per month, implying a further decline for the month of July.

* W. Birkenfeld, op. cit., p. 264.

† This was the first of five Hydrogenation Memoranda (Hydrier-Denkschriften), which Speer prepared for Hitler on 30 June 1944, 28 July, 30 August, 5 October, and 19 January 1945. In these reports, the deterioration of the fuel situation is clearly set forth and the effects accurately predicted. The reports appear in several places, the most reliable of which is the account of the synthetic fuel industry by Birkenfeld, op. cit.

The situation for carburetor fuel, diesel fuel, and gaseous fuel (the most important substitute for the other two fuels) was equally grim. National production for carburetor fuel was April - 125,000 tons, May - 93,000 tons, and June - 70,400 tons (estimated). With imports, the best that could be expected for June would be 96,000 tons against an April consumption of 205,000 tons.

Production of diesel fuel was April - 88,900 tons, May - 74,000 tons, and June - 66,000 tons. Imports could increase the availability for June to 94,000 tons against an April consumption of 194,000 tons.

The important liquid fuel substitute, propellant gas, also had suffered a drastic reduction to 10,400 tons against an April production and consumption of 37,000 tons.

Since six to eight weeks were required to repair a hydrogenation plant, the production losses of June (and those to be expected for July and August) would result in the consumption of most of the slim reserves of these fuels. Speer wrote:*

"Inevitably by September of this year the supply of the amounts necessary to cover the most urgent requirements of the Wehrmacht will no longer be assured, i.e., from this moment an unbridgeable gap will occur which must lead to tragic results."

The really critical fraction of these fuels was aircraft gasoline. Flak batteries, smoke, and camouflage on a massive scale were insufficient for the defense of the plants. If fighter protection could not be provided for the plants, the supply of all other fuels was endangered.

On 28 July, Speer reported that aviation gasoline production had fallen by 50 percent to 29,000 tons in July. The reconstruction efforts had proceeded at a frantic pace. The large plant at Leuna had been restored to production four times, and eight other plants had been repaired only to be put out of action again.

If the attacks continued with the same results, Speer reported that the planned use of the air force in September and October would be impossible. Judging from the experience in June and July:*

"The Air Force can reckon at the very most with a new production of 10-20,000 tons of aviation fuel."

* Speer to Hitler, Hydrogenation Memorandum, 28 July 1944, cited in Birkenfeld, op. cit., pp. 328-329 ff.

In August the Leuna, Pölitz, and Brux plants were repaired only to be struck again along with others. Geilenberg worked furiously, employing over 150,000 persons in the rebuilding effort.

In his report for August, Speer could point to a production of only 12,000 tons of aviation fuel. In this report, Speer sketched the effects of the oil plant bombings on the chemical industry, as well as the fuel situation for the armed forces.* The report closed with an appeal to concentrate the air force in defense of the synthetic plants--at the expense of the front;--using flight instructors and the best pilots and equipment.†

"If this course is taken it will, if successful, mean the beginning of a new air force, or it will mean the end of the German Air Force."

The action Speer requested was not taken and, although production was on schedule for the first ten days in September, further raids halted all production until 19 September. The aviation fuel total for that month reached a new low of 9,400 tons.

There is every reason to believe that, without the good fortune of bad flying weather for the Allies and the success of Geilenberg, the end would have come in late October and November. As it was, production was not sufficient to permit planned use of the army and air force. Without the protection of the air force, the remaining oil plants were pounded into irreparable ruins in December and January. Speer attributes the failure of the Ardennes offensive and the Russian breakthrough at Baranov (which resulted in the loss of Silesia) to the absence of sufficient fuel for the ground forces. The massive and unopposed air attack on Dresden found the German air force with a peak strength in fighters that could not be flown for lack of fuel.

Coal and Steel. The pervasive effects of an oil shortage on the chemical industry and the mobility of the armed forces, which Speer sketched for Hitler in August of 1944, perhaps would have been sufficient to bring about a military collapse. Yet the picture was vastly more complex due to a widespread shortage of coal.

At the time of World War II the industrial life of Germany, like the rest of Europe, was dependent on coal. Germany was more than

* Significant portions of this report appear as Appendix B.

† Speer to Hitler, Hydrogenation Memorandum, 30 August, cited in Birkenfeld, op. cit., p. 254.

self-sufficient in coal, but 80 percent of it was mined in the Ruhr. The majority of the Ruhr coal production was distributed to the rest of Germany by rail and inland waterway. When these two transport nets received concentrated attention from Allied bombers, an impossible situation was created. The vulnerable points of both systems came under increasing attack in September 1944. On the waterways, which carried a third of the Ruhr's coal exports, such points as the Mittelland canal bridge over the Weser River at Minden were struck repeatedly, and marshaling yards and sidings in the Ruhr were pounded so severely that, by the beginning of October, Speer had to contend with a serious transport crisis.

His response in Central Planning was the appointment of another Special Commissioner for the industrial area of Rhineland-Westphalia. The man chosen was Dr. Lammers, the President of the National Railway Regional Executives; he was given responsibility for decisions affecting transport over the whole industrial area, including local services and inland waterways. This step, Speer explained to Hitler, was necessary because "constant dislocation of communications made it impossible to maintain a unified program controlled from Berlin."^{*}

Although this justification of his actions in the Ruhr was offered almost as an aside in a larger report treating with the coal shortage, it reveals another breakdown--this time in the field of communication. While data exist for the study of communication, they are too diffuse to be useful in this report. It is sufficient to note that each of the Special Commissioners conducted their work at the scene of the problems they were charged with correcting. Karl Otto Saur, who was selected to expedite the production of fighter aircraft, traveled between plants and regional commissions by a special train, holding conferences on convenient sidings with local managers.[†]

Coal fed every aspect of industrial life; 22,000 railway cars left the Ruhr each day to supply the German industrial and civil sectors. The effects of early interdiction of the coal supply were not felt immediately, because some winter reserve stocks were used to cushion the shock. Speer's report to Hitler on the Ruhr is a classic description of imminent economic collapse. The section describing the effects of the coal shortage on industry is reproduced as Appendix D.

* RMf/RÜK 1840, Roll 182, T-73, Speer to Hitler, "Lage Ruhrgebiet."
(Situation in the Ruhr.)

† Speer Report No. 77, p. 1.

The National Coal Federation reported that, on 10 September, the winter stock of top priority service coal for the railways stood at 1,839,750 tons (a 19-day supply) and that, by early November, these stocks had decreased to a 10.9-day supply. Further bombing resulted in a decline of the winter reserves at a rate of 40,000 tons per day by early November. Railroad reserves for some regions were dangerously low (a 5-day reserve for Berlin and a 2-day reserve for Stuttgart). The number of railroad cars leaving the Ruhr was reduced to 5,000 per day in early November. From these deliveries, it was absolutely essential to supply the railroads first and then the power stations ahead of armament, since a breakdown of the national power grid would be irreparable in the short run.

Speer had not given up publicly, and he had an emergency program to present that Dr. Lammers might be able to apply:

1. 10 percent or 4,000 of Germany's agricultural tractors, which had been converted to operate on kerosene and naval fuel oil, were to be diverted to the Ruhr.
2. 8,300 anthracite and low temperature, coke gas, generator units were sent to the Ruhr. (These units would operate motor vehicles at low efficiency.)
3. 50,000 foreign workers were set to rubble clearance and transport repairs.
4. 30,000 laborers were drawn from the armament factories idle or soon to be idle.
5. 4,500 skilled electricians, pipe fitters, and welders were drawn from all over Germany for the Ruhr.
6. 10 percent of the total force of mineworkers were made available for relief work.

Speer left little room for optimism in his November conclusions:*

"It is clear from Germany's overall economic structure that in the loss of the industrial area of Rhineland-Westphalia would be a mortal blow to German economy and to the conduct of the war.

* RMf/Rük 1840, Roll 182, T-73.

"In actual fact, at the present time the Ruhr area can be completely written off as far as the German economy is concerned except for goods still manufactured within the inner network."

The Ruhr situation with all of this assistance was extremely sensitive to continued bombing. A few days of bad flying weather in February increased the number of coal cars leaving the region to 8,100.

It had been clear to Speer for some time that the war was irretrievably lost for Germany and, in his second report on the Ruhr, he made this clear to Hitler for the first time:*

"Therefore it is a matter of estimating with certainty the final collapse of the German economy in four to eight weeks. After this collapse, the war can no longer be pursued militarily."

The lull in bombing only extended Speer's calculations. In a general report on "The Economic Situation for March-April 1945 and Following," submitted on 15 March, he outlined an impossible situation. The Ruhr was now within Allied artillery range. The Lorraine had been lost, and the Saar and Silesia could no longer be counted on. Bombing had further reduced the number of coal cars leaving the Ruhr each day to between 2,000 and 3,000.

It was of no avail to conjure with estimates of the supply that remained to Germany in the Ruhr. Although, in theory, the potential was now 12.1 million tons per month or 51.7 percent of the capacity for January 1944, this amount would be reduced by lack of transport to 5.5 million tons per month or 26 percent of the supply of January 1944. Even this figure was unrealistic because bombing had been joined by artillery, and damage would continue to mount.

The slender reserves for users in the rest of Germany reported in the last memorandum (see Appendix D) were now even more critical. Because of the minimum essential needs of the railroads, it was possible to give power stations and gas plants only 33 percent of their 1944 quotas of coal, and other civilian users were reduced to 25 percent.

* RMf/RüK 1677, Roll 180, T-73. Speer to Hitler, "Zur Rüstungslage Februar-März 1945," 30 January 1945. (The Armament Situation February-March 1945.)

The German economy was damaged in many areas by the coal crisis, particularly in the production of steel. As plants dropped out from bombing or as shortages of coal and transport reduced their output, Speer's best estimate was that 450,000 tons of steel per month were available for armament production. Munitions required 350,000 tons per month, leaving 100,000 tons per month for tanks, trucks, guns, and ships.*

In his conclusions, Speer faced the fateful implications of the reduced steel supply:†

"In the long run it is impossible to maintain Germany's economic life for any length of time with the amount of hard-coal still available and the raw steel production capacity.

"The German economy, to remain capable of life, needs, apart from armaments, at least a few hundred thousand tons of raw steel per month, which, under the present circumstances, is no longer forthcoming.

"It is possible to delay this threatening collapse of the German economy for several months.

"300-400,000 tons of raw steel per month is 10% of the raw steel production available in spring 1944. The output which could still be achieved in January, February, and March was considerably higher than absolutely necessary given the limitations of this raw steel output. So, therefore, armaments production in January, February, and March was solely the continuation of a final process of manufacture of an earlier output on a higher basis.

"The actual production figures corresponding to the present raw steel output will only amount to a fraction of the January output.

"After the loss of Upper Silesia German armament will no longer be even remotely in a position to meet the requirements of the front and the demands for new lists of equipment. The material superiority of the enemy can therefore no longer be balanced by the bravery of our soldiers."

* RMf/RüK 1679, Roll 180 T-73, Speer to Hitler, "Wirtschaftslage März-April 1945 and Folgerungen." (Economic Situation March-April 1945 and following.)

† Ibid. (The emphasis is Speer's.)

Collapse

The collapse of the German nation in May 1945 was total. German post-war literature to this day (1967) still refers to the event as the collapse (Zusammenbruch), the word used by Speer in his final economic report to Hitler on 18 March.*

The event itself, in the last days of April and early May 1945, was complex and difficult to assess. The constricting effect of the loss of territory to the Allies and the increasingly effective targeting of the strategic air offensive certainly precipitated collapse. As the territory controlled by Germany began to shrink, so also did resources. Swedish iron ore imports required war materials and other exports for their purchase. Turkish chrome deliveries decreased as land links with Germany and Mediterranean shipping disappeared. Bombing produced crises in the production of fighters, tanks, ball bearings, and oil and in the operation of transportation and communication. As territory constricted, Germany's dependence on the Ruhr and Silesia produced a nationwide shortage of coal.

These developments and the increasing losses in equipment and men in the armed forces combined to aggravate a long standing shortage of skilled manpower.

Although certain crises, such as those in fighter, tank, and ball bearing production, were successfully countered, the cost of each of these industrial victories was high in terms of inefficient, dispersed, or underground production. Each successful solution required manpower to rebuild or relocate plants and new transport schemes to ensure delivery, both of which were wasteful of scarce fuel and vehicles.

Crisis not successfully countered, such as oil and coal shortages brought about by attacks on transport, demanded additional manpower at a time when the military drafts reached a peak.

The internal crises must be described sequentially, but it is essential to consider that their effects on the German economy were cumulative from 1942 to 1944 and, from May 1944 to the end of the year, they became increasingly concurrent. In those six months, Speer, his Ministry, and the regional and local authorities were trying to conduct planned production programs and, at the same time, rebuild synthetic oil plants and meet an increasing shortage of coal and steel with a transport and communication system that was deteriorating rapidly under the strain of bombing and lack of maintenance and repair.

* RMf/RüK 1679, Roll 180, T-73.

No consideration of any aspect of Hitler's Germany can ignore the effects of the Nazi Party and its ideology. While this has been abundantly chronicled in postwar literature and is not the focus of this report, it must be counted in an explanation of Germany's collapse. The primitive and fatally counterproductive brutality of Nazi Party leadership poses an enigma that will occupy the attention of historians and moral philosophers for some time to come. For present purposes, it is perhaps sufficient to note that a number of Party members--of whom Speer, Todt, and their associates can be numbered--were less ideological than "technocratic" in their orientation. This division grew sharper as the stress of war brought this group into positions of responsibility. The division was tacitly recognized by referring to the Armament Ministry, as well as Finance, Economics, and others as "Technical Ministries." Shortly after D Day, Speer delivered a pep talk to the officials of his Ministry and industrialists in which he called for "a shift from a romantic to a technocratic ideology as the necessary course for the future."*

Some time in late September or early October 1944, Speer seems to have reached a private decision that the war was lost. In August, Hitler had outlined his plans for destroying Germany's economy before its capture by the Allies. At this point, patriotism began to overtake Speer's former political naivete and technocratic preoccupation, and he systematically began to oppose Hitler's intent. His first move was to blunt the effect of Hitler's policy of destruction (Zerstörung) by securing instead a policy of crippling (Lähmung) by selective sabotage.[†] Speer continued his opposition by persuasion and by the deliberate alteration of Hitler's directives. After his report of 30 January publicly admitting defeat, he went into active opposition, issuing arms to Ministry officials and factory and power plant managers and engaging in two unsuccessful plots against Hitler's life.

Proceedings at Nürnberg and contemporary documents leave no doubt that disaffection in the single rational and coherent national economic directing authority, the Armament and War Production Ministry--and its leader--contributed both to the final collapse of Germany's economy and to the preservation of its means of production.

A final element in the collapse was the effect of multiple crises on the management structure of the economy. German managers at all levels were unable to count on deliveries of materials and components or on the attendance and quality of the work force. In the final year, the vertical control and planning of production programs was disturbed and diluted

* RMf/RüK 1690, Roll 179, T-73.

† RMf/RüK 1679, Roll 179, "Conference with Hitler, 21 August 1944."

by the horizontally-imposed interference of Special Commissioners, each bent on remedying some crucial problem. Speer's comment on the effect of his Special Commissioners was:*

"In the long run it was clear...To these agencies belonged Tix, Rohland, Geilenberg, for example. The danger was that these people could act as ministers without regard to other things. This was not the case for the leader of the Main Committees. It was the case with Kessler and Geilenberg. At the end I was forced because of the air attacks to make so many commissioners that the system of the Main Committees was broken. These Main Committees were the correct approach but they no longer functioned properly. That was the dilemma in which I found myself."

The suddenness and totality of the collapse can be accounted for only by the failure in the supply of resources--coal, oil, steel, transport, and communication; the limits of managerial ingenuity finally were reached, thus destroying the will to continue.

The result was not only the military collapse of the German nation but the reversion of the economic processes of production, distribution, and consumption to the most primitive levels. The economic paralysis that persisted from May 1945 to 1949 has no precedent in the history of modern, highly industrialized nation-states.

* USSBS Interrogation at Flensburg, 20 May 1945.

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VI THE MANAGED ECONOMY IN PEACE, WAR, AND RECOVERY

The purpose of this report is to examine the wartime phase of recent German history with the hope of deriving inferences useful for planning the recovery of an industrial nation-state after a nuclear war. The early sections deliberately avoid reference to the post nuclear recovery problem and are devoted entirely to the historical narrative.

For the purposes of general history, there are obvious omissions; for example, a treatment of the elaborate and ingenious net of state-trading devices used by the Minister of Economics, Dr. Schacht, to help finance prewar rearmament.* The complex interrelationships of the Nazi Party, the army, and big business are sketched only in the most general terms.†

For the more specific purposes of Civil Defense research, several attractive possibilities for research in the period are foregone: price control and rationing, war damage insurance, and industrial and civil air raid damage repair.

The industrial-government structure with which Germany entered the war, the efforts made to convert that structure to effective war production, and, finally, the reaction of the leadership to the stresses that brought about collapse are examined in some detail.

This approach offers insight into one of the most significant questions posed by the consequences of nuclear war, e.g., how and under what kind of economic organization can the stricken nation commence the recovery process? German analogies will not do full service in this regard until the entire cycle of warfare, collapse, paralysis, and recovery are carefully examined. Certain aspects of the German experience lead to some

* Examples of the operation of exchange controls, import quotas, and bilateral trade or barter agreements in this period are given in: H. E. Striner and T. G. Jackson, National Economic Effectiveness, The Role of U.S. Foreign Economic Policy in World Conflict, Stanford Research Institute, Menlo Park, California, 1962, pp. 10-21.

† The most complete account up to 1939 is to be found in A. Schweitzer, Big Business and the Third Reich, Indiana University Press, Bloomington, 1964.

important inferences about early national economic planning for a nuclear postattack period, and it is in this context that some major findings are cited.

U.S. Planning Experience and Nuclear War

Almost without exception, efforts to postulate a nuclear postattack recovery program for the United States call for a centrally managed economy similar to those evolved from national experience in two world wars.

U.S. experience in national economic planning and control for large conventional conflicts has been gained at the expense of near failure in 1917-18, followed by a successfully managed war economy in 1940-45 and the Korean conflict.

The probable conditions of nuclear conflict raise serious questions about the adequacy of present plans for managing the economy in recovery from such a war.

There are two general reasons for this dissatisfaction: time may not be available to develop the government-industrial organization necessary to plan and control the economy, and organization and planning may have to be undertaken in the midst of destruction and uncertainty about available resources of land, labor, and capital. The effort may have to be organized, planned, and administered in the face of uncertain or destroyed communication and transport services so necessary to central control.

Although there are many other consequences that may be expected to accompany and immediately follow nuclear war, these two factors have particular significance for the use of past defense economic planning experience.

Time

In describing four discernable stages in an armament economy, a distinguished group of economists (all veterans of the successful effort in World War II) stresses the importance of lead time for conversion.*

* J. Backman, op. cit., pp. 6-7.

Stage 1. After the decision for war is taken, a first stage can be defined when time is necessary to reallocate and create new factors of production. In this period, there is an initial increase in civilian and military production if surplus capacity exists in the economy as it did in 1940. If, on the other hand, the economy is close to capacity as it was in 1950, increases will be smaller. Time is necessary in any case for full effectiveness, as public information policy made clear in 1941-42 by referring to "the Battle of Time."

Stage 2. A second stage is defined in which total production increases but at a slower rate, and civilian production requiring scarce materials and skills reaches a level and then declines. This phase can be reached rapidly if the economy is at or near full production.

Stage 3. A third phase is described wherein total production reaches full capacity as labor, material, plant, and equipment are drawn progressively from the civilian economy to the limit of national endurance.

Stage 4. A fourth phase is defined in which total output declines because of deterioration and shortage of materials, plant, equipment, labor, and military attrition. This phase was not reached by the United States, but it was reached by Germany between May 1944 and May 1945.

Destruction

The United States was able to count on the absence of domestic destruction in the two major wars of this century, but in nuclear war under any targeting philosophy the enemy might adopt, this is not the case. Organization and direction of a war or recovery economy necessarily will take place during or after massive destruction of the very resources with which planning and control must deal.

Damage assessment operations could be expected to follow the general pattern shown in Figure 5, which is designed to reflect the relative rates at which the assessment effort will reveal those assets that would remain intact in the economy, those that would be recoverable, and those that would be destroyed. It is assumed that those areas emerging intact could be identified most rapidly, and the inventory of economic assets remaining would be paced by available communications. The task of identifying recoverable assets would be the most prolonged due to the necessary close inspection by technically qualified observers. The third class of information on total destruction could be collected rapidly at the outset but less rapidly as it approached the point where the distinction between the recoverable and nonrecoverable would depend on on-site technical appraisal and careful cost-benefit analysis.

The reliability that might be expected of economic information gathered by indirect damage assessment is reflected in the results of a recent study:*

"Possibly fairly reliable

Direct weapons effect in terms of

Gross numbers of population survivors (or casualties)

Gross surviving amounts of highly dispersed inventories (e.g., most foods, clothing, housing)

General status of specific areas or population centers

"Less reliable

Direct weapons effects, in terms of

Gross amounts of unevenly dispersed inventories (e.g., fuel, livestock)

Conditions of specific groups of people

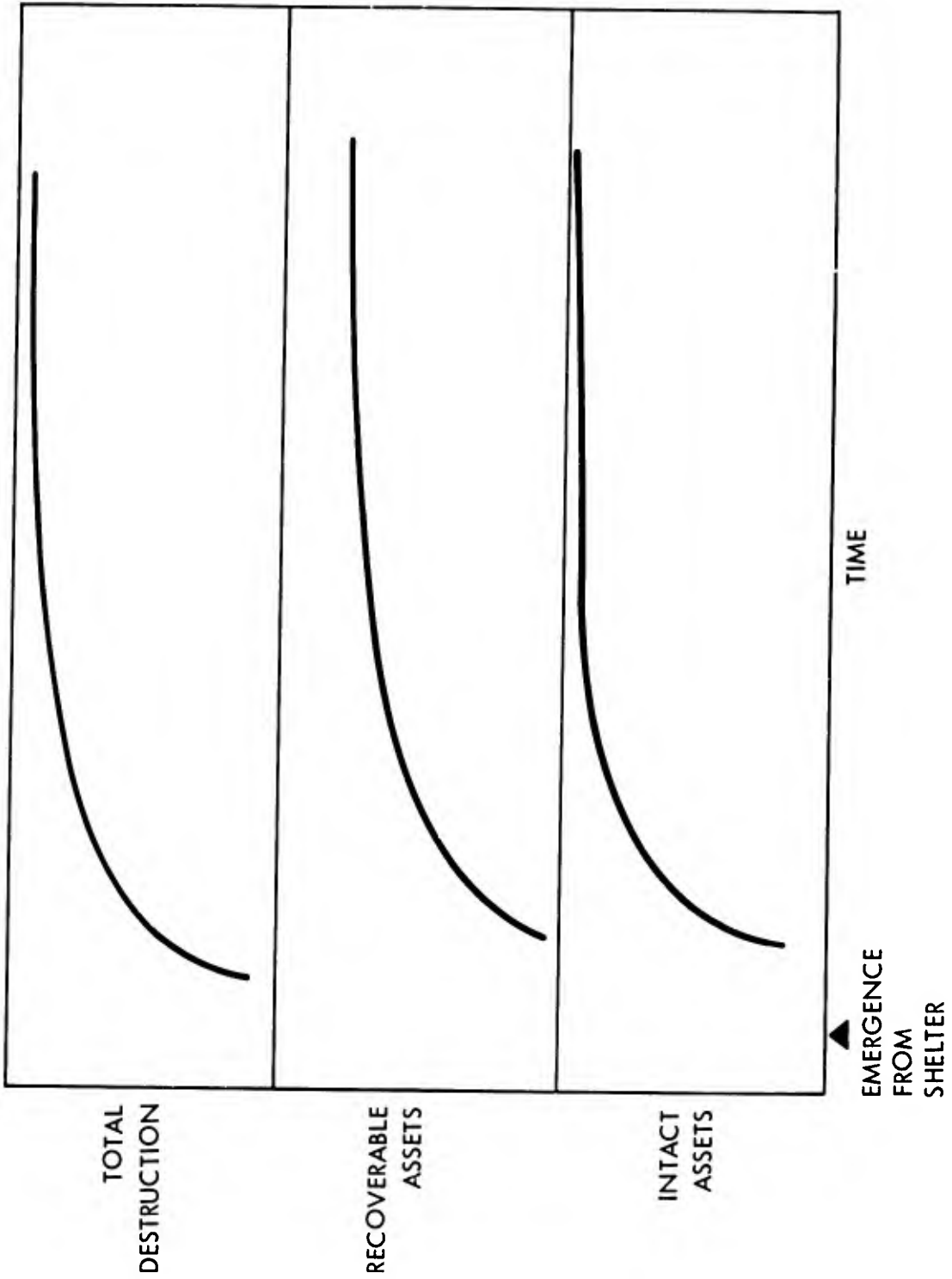
Status of specific inventories, installations, facilities

Status of particular types of manpower

* E. R. Brooks, Post Attack Damage Assessment for Civil Defense, Research Triangle Institute (OCD Project 4631A), Durham, North Carolina, 1964, pp. 30-31.

Figure 5

RELATIVE RATES OF DAMAGE ASSESSMENT



"Low reliability

Direct weapons effects, in terms of

Gross amounts of poorly dispersed inventories in target areas

Capabilities of surviving production and operational facilities mostly primary production, military units, transportation lines, long-line communication

"Extremely low reliability, if obtainable

Secondary production capabilities, capacity of transportation and communication nets, complex government operations, capability for replacing production or transportation facilities

Effects of floods, explosions, fires and other incidental effects."

Direct damage assessment, so necessary to economic recovery planning, receives an even lower evaluation:

"Since there are as yet no complete formalized procedures for obtaining direct damage assessment information, it is impossible to evaluate the completeness or the timeliness of the information to be provided. Theoretically, an infinite amount of information could be provided by air and ground surveillance. However, such information could also require an infinitely long time to aggregate and process."

The reliability of damage assessment information collected by direct and indirect methods is extremely low when considered from the standpoint of a central authority trying to construct a picture of the economy. The outlook for the central authority hoping to apply present plans based on national experience in World War II and Korea is unrelievedly grim. At the regional level in those areas that would remain intact, the process of listing assets would be rapid and reliable until the fringes of damage were encountered.

It is proposed that the planning expedients forced on Speer by the need to reorganize the German economy in midwar have a bearing on this

* Ibid., p. 33-34.

planning dilemma and can serve as a point of departure for planning a postattack recovery program for the United States. To avoid the dangers of uncritical comparison, it will be necessary first to examine some characteristics of economic systems in general and the planning process in controlled economies in particular.

The Planning Process in Managed Economies

Economic systems may be classified at their most elemental level as market economies and managed or controlled economies. The economic ideal of the United States has been the market economy, with economic decisions resting with countless producers and consumers meeting in the marketplace where prices act as an index of resource scarcities and provide schedules of output priorities.

A somewhat different picture prevails among economists who describe the contemporary U.S. system as one of "countervailing forces" or as an "organizational market directed" economy. A representative definition is presented by Robert Solo:*

"Now an economic form is conceived where decision-making is neither by individuals acting independently nor by the state collectively acting through its instruments of political choice. Rather, action is organized primarily through autonomous organization. The key agencies of economic control are voluntary associations, profit-oriented, countervailing, and countervailed against, negotiating together and existing in a context of negotiated relationships. Goods and services are produced and offered for sale, but the market is not master. Activities are not controlled by a free-moving price. Rather, price is decided as a matter of policy, or is agreed upon by counterbalancing powers. This organizational market-negotiated form of economic organization has its analogue in the big business or corporate enterprise sector of the American (or any comparable Western) economy."

As opposed to the market economy, British Marxist Maurice Dodd describes a planned or centralized economy:†

* R. Solo, Economic Organization and Social Systems, Bobbs Merrill and Co., Indianapolis, Ind., 1967, p. 13.

† Maurice Dodd, Soviet Economic Development Since 1917, Routledge and Kegan, Paul, Ltd., London, 1948, p. 29, cited in Solo, *ibid.*

"...the essence of economic planning lies in the fact that decisions which in a capitalistic society are diffused among numerous units are embodied in a single complex decision which constitutes the plan. Decisions about price and output and about investment in the renewal or extension of capital equipment are taken, no longer automatically according to profit-motivation--the motive of maximizing profits in a given market situation--but integrally according to the dictates of social policy."

While the statement may serve as the ideal of controlled economies, some further distinction is in order. The German economy before and during World War II was a form of controlled capitalism. In the prewar period, control was sought for political purposes ("dictates of social policy," as Dobb says) and later, during the war, for military effectiveness. In wartime, the United States and Great Britain also accepted controlled economies, retaining profit motivation but accepting national planning in the interests of defense.

While the national organization of German industry was formalized by Schacht for political purposes before the war, its general form fits Solo's description. Speer took advantage of this organization by removing the rigid vertical control of the army and encouraging horizontal coordination between industrial groups and their executives. The habits of interindustry communication and intracorporate policy coordination are also extremely well developed in the U.S. "organizational market directed economy." The lines of communication within and among industries are a national resource for economic recovery purposes.

Offices of large corporations surviving in fragments of the U.S. economy would contain much data about industry on a local and national level that would be more complete, current, and relevant to the industrial recovery process than the best centrally-gathered national statistics.

With respect to the planning process, almost all controlled economies begin by specifying schedules of desired outputs, assessing their feasibility, and then producing a plan. The plan, as Solo says, "implies complex anticipations concerning future events, and complex directives concerning future activities."

Output-Oriented Planning

In the defense economies of the United States and Great Britain in wartime and in the peacetime practices of the Soviet Union, such planning

is output-oriented. A student of the contemporary Soviet economy, J. M. Montias, describes how "tentative targets" were passed from the Central Soviet planners to the industrial ministries and then to their Chief Industrial Administrations (glavki).*

"Each 'glav' in turn set specific targets for its subordinate enterprises, which were then expected to calculate the material inputs they would require to hit these production targets."

In an ideal never approached in practice, an economic plan should specify concurrently inputs or resources required, the value added or process of production and distribution, and the outputs expected. Since the production process cannot be specified completely or conveniently, it is not unexpected that Soviet and other planners would begin by specifying a series of what appear to be achievable "targets" or outputs, asking the producers to specify the required "material inputs."

In wartime, the United States also specified successive programs or targets and tested them for feasibility before production was undertaken. The results are shown in the following programs of munitions production and war construction for 1942 and 1943 (in billions of dollars at 1942 "standard" prices):†

	<u>1942</u>	<u>1943</u>
Program		
Nov. 1, 1941	28	35
Feb. 1, 1942	60	101
Apr. 1, 1942	50	--
Oct. 1, 1942	--	80
Mar. 1, 1943	--	72
Feasibility Estimate		
Nov. 1, 1941	40	56
Oct. 1, 1942	--	75
Actually Produced	44	63

* J. M. Montias, "Planning with Material Balances in Soviet Type Economies," American Economic Review, December, 1959, p. 965, (underline added).

† J. A. Krug, "Production: Wartime Achievements and the Reconversion Outlook," WPB Document No. 334 (Washington: War Production Board, October 9, 1945), pp. 9-10, (cited in Backman, op. cit., p. 53).

In the U.S. wars of the 20th century, the economic planner could afford to be output-oriented. He could ask himself and the Joint Chiefs of Staff, "What do we need?" He could test the answers for feasibility and set about creating an armament economy. Although the problem was immense, time was available (1) to develop a base year (1940) for the production and consumption of steel (see page 63); (2) to find leaders to organize a War Production Board and the many other agencies needed; (3) to collect and analyze immense bodies of required data, and most important, (4) to plan, construct, and operate new capital plant so the military output could be produced.

Input-Oriented Planning

Speer, on the other hand, in the situation in which he found himself, had to pose the questions, "what do we have to work with?" and "from that, what can we make?" The process in wartime Germany was input-oriented. As Speer said:*

"The allocations of the raw materials were not made according to the armed forces requirements but according to the available capacity of the industry and according to the program that was calculated on the basis of that capacity."

The distinction between input- and output-oriented planning is a subtle one and is of significance only under such conditions of stress as Germany experienced. Speer was working with a production plant in which efficiency and capacity could be assumed due to the working of the profit motive and the efforts of his Ministry staff and the Main Committees and Rings. In addition, he was faced with the need for achievement in the intermediate run period; e.g., supply was based on the rate of production that producing firms could achieve with the relatively fixed facilities at Germany's disposal. After the failure of the "five-month war" in Russia, no long run was available to Germany in which massive new capital plant could be constructed.

To construct a base year that would reveal interindustry relationships, Wagenführ had to select 1943; and he set about the enormous task of conducting a census of an industry in which previous industrial classifications had become contaminated by changes in the mix of products (see page 64). This effort proved to be impossible, and Speer's input-oriented planning continued to operate successfully until the onset of multiple crises that began in May 1944.

* USSBS Interrogation Report No. 65, 13 July 1945. (For full quote see page 62.)

Speer's principal production achievements were in the control of an industry bloc within Germany, which he correctly suspected was well supplied with inventories and operating at a fraction of its potential, with reserves of productivity that could be realized through increased management efficiency and through process and product refinement. If the effects of allied bombing had not intervened, there is every reason to believe that further reserves could have been exploited.

In terms of economic environment, there is a remarkable similarity between the constraints faced by Speer in 1942-44 and the position in which intact surviving areas of the United States would find themselves for some time after a nuclear war.

VII REGIONAL INPUT-ORIENTED RECOVERY PROGRAMS

With the establishment of a distinction between input- and output-oriented planning, it is now possible to return to the question, "how and under what kind of economic organization can the stricken nation commence the recovery program?"

There is a vacuum of research and speculation about economic recovery in the period between "emergence from shelter" and the commencement of the centrally-controlled, national economic recovery programs. This contributes an air of implausibility to most attempts to visualize, much less plan, the operation of the proposed federal Office of Defense Resources or the Office of Emergency Planning as an agency for directing a timely and effective recovery effort.

The reason for this implausibility is that national economic planning, as conventionally practiced, enters the problem from the standpoint of desired outputs, which cannot be specified in the detail necessary for control unless an immense body of data is centrally collected and analyzed. This must be accomplished by a body of officials and "executive reservists," who rarely see one another in times of nominal peace but who are expected to assemble and function as a team under the conditions of nuclear war.

It is a finding of this study that the most realistic expectation of an early and aggressive recovery effort lies in the preparation of input-oriented regional recovery plans for the use of surviving segments of the economy. This would enable recovery to progress from production to national planning, rather than the converse.

German experience has demonstrated the surprising reserves that can be extracted from a high technology capitalist society. The portions of the United States that remain intact outside of the damage areas of nuclear strikes would contain mixes of industrial enterprise and inventories of materials, which, for better or worse, are the only point of departure for national recovery.

There is reason to believe that as the U.S. economy becomes more complex, it is also becoming less vulnerable. As industries diversify their product lines and disperse their plants geographically, technological change is also at work altering the structure of industrial inputs.

Recent studies of the changing nature of the U.S. economy provide some hope that intact segments remaining after a nuclear strike may have a greater economic potential than previously suspected. The Harvard Economic Research Project, under the Direction of Professor Wassily W. Leontieff, has undertaken the comparison of input-output tables for the U.S. economy, based on detailed interindustry transactions for the years 1947 and 1958.* The object of the comparison was to reveal the effects of technological change on the economy over a decade. After some difficulty in the alignment of tables for the two years, it was possible to examine changes in coefficients from one table to the next, thus showing the effects of changes in an industry's technology on its requirements for a particular input.†

A major finding, and one that is of importance to regional input-oriented recovery planning, is that "by and large technological change from 1947 to 1958 tended to reduce the differences in input structure distinguishing the major groups of industries." The reduction of differences in the input structure can be traced to the appearance of new materials and methods that increase the variety of inputs required for each industrial sector. With this greater variety, the input columns show more elements in common. One of the more interesting conclusions is that "in effect the rapid development of materials technology has brought the replacement of old inputs with new ones of lower value. The changing input pattern shows, however, that these developments have had the more important effect of making materials increasingly interchangeable."‡

The problem for leadership in surviving segments would be to ensure the supply-of-factors of production to intact industries so necessary production can continue. The key terms here are "factors of production" and "necessary production." The object of preattack planning would be to establish the input requirements of producers thought to be essential for recovery. If, as we have seen, inputs are becoming more broadly usable as the economy matures, substantial reserves could be identified in

* Anne P. Carter, "The Economics of Technological Change," Scientific American, Vol. 214, No. 4, April, 1966, pp. 25-31.

† "An input-output or 'direct' coefficient expresses the ratio of a given input to the total output of the industry receiving the input. The full column of direct coefficients for an industry shows just how much that industry must draw from each of the other industries in order to produce a unit of its product." Ibid., p. 28.

‡ Ibid., p. 31.

existing input inventories and diverted to production ends in accordance with schedules of priority developed for the particular region. Schedules of priority for recovery are not uncommon among Civil Defense planners, and the selection of the first few functional items, such as the restoration of power, communication, and transportation, is not difficult.

For the early recovery period in intact areas, priority schedules would consist of preferred products. Local leadership would see that qualified producers (and those readily convertible) produced certain products to the limits of their capacity. It would be assumed that the larger society as it emerged from shelter would require all of the storable food, pharmaceuticals, chemical fertilizer, oil refinery components, and other vital goods and equipment that could be produced.*

Without attempting more than a general description of the operation of a regional recovery program, it may be rationally inferred that the best use of available inputs can be determined most effectively by the producers themselves. Speer's Main Committees and Rings are but a variant of the U.S. dollar-a-year men in World War II or the contemporary Executive Reserve of the Office of Emergency Planning. Like Speer's Ministry, the regional authority, through such technical-industrial leaders, would make every effort to rationalize both process and product to ensure that valuable and limited inputs were conserved as efficiently as possible. Although the emphasis here is placed on productive processes, it may be expected that concurrent efforts would be made to define further the boundaries of the intact areas and the recoverable assets that lie beyond. The regional economy could be expected to gain from this activity. Its productivity factors and input inventories would increase for a time, but such gains could be offset by the demands of refugee accommodation and the needs of less fortunate areas.

These and many other activities would continue until the restoration of wider regional or national communication permitted the consideration of more sophisticated, output-oriented recovery plans and operations leading to the restoration of the market economy.

For purposes of Civil Defense recovery planning, the most important finding revealed by the German wartime experience is its testimony to the industrial achievements possible in the intermediate run, where total production rests on the most effective use of existing capital plant in the consumption of the scarce inputs available. Surviving fragments of the United States would differ from wartime Germany in that they would not be

* This list is assembled in no particular order and would depend on assumptions derived from vulnerability studies.

"nations" but mixes of capital plant and resource inventories--parts of a larger economy that had lost its historic form. The increasing homogeneity of industrial society suggests that these fragments would contain sufficient potential to make reconstruction possible. No attempt has been made to postulate the number and location of focal points for such planning, but the question is researchable. Among the reasons commending this concept of recovery are:

1. It could commence at the earliest possible time. This is a factor of critical importance if recovery is to attain and retain the industrial impetus and social support needed to overcome the expected psychological shock.
2. It anticipates a course of action that would be taken by aggressive surviving leaders in any case.
3. It makes most effective use of technical-industrial leaders and labor in their own areas, working with their plants and materials.
4. It is not dependent on prestored national statistics of dubious relevance to the task at hand.
5. It permits recovery operations and direct assessment to proceed through the national communication system, using the most reliable and up-to-date listing of industrial capacity indicators, e.g., telephone company yellow pages, private corporation telephone books, or the machine search of tapes from which they have been prepared.

A model can be constructed for a sample regional recovery operation that would fill the currently existing gap between emergence from shelter and the time when a national recovery program could be considered realistically.*

* The latter time could be determined by the completeness of damage assessment and the restoration of communication and transport. The nation then might consider a conventional output-oriented controlled economy or a return to a market economy. The latter course, chosen by the Bonn Republic in 1951, is surprisingly successful, and the case should be examined in future research.

Such a model should have six general characteristics:

1. It should be both quantitative and qualitative. The listing of assets and calculation of probabilities within the limits of the assumptions should not preclude rational inference. Exceptionally cold winters, demoralization and panic in the midst of physically intact communities, and nonattack-connected fires are all qualitative problems that the model must accommodate.
2. It should include the design of a schedule of priorities for products needed for recovery and those the region can produce, together with the rationing of vital supplies and materials.
3. It should incorporate the management skills and communication links of the industrial community, as well as those of local government.
4. It should accommodate an input-orientation for the identification of resources and their supply to producers, with the object of maximizing production.
5. It should incorporate means for the assurance of the highest achievable production and distribution efficiencies.
6. It should provide for a continuous, aggressive, and ever-widening recovery program, pushing to the boundaries of the damage free area and into the areas of recoverable assets.

Operational versions of such models could be refined by regional government and industry representatives and used in familiarization exercises. Input-oriented schedules, such as those prepared by Speer (see Appendix A), could be prepared and tested through the model for feasibility under a wide range of conditions.

BIBLIOGRAPHY

The portions of this report that treat the history of the Third Reich rely principally on primary sources; among the most useful is the microfilm collection of captured German records held by the National Archives. Particular reliance has been placed on the records of the Ministry of Armament and War Production, the Ministry of Economics, and the Economics and Armament Office of the High Command of the Armed Forces. These records are held by the National Archives, and the proper designator and finding aid for their recovery is given wherever they are cited in the text.

A second series of documents are the interrogation reports of Reichsminister Albert Speer and his staff, produced by the Technical Branch of the Field Information Agency (FIAT) of the Allied Army of Occupation. The most valuable records are the essays prepared by Speer and his associates. The formal questioning is heavily biased by the questioners' preconceptions and the general desire to confirm the efficiency of strategic bombing. The written essays have withstood rigorous internal and external criticism and are quite reliable for matters of policy.

The reports of the U.S. Strategic Bombing Survey (USSBS) contain valuable statistics, although limitations of the survey charter tend to focus the reports on the effects of bombing, thus obscuring a more general understanding of the wartime economy. For USSBS citations, the report number is given in the footnote. The documents from which the printed survey reports were drawn are of more general interest and are also available in the World War II section of the National Archives. Among these is a manuscript copy of the work Aufstieg und Niedergang der Deutschen Rüstung (Rise and Fall of German Armament), by Rolf Wagenführ. As head of the Statistics Office of the Planning Department in the Armament Ministry, Wagenführ was well qualified to treat the subject, and his work has stood the test of postwar criticism.

Occasional use has been made of material drawn from the Trial of the Major War Criminals before the International Military Tribunal. Since they are readily available at the National Archives in Washington, D.C., original documents were consulted.

More general sources consulted were:

Backman, J., et al., War and Defense Economics, Rinehart and Co., New York, 1952

- Birkenfeld, W., Der Synthetische Treibstoff, 1933-1935, Mieterschmidt Verlag, Göttingen, Berlin, 1964
- Blodgett, R., Comparative Economic Systems, The MacMillan Co., New York, 1947
- Brooks, E. R., Post Attack Damage Assessment for Civil Defense, Research Triangle Institute, Durham, North Carolina, 1964
- Bullock, Allen, Hitler, A Study in Tyranny, Harpers Brothers, New York, 1952
- Carter, A. P., "The Economics of Technological Change," Scientific American, Vol. 214, No. 4, April 1966.
- Dewey, John, Logic: The Theory of Inquiry, Henry Holt and Co., New York, 1938
- Dresch, F., Resource Management for Economic Recovery Following Nuclear Attack, Stanford Research Institute, Menlo Park, Calif., 1964
- Deutsches Institut für Wirtschaftsforschung, Die Deutsche Industrie im Kriege 1939-45, Berlin, 1954
- Euken, "On the Theory of the Centrally Administered Economy: an Analysis of the German Experiment," Economica, May-August, 1948
- Frankin, N., and Webster C., The Strategic Air Offensive Against Germany 1939-45, 4 Vols., HMSO, 1961
- Harris, Seymour, American Economic History, McGraw-Hill, New York, 1961
- Jackson, T. G. and Striner, H., National Economic Effectiveness, the Role of U.S. Foreign Economic Policy in World Conflict, Stanford Research Institute, Menlo Park, Calif., 1962
- Kannapin, F., Wirtschaft Unter Zwang, Deutsche Industrie Verlag, Köln, 1966
- Klein, B. H., Germany's Economic Preparations for War, Harvard University Press, Cambridge, Mass., 1959
- Klein, B. H., "Germany's Preparation for War, a Reexamination," American Economic Review, December 1948

- Milward, A., The German Economy at War, Athlone Press, University of London, 1965
- Montias, J. M., "Planning With Material Balances in Soviet Type Economies," American Economic Review, December 1959
- Neuman, F., Behemoth, the Structure and Practice of National Socialism, Harper and Row, New York, 1966
- Roskamp, K. W., Capital Formation in West Germany, Wayne State University Press, Detroit, Mich., 1965
- Schweitzer, A., Big Business and the Third Reich, Indiana University Press, Bloomington, Ind., 1964
- Schweitzer, A., "Business Power under the Nazi Regime," Zeitschrift für Nationalökonomie, Springer Verlag in Wien, Band XX, Heft 3-4, 1960
- Schweitzer, A., "Die Wirtschaftliche Wiederaufrüstung Deutschlands von 1934 bis 1936," Zeitschrift für die gesamte Staatswissenschaft, Vol. 114, 1958
- Solo, R., Economic Organization and Social Systems, Bobbs Merrill and Co., Indianapolis, Ind., 1967
- Wagenführ, R., Aufstieg und Niedergang der Deutschen Rüstung, unpublished manuscript in Documents of United States Strategic Bombing Survey, National Archives of the U.S.
- Welter, E., Falsch und Richtig Planen, Eine kritische studie über die deutsche wirtschaftslenkung im Zweiten Weltkrieg, Forschungsinstitut für Wirtschaftspolitik, Universität Mainz, Heidelberg, 1954

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APPENDIX A

INDUSTRIAL REQUIREMENTS PLAN
(VERTICAL AXIS)

Division of the Branches of Production

- I Industria' Production
(including numbers 1-18)
1. Tanks
 2. Motor vehicles
 3. Rail vehicles
 4. Ships
 5. Weapons
 6. Submarine weapons
 7. Airframes, propulsion units, etc.
 8. Ammunition
 9. Powder and explosives
 10. Precision and optical instruments (including war equipment)
 11. Electrical engineering products (including war equipment)
 12. Machines (excluding war equipment)
 13. Iron and steel construction (excluding war equipment)
 14. Iron and steel and sheetmetal goods
 15. Metal articles (excluding war equipment)
 16. Refinement of materials (excluding war equipment)
 17. Semifinished metal goods
 18. Foundry products
 19. Ceramic goods
 20. Glassware
 21. Woodware
 22. Paper
 23. Paper goods
 24. Printed goods
 25. Leather and leather goods
 26. Shoes
 27. Textiles
 28. Clothing
 29. Food
 30. Beer, malt
 31. Sugar
 32. Spirits

- II Food Industry
(excluding Food Products Industry)
- III 1. Forestry
2. Wood processing
- IV Building Industry
(including auxiliary building trades)
- V Basic Raw Materials
 - 1. Mining (excluding mineral oils, but including)
 - 1a. Hard coal
 - 1b. Brown coal
 - 1c. Iron ore mining
 - 1d. Metal ore mining
 - 1e. Potash and salt
 - 2. Electricity production
 - 3. Gas production
 - 4. Iron and steel
 - 5. Metal production
 - 6. Mineral oils, including oil boring
 - 7. Chemicals
 - 8. Quarry materials (Steine u. Erde)
- VI Other Branches, including
 - Commercial goods
 - Catering trade
 - Private households

INDUSTRIAL REQUIREMENTS PLAN ACCORDING TO
BRANCHES OF INDUSTRY, AREA, AND DATE
(HORIZONTAL AXIS)

1. Type of Production
(see Vertical Axis)
2. Production
 - a. Turnover (value) millions RM
 - b. Quantity in numbers, tons, etc., where possible
3. Distribution of Production among
 - a. Forces
 - b. Industry
 - c. Export(in percentages)
4. Workers (in thousands)
 - a. Industry
 - b. Handicrafts
5. Hours worked in 1943 (in millions)
6. Hard coal and coke (in thousands of tons)
7. Brown coal (in thousands of tons)
8. Electricity (in millions of KW hours)
 - a. Outside supply
 - b. Own supply
9. Gas (in thousands of cbm)
 - a. Strong gas
 - b. Other gas
10. Iron quota weight (in thousands of tons)
11. Metals (in tons)
 - a. Lead
 - b. Zinc
 - c. Copper
 - d. Tin
 - e. Aluminum
 - f. Nickel
12. Wood
 - a. Round timber (in thousand theoretical m^3 including bark)
 - b. Cut wood and other wood (in thousand m^3)

13. Chemicals (in thousands of tons)
 - a. Nitrogen
 - b. Carbide
 - c. Chlorine
 - d. Sulphuric acid SO_3
 - e. Soda NaOH
 - f. Caustic soda
 - g. Sulphur
14. Industrial Fats (in tons)
15. Packing (in thousands of units)
16. Investments
 - a. Building investment (in millions)
 - b. Machine investment (RM)
17. Transport (quantities required in thousands of tons)
 - a. Rail
 - Quantity (in tons)
 - Wagons (numbers)
 - b. Inland waterways 1943
 - c. Sea shipping

APPENDIX B

3rd Hydrogenation Memorandum

Nr. M 623g.Rs
Report of 30th August, 1944

Albert Speer
(Hs) M 623g.Rs

State Top Secret, Berlin

My Fuehrer,

The last air attacks have again hit the more important chemical works heavily. Thereby the three hydrogenation plants, Launa, Bruex and Poelitz, although only recently in commission again, have been brought to a complete standstill for some weeks.

As the home defence against enemy air attacks promises no appreciably greater results in September as against August, chemical (oil) production in September must now be considerably lowered.

Nevertheless, no effort will be spared to restore the hydrogenation plants so that past production, at least, can be made possible in a short time.

The effect of these new raids on the entire chemical industry are extra-ordinary as severe shortages will occur not only in liquid fuels but also in various other important fields of chemistry.

(1) Methanol Production

The production of Methanol dropped, as a result of the air-attacks, from an estimated essential production of 34,000 tons in August to 8,750 tons, and will at the outside only attain this figure in September.

The reserves of Methanol will only be 9,000 tons at the end of August with the result that heavy inroads will occur in the following essential chemical fields in September if this reserve is completely used.

In the powder and explosives sector, the estimated production of precious explosives (Hexogen and Trinitrotoluol) will drop 30 per cent in spite of the use of emergency measures and what is more, this notwithstanding that Methanol will be reserved for powder and explosives and use of it greatly reduced in other branches.

A particularly severe inroad is to be expected in artificial resins and plastics, the production of which will drop from 4,000 tons a month to 2,700 tons a month due to the shortage of raw materials.

The production of melamine glue will reach about half the requirements, while solid fuel for the Wehrmacht (for spirit stoves, & c.) will now be completely counted out in September.

(2) Buna Production

By the failure of hydrogen from Leuna for Schkopau and the air raid damage in Ludwigshafen, Buna production sank from an estimated possible total of 13,000 tons to 5,400 tons in August.

After the new attack on the 24th August on Leuna, this figure cannot be improved in any way in September.

The Buna reserves, which we were able to increase in the monthly production during the last months before the attacks, stood at 9,000 tons on the 1st October so that October is secure as far as Buna is concerned. About one-third of the anticipated production for November will not be sufficient.

(3) Nitrogen Production

Here also the new attack on Leuna has meant a considerable decrease in production, so that against an anticipated output of 85,000 tons for September, the highest possible figure will be 45,000.

This decrease in production will hit agriculture which at the moment holds only about 45 per cent of its last year's allocation, which means that next year's harvest will suffer unusual losses.

Even worse are the effects in the field of liquid fuel as the hydrogenation plants and oil refineries have again been heavily hit in the last few days in the Protectorate and round Hanover.

I. Carburetor Fuels

Before the April attacks the carburetor fuel production in the Reich stood at 125,000 tons. In August, as a result of air attacks, at the most 60,000 tons were produced in August instead of the 84,000 tons estimated at the end of July.

If similar attacks continue the highest figure to be expected in September and October is 40,000 tons.

II. Diesel Fuels

Before the April attacks the diesel fuel production figure stood at 88,900 tons.

Due to air attacks only about 65,000 tons were produced in August as against 93,000 tons estimated at the end of July. If similar attacks continue the highest figure to be reckoned with for September and October is 60,000 tons.

III. Bottled Treibgas

In April the production of bottled gas stood at 37,600 tons (reckoned in terms of gasoline).

Only about 3,000 tons were produced in August due to air attacks. If similar attacks continue a figure of 2,500-3,000 tons is the highest to be reckoned with in September and October.

IV. Aviation Spirit

While 175,000 tons of aviation spirit was produced in April, production fell to 12,000 tons, i.e., to two normal days' production in August due to the destruction of the aircraft fuel installations at Leuna, Poelitz and Bruex which had only recently been restored to working order. For September production, because of the re-building measures, was still estimated at 101,000 tons even on the 15th August.

After the new attacks production will not rise about 10-15,000 tons because of insufficient home defence.

With these results the enemy has hit the chemical industry so heavily that only by abnormal changes in the conditions is there any hope for the retention of the bases for powder and explosives (Methanol), Buna (Methanol) and nitrogen for explosives and agriculture. At the same time the loss

in carburetor and diesel fuels is so widespread that even the severest measures will not be able to prevent bad effects on the mobility of the troops at the front.

The possibility of moving troops at the front will therefore be so restricted that planned operations in October will no longer be able to take place. With this fuel situation offensive moves will be impossible.

The flow necessary for the supply of the troops and the home country will therefore be paralyzed in the late autumn of this year, since substitute fuels, such as producer gas, are also inadequate to provide the essential help in all sectors.

(Source: Birkenfeld, op. cit., p. 250.)

APPENDIX C

Minister for Armaments
and War Production

Berlin, August 9, 1944

Special Commissioner
for Emergency Measures

Secret

Distributed by:

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Order #4

Re: Geilenberg Staff

1. Priority Designation

All orders for goods that are necessary to carry out the tasks set by me will be accompanied by the special army project number SS 4900W of the priority series of the Delivery Group. This is in accordance with the communication of the Minister for Armament and War Production-- Rue A/Rue V #9073/44 Secret. The Plant Deputies installed by me and Dr. Saur of Procurement Staff I are to see that the army project number is used only on contracts necessary to meet the time limits on my tasks.

2. Tank Capacity

The repair of tanks has become such a bottleneck that the rebuilding of full tank capacity that was desired before can no longer be achieved. There is a survey appended to this written by Dr. Saur which describes ways in which gasometers and tank capacity can be conserved and also preparation and practice already accomplished at the plants.

In accordance with these suggestions, the Plant Deputies have to adjust their present and future demands so that the tank capacity at our disposal will suffice. I will make the decision in difficult cases.

3. Employment

a) Pipe-fitters for gas and waterlines.

I have reached an agreement with the Economy Group for Gas and Water Provision whereby the present need for pipe-fitters will be met by the District Group-leaders of the Economy Group for Gas and Water Provision. The address of the appropriate District Group-leader is to be requested from the head of the nearest gas works.

b) Fitters for High-Pressure Equipment

The bottleneck in the provision of high-pressure equipment fitters must be overcome through training machine fitters. A high-pressure equipment fitter should be able to train two fitters. The necessary men with the best skills will be furnished to a plant by the President of an Armaments Commission at the request of one of my Plant Deputies.

c) Tank-Caulkers

This bottleneck is also best overcome through on-the-site training. The necessary teaching personnel will be furnished by the President of the Armaments Commission at the request of the Main Committee for Steel Construction.

d) National Power Controller Pauly, Berlin W8, Charlottenstrasse 46, Telephone 160164, is responsible for the timely completion of work done by the skilled labor furnished by the District Power Controllers.

e) Lodgings

Petitions for lodging, vacation, revocation of draft orders, etc. should be submitted at the proper time to Dr. Tittus on the Geilenberg Staff who will process them.

4. Antiaircraft Protection

I have reached an agreement with General Burchardt whereby my Plant Deputies will furnish him with sufficient labor to bring up ammunition to the guns at the plants to be defended. Requests for labor are to be responded to most promptly. Possible replacements are to be requested from the President of the Armaments Commission.

5. Railroad

I have reached an agreement with Secretary-of-State Gauzenmueller under which technical advice and supervision will be furnished for the repair of severe damages to rail facilities of plants under my care as well as for construction of new rail facilities at these plants. Where it is necessary to stay within a time limit, roadbed material will be provided from Reichsbahn supply dumps.

The material taken will be returned from my allocations. The Plant Deputies are to accept Reichsbahn requests for supplies and send them on to B Staff I for further action.

Firms which equip the Reichsbahn should be spared from the draft of skilled workers as far as possible. However where it has to do with the temporary employment of a few workers with special skills and where otherwise time limits would not be met, exceptions may be made.

6. Telephone Communication

Minister Zerbel, who is responsible for communication emphasizes that for all communication problems the Plant Deputies should seek help from the Armaments-Staff worker at the appropriate postoffice.

7. Supplement

This order from Dr. Saur-Operation without Gasometers (Gasometer) is included only for Plant Deputies.

Gellenberg

APPENDIX D

REPORT SPEER TO HITLER,
SITUATION IN THE RUHR

"November 1944"
(Excerpt)

Judging by the report which the Reich Coal Federation submitted to the Central Planning Board, we are on the verge of the most serious coal production crisis since the beginning of the war. This is indicated by the figures for the top-priority supply of service coal to the railways during the past two months:

Level of winter stocks

On 10 September 1944 1,839,750
On 5 November 1944 1,026,520 tons = 10.9 days.

Winter stocks have thus fallen by 813,000 tons during this period, that is almost by half, and the serious transport crisis in the Ruhr did not arise until the beginning of October.

As a result of the supply shortage, the Reich Railway's stocks of service coal are at present diminishing at an average rate of some 40,000 tons a day. The Reich Railway Executives in the west of Germany are particularly hard hit and other Reich Railway Executives have stocks well below average, some with as little as 5 days in hand (Berlin 5 days, Stuttgart 2 days).

I have therefore decided that all coal suitable for railway use shall be diverted to the Reich Railways irrespective of the needs of other consumers. But even with this priority allocation it is not certain in the present transport crisis that adequate deliveries of service coal can be made to districts in Germany where communications are difficult.

The railways' coal requirements are very great. They amount to 96,000 tons a day, i.e. 25% of the total daily load carried; and since railway coal has to be of special quality, the requirements amount to about 80% of all available stocks of this quality coal in Germany.

Similar difficulties are arising in supplying bunker coal for shipping in the north-west of Germany. For some weeks now the Reich Commissar for Shipping has reported a state of emergency in Hamburg and the ports of Schleswig-Holstein to the considerable detriment of shipping. Also the supplies for electricity works, which should be treated as a matter of priority, are so much in arrears that the winter stocks have sunk

from 1,237,100 tons (3.8 weeks) on 1.8.44
to 865,000 tons (2.5 weeks) on 28.10.44

that is, by 372,000 tons.

Many important electricity works are struggling to carry on unable to obtain sufficient supplies and with stocks which have already fallen below the 10-day limit (Hamburg, Farge, Herrenhausen, Marbach, among others). Various power stations are on the point of closing down (including Kiel, Afferde, Gevelsberg). One or two power stations are at a standstill (Oldenburg, Hanau).

Supplies for gasworks have reached a particularly critical stage, since it is not possible to make good the loss of Ruhr fuel with supplies from other coal stations. Stocks in numerous gasworks in western and central districts of Germany have fallen below the 10-day limit. In many areas gasworks are already being forced to close down. Even gas rationing, mainly for domestic consumers, can only delay the end for a short time, as the flow of supplies to the gasworks is well below daily requirements.

Urgent calls for help have been received from industrial areas in western and central Germany, and there is no effective means of assistance to hand.

Important works in the iron industry are in imminent danger of closing down (Ilseder Hütte, Peine - 8 days' stocks; Norddeutsche Hütte, Bremen - 8 days' stocks; Hermann Göring Werks, Watenstedt - 7 days' stocks).

Supplies for chemical industries in the Wiesbaden area have had to be suspended.

A large number of very important armament works are on the point of closing down (e.g. Deutsche Waffen-und Munitions A.G., Lübeck; Phönix, Hamburg; Miag, Brunswick).

In the present circumstances there is no possible way of preventing these stoppages.

Most food manufacturing plants have managed to keep production going on the stocks available. Supplies to the sugar industry in the Hanover area are, however, insufficient, with the result that the continuance of the product is no longer guaranteed. Oil and margarine works in the Hamburg area are faced with closing down.

There is an increasing number of food manufacturers in the west, such as bakeries and small dairies, who are normally supplied from the household quota, but whose supplies can only now be maintained by requisitioning measures because of inadequate deliveries of brown coal.

Deliveries of coke to civilian and military hospitals in central and southern Germany are also totally inadequate because of the shortage of supplies from the Ruhr.

Despite increased demands arising from rebilleting and the accommodation of refugees, the general situation in respect of household fuel will probably remain the same until the middle of December. After that, only a substantial improvement in supplies will avert a serious emergency in respect of cooking and heating coal for the population; and as things stand at the moment it will not be possible even to keep up the present volume of supplies.

As the movement of service coal for the railways must be given first priority, the emergency in household coal, far from improving, is bound to become even more serious.

The situation with regard to German armaments and war production is being further aggravated by the fact that, in addition to raids on transport installations, systematic attacks are being made to eliminate Germany's steel potential. One blast furnace after another is being attacked with effect.

As the labour force available in the Ruhr is not large enough for restoring these works, labour is being drawn from armament industries and war production throughout Germany.

It is evident from an aircraft leaflet that the enemy is following a definite plan aimed at crippling our steel production. This leaflet states: "Three of the most important steel works, the Hermann Göring Werke at Salzgitter, the Ilseder Hütte at Peine and the Georg-Marien Hütte at Osnabrück, which all receive their smelting coke via the Dortmund-Emms Canal, have only limited stocks left and will have to lie idle if the canal is not repaired soon."

As, however, at the moment it is not even possible to move semi-manufactured goods from the industrial area of Rhineland-Westphalia, where they are piling up at the works, the matter of systematic raids on production centres is secondary to the problem of transport.

Moreover, as stocks of component parts in the German armaments industry are comparatively good, it should be possible to maintain the situation for a few weeks yet. But an ammunition crisis is likely in November. According to estimates which are certainly not too pessimistic, the entire production of ammunition may fall by 25-30% in November.

For more than 6 weeks now, in the matter of transport the Ruhr district has become more and more cut off from the areas it supplies.

While it seemed for a time as if the allocation of cars for coal in the Ruhr district would recover from 7000 cars a day to at least 11,000-12,000 a day, in fact it has fallen to the record low level of 4,000-5,000 a day.

The number of cars used for coal per day in the Ruhr district should amount to 18,000-21,000, to cover both the Ruhr district's internal requirements and deliveries to northern, south-western and central districts of Germany. The present number of cars, however, is nowhere near sufficient even to serve internal transport in the industrial area of Rhineland-Westphalia, which in normal times amounted to 10,000 cars.

Hopes that the Mittelland Canal would be navigable again 8 days after the first attack have been nullified by renewed attacks. As things stand at the moment, the Mittelland Canal will be navigable again by 20 November, provided no further damage occurs.

The Reich Coal Board has exhausted possible relief measures such as using coal from Upper Silesia or other districts to assist the most important works in the distressed areas, namely north-west, central and southern Germany.

According to latest reports, reserves for industry in the distressed areas, which amounted on an average to 4-5 weeks at the beginning of September, have now fallen to under 8-10 days in districts supplied with West German pit coal. These reserves will be exhausted by the end of November, unless there is a distinct improvement in the movement of supplies. A further aggravating factor is that this reserve of 4-5 weeks, which is now being consumed, is earmarked every autumn to allow for transport hold-ups on the inland waterways due to ice and for increased consumption during the cold season.

(Source: Webster and Frankin, op. cit. p.349.)

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13. ABSTRACT The research developed strong inferences from German wartime experience, which bear on the conduct and organization of early postattack recovery:

1. The assumption that national recovery could proceed only with a centrally planned and controlled economy should be reexamined thoroughly; e.g., it may be possible to pass from fragmented regional economies directly to a national market economy as the Bonn Republic has done with evident success.
2. Direct damage assessment for economic recovery would have to be conducted by informed technical-industrial personnel from private industry, working outward from the intact areas into the zone of recoverable assets, with or without central direction.
3. The German experience demonstrates that an advanced industrial-capitalist economy possesses significant reserves of productivity. Recent changes in the U.S. economic structure appear to promise a degree of autonomous productive capacity for the surviving fragments, which must be the basis of recovery.
4. Good data exist for specific studies of German wartime experience of interest to Civil Defense planning (e.g., civil and industrial reconstruction programs and certain essential recovery operations and techniques, such as rubble clearance, refugee assimilation, and emergency public finance).

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