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The Creation of a Modern Arms Industry
Sweden 1939—1974

BY
ULF OLSSON

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UNDER PRESSURE FROM ABROAD

Sectors of the Swedish economy 1939–1945

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ABBREVIATIONS

FCA	Försvarsstabens centrala arkiv, Stockholm
FFV	Försvarets fabriksverk, after 1970: Förenade fabriksverken (the National Defence Factories)
FMV	Försvarets materielverk (Military Administration of the armed Forces)
Fst	Försvarsstaben (the Defence Staff)
FVN	Försvarsväsendets verkstadsnämnd (the Board for Maintainance of Defence Equipment)
IK	Statens industrikommission (the National Industry Commission)
IUI	Industriens utredningsinstitut (the Industrial Institute for Economic and Social Research)
KATD	Kungl. arméförvaltningens tygdepartement (the Royal Army Matériel Administration's Ordnance Department)
KFF	Kungl. flygförvaltningen (the Royal Air Force Matériel Administration)
KKV	Kungl. krigsmaterielverket (the Swedish Board of War Supplies)
KMF	Kungl. marinförvaltningen (the Royal Navy Matériel Administration)
KrA	Krigsarkivet, Stockholm
MHA	Krigshögskolan/Militärhistoriska avdelningen, Stockholm
PR	Statens industrikommissions prisbyrå (the Price Board of the National Industry Commission)
RA	Riksarkivet, Stockholm
RKE	Rikskommissionen för ekonomisk försvarsberedskap (the Board of Economic Defence)
SAK	Statens arbetsmarknadskommission (the National Labour Market Comission)
SAN	Statens ammunitionsnämnd (the National Ammunition Board)
SOS	Sveriges officiella statistik (the Official Statistics of Sweden)
SUAV	Forskningsprojektet Sverige under andra världskriget, Historiska institutionen vid Stockholms universitet
UDA	Utrikesdepartementets arkiv, Stockholm
ÖB	Överbefälhavaren (the Supreme Commander)

FOREWORD

A research project entitled "Under pressure from abroad. Sectors of the Swedish economy 1939–1945" has been in progress for some time now at the Institute of Economic History at Gothenburg University. In spite of the fact that Sweden managed to keep out of the Second World War she was greatly affected by the events in neighbouring Europe. This applied not least to her economic life, the development of which will be described in the project. The connections to the west were cut off by the German armed forces' occupation of Denmark and Norway in 1940 and by the Allies' blockade. Sweden was therefore compelled to look to Germany for her foreign trade. These changes caused great difficulties for the Swedish export industry while at the same time Sweden became dependent on Germany for supplies of important raw materials. Up to 1944 Sweden was faced with the problem of living with her mighty neighbour to the south in a precarious state of balance between economic and political dependence and independence.

As a result of pressures from abroad the Government came to play a more extensive role in the economic life of Sweden. As in other countries individuals and companies became enmeshed in a network of laws and regulations designed to secure the supplies which were the most important from society's point of view. The rearmament of Sweden's outmoded armed forces formed part of this. Here the engineering industry came into its own. In the short term this meant that Sweden's engineering works were occupied to a great extent in the productions of grenades and other simple equipment for the armed forces. Since there was no opportunity to import technologically advanced equipment such as tanks and aircraft, it also became necessary to build up an independent and specialised Swedish

arms industry. In spite of great difficulties, by the time the war was over the Government and the major private industries had succeeded in doing this.

This book describes the conditions and consequences of the rearmament from the end of the 1930s. It shows the extent and the effect of the engineering industry's involvement in this rearmament. The final chapter demonstrates how the structure of Sweden's arms industry has endured far into the 1970s.

I

MILITARY EQUIPMENT AT ANY PRICE? THE ACQUISITION 1939–1945

A. Requirements and shortages

From the year 1936 onwards Swedish rearmament for the Second World War passed through four main phases with borderlines in 1938, April 1940 and 1942. The lines of demarcation between the phases are not absolutely precise, nor do they coincide for all branches of the services and for all types of equipment, but they can nevertheless be distinguished. It is noteworthy – and perhaps not surprising – that political developments abroad are decisive.[1]

It was the aspect of the darkening political horizon in Europe which lay behind the proposal for a considerable extension of the defence organization which the Defence Commission of 1930 put forward, and which resulted in the Defence Act of 1936. The acquisition of equipment for this organization was planned on a long-term basis of between five and ten years, and the cost of the equipment amounted to a sum of between 75 and 100 million kronor a year. During the years 1936 and 1937 the plans which had been devised were in the main adhered to.

It was plainly with regard to the alarming development of Germany's power in Central Europe, which was manifested in the Austrian "Anschluss" and the Munich crisis of 1938 and the march into Czechoslovakia in 1939, that the defence was given money over and above the sums provided for in the plans. This related to the two "70 million kronor grants" in 1938 and 1939 respectively, and an extra grant of 20 million kronor in 1938. In each case the grant was

[1] Ehrensvärd, C. A., Vett och vilja. Studie över svenska försvarsprinciper pp. 61–75. No complete account of the development of foreign policy is given in this work, but familiarity with its main features is assumed. References generally to Carlgren, W. M., Svensk utrikespolitik 1939–1945.

to be used to buy equipment. At the same time the rate of acquisition provided for in the plans of 1936 was increased.

When the World War broke out there was a definitive abandonment of the plans of 1936. However, the character of the rearmament was not one of maximum acceleration, but rather of reinforcement in certain areas, with transitional and preparatory work. The Government was still not prepared to devote all available resources to the production of military equipment. Certainly a so-called war industrial production was started during the first quarter of 1940, but the system worked badly. The size of the grants for equipment was still a limiting factor and even in industries of military importance a substantial civil productions was still permitted. The rearmament of the Swedish armed forces was severely restricted by the extensive support given to Finland during the Winter War in the shape of military equipment.

The events of April 1940 in Denmark and Norway constitute a clearer watershed in the history of rearmament than the outbreak of the war in September 1939. All efforts were now concentrated on a reinforcement of Sweden's armed forces. Ironically, at the same time the country's supply situation deteriorated because of the western blockade. The most important characteristic of the phase of rearmament which began in April 1940 was the fact that on the whole questions of grants ceased to be decisive as far as acquisitions were concerned. Costs increased more than tenfold in comparison with the pre-war period. It was instead the country's production capacity and its ability to import which constituted the limiting factors. Nor did the organizational freamework any longer play a significant part in the acquisition policy; equipment which increased the war potential was acquired and used within the organization in the best possible way. By virtue of the very fact that the production capacity within the country governed the rate of rearmament to a great extent, the organizations set up during this period to manage the production resources were to be at the centre of events. For example the National Industry Commission (IK) was deeply involved in endeavours to remove the bottlenecks in production which occurred when resources were taxed to the utmost.

The charting of the country's capacity to produce military equipment was one of the most important of the basic factors for the Defence Commission which was at work in 1941. The new Defence

Act which was passed in 1942 included a five-year plan for the build-up of equipment for defence which was geared to the country's production capacity. Through the very passing of this Act rearmament became less hectic in character and orientated to a greater degree towards long-term goals. In addition, the fact that certain requirements had been met and production capacity extended through the accelerated rearmament in 1940–1941 also played a part. Major problems still remained, but they related to certain particular types of military equipment: heavy modern equipment the production capacity for which could not be created in a short time. At the same time the winter of 1942–43 saw a change in the political scene abroad. Germany's setbacks in the Mediterranean and the Soviet Union meant that the pressure on Sweden eased; together with the improvement in Sweden's military preparedness, this meant that there was no longer such an immediate threat of a German invasion of Sweden.

One manifestation of the fact that rearmament entered a new phase at this point in time was the decline in the proportion of equipment in the defence costs between the budget years 1941/42 and 1942/43 (table 1, p. 14). This final phase extends beyond the end of the war.

The extensive rearmament of the Swedish armed forces took place on the basis of changes in the political situation abroad. From a formal point of view the acquisition of equipment was justified partly by a long-term estimate of the country's need for armed forces and partly by a short-term estimate of the extra acquisitions required for the increased military preparedness which came into operation on 3 September 1939. This division into two categories was reflected in the terms of the budget in that what was called ''peace expenditure'' was financed out of the national budget, while the grants which were justified by the emergency situation were paid from so-called emergency budgets.

The theory behind the long-term acquisitions was that an organization would be set up in accordance with certain strategic and economic considerations, and this would then constitute the framework for the contents which would include equipment in accordance with certain specific equipment regulations. In practice it did not happen in this way. The development of the army can be studied to illustrate this.

As regards the army the provisional war organization of 1937 was to

lead to the organization of 1940, but this never came into force and was replaced by the transitional organization of 1940. This merged into the war organization of 1941 which was intended to be ready in December 1940. This objective soon had to be abandoned, and instead a plan was devised for a gradual transition from 1/7 1940 to 1/4 1941. The war organization of 1941 was to be in force from 1/8 1941, but by that time the aim had long since been the introduction of a completely new organization on which the 1941 committee for national defence worked and which was approved at the start of 1942. It involved a considerable increase in equipment required and now the aim was to change to a new war organization on 1/7 1943. This was not to be the case, and it was not until the autumn of 1945 onwards that there was a transfer to "the modified war organization of 1943".

Thus throughout the whole of this period the aims were altered, while within the army administration ceaseless work was carried out on lists of "shortages", i.e. the differences between the equipment required to fill the organizational framework and that which was in fact available. However, one result of the shifting objectives was the fact that the "shortage estimates" were not merely based on the organization which was formally current, but also incorporated the more long-term aims which were more or less certain to receive formal sanction in due course. Furthermore, it turned out that when purchases of equipment were made there was not always an existing organizational basis for them, but instead purchases were made of equipment which was deemed "desirable" and which could later be sent to the units. For example, sub-machine-guns were purchased and distributed according to availability. Thus the lists of equipment were dictated to a certain extent by the acquisition of equipment rather than vice versa. This was particularly the case during the first years of hectic rearmament.

In these circumstances it would hardly be worthwhile to try to reconstruct after the event the development of the "shortage situation" during the period 1939–1945, either for the branches of the services or for the armed forces as a whole, although there is no lack of records for such an undertaking. Nor has it been considered profitable to separate the acquisitions for the peace organization and those which resulted from the increased preparedness. Moreover this

legal separation was very poorly observed by the military authorities themselves during the first period, and throughout the whole of the period under investigation was affected far too much by budget technicalities and by other factors which are irrelevant to the inquiry. Instead the demand is defined in a highly operational sense: it becomes apparent by virtue of the very fact that it is met. The orientation of the rearmament will therefore indicate where the most urgent demands lay. It is a condition of such an approch that the demands are actually met. It is possible to compare the situation in a civil economy: a market system is presumed in theory to meet the relevant needs because of the fact that market demand controls production. In reality this is not always the case because of the fact that markets do not function perfectly and many needs never find expression as demands there. On the other hand in a planned economy no needs are permitted to have an effect without the planning of the subordinate authorities. Sweden's rearmament was to a high degree a planned economic operation but there was no conflict between the consumer and the planner: the Government authorities can be regarded as a single unit which itself gauged the military demand, and allocated and controlled acquisitions with a power which was on the whole unlimited. Thus it is possible to accept that the acquisitions reflect the true demand which in turn is equal to the shortages in the equipment with which the armed forces were equipped. Whether the many priorities which were selected on all levels – from the adjustments between the branches of the forces to the establishment of lists of equipment for the gun crew – were correct is a question which might possibly have been answered if the country had been drawn into the war.

However, there is a further important factor here, viz. the time. External political and military developments through decisions about the acquisition of equipment rapidly created a very great demand for many kinds of military equipment. The chronological order in which they were acquired was not dictated by the degree of urgency but to a large extent by the availability of the equipment. If all military equipment had been available for purchase at any given time it is probable that the equipment whose shortage made itself felt most acutely would have been purchased first and later it would have been possible to draw conclusions from this about the demand

position. Now this was far from being the case, as will be shown later. On the other hand it is possible to assume that there was a balance at the end of the war so that the total of acquisitions by that time reflects a kind of total demand structure. During the six years of the war it was possible to build up a domestic production capacity in all the vital areas.[2]

Undoubtedly the argument outlined above involves a simplification of reality. To an extent the demands for equipment arose and were met continuously, at least as regards technologically advanced equipment, where domestic research and external stimuli gave rise to new types. Nevertheless the period of the Second World War appears to be so clearly demarcated, comparatively speaking, that the typical problems of divisions into periods which beset the study of an economic process seem to be surmountable.

In all the circumstances there is hardly any risk that in using the definition of operational demand any shortage will be overlooked on account of the fact that it could not be met. Every trouble has its own stamp, and this account will deal above all with the problem areas, the bottlenecks.

B. The size of the grants in 1939–1945

As mentioned above, expenditure on defence increased very sharply during the period 1938–1940. In the budget year 1940/41 there had been a tenfold increase to about two thousand million kronor a year. The costs would continue on this level in the years which followed. A considerable proportion of these grants was used to acquire equipment as shown in table 1.

It transpires that during the period as a whole 46 per cent of the funds had been spent on acquiring equipment and that this had occurred with an emphasis which was both absolute and relative during the first three budget years.[3] The acquisition of equipment had been dominated by the type of equipment which is central to this investigation, viz. "mechanical military equipment": ammuni-

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[2] At least funds had been allocated. As regards aircraft, for example, the period between decision and delivery was very long.

[3] See appendix 1.

Table 1. *Defence expenditure and the proportion of it spent on grants for equipment during the budget years 1939/40–1944/45.*

	total defence budget in millions of kronor	equipment		mechanical military equipment	
		millions of kronor	%	millions of kronor	%
1939/40	1,289	1,117	86	874	67
1940/41	2,010	1,197	59	822	40
1941/42	1,847	1,176	63	1,005	54
1942/43	2,065	478	23	395	19
1943/44	2,007	763	38	693	34
1944/45	1,722	434	24	410	23
Total	10,990	5,165	46	4,199	38

Source: Appendix 2, table 15.

tion, weapons, vehicles, ships, planes et cetera.[4] Table 1 shows that the bulk of the materials acquired fall into this category: forty-two thousand out of fifty-two thousand million kronor, or 38 out of the 46 per cent of the defence budgets which related to the acquisitions of equipment. During the first half of the period the costs of mechanical military equipment exceeded half of the total grants, while during the second half they amounted to somewhat less than one-third.[5]

In order to be able to study the composition of the equipment group in greater detail certain types of equipment have been gathered together in diagram 1 which is based on types of equipment rather than branches of the forces. The total sums for the period amount to the following:[6]

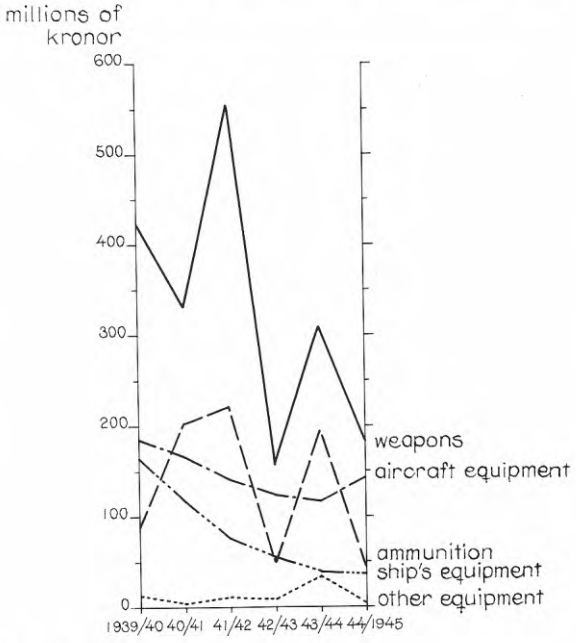
[4] See appendix 1.

[5] The grants for equipment show an apparent decline in the budget year 1942/43. This is probably connected with the changes in the organization. After large orders had been placed during the first years of the war there was less activity in connection with the drafting of the Defence Act of 1942. Once this had been passed – with its five-year plan for the expansion of the defence – it was possible, after a period of preparation, to place extensive new orders again (Cronenberg, A., Armén). However, it should be borne in mind that the figures in the table do not relate to the supply of equipment but the allocations of grants.

[6] Appendix 1, table 18.

	ammuni-tion	weapons	ship's equip-ment	aircraft equip-ment	other equip-ment	total
millions of kronor	802	1,956	488	876	75	4,199

Diagram 1. Grants for the main types of mechanical military equipment.



Source: Appendix 2, table 15.

The rough breakdown of mechanical military equipment into five categories already shows the main pattern of the rearmament. Weapons constitute the biggest item. As will be seen later, a large number of products, mainly for the use of the army and the navy, are included under this heading. The acquisition of aircraft equipment is the second biggest item with the highest figures towards the beginning of the period. The ship's equipment shows a similar but even more pronounced fall on the graph. Finally, ammunition is a

large item, the grants for which obviously co-vary with those for the purchase of weapons. As regards these two types of equipment it is possible to find a connection between the organization and the acquisition. The decline in the grants for the budget year 1942/43 is connected with the fact that at that time money had not yet been provided for the organization which the defence resolution of 1942 involved. Instead the grants increased in the following budget year.

Mine and torpedo equipment have also been included in the ammunition group, which is incorrect according to military terminology. The mines accounted for a total of about 78 million kronor and funds for these were mainly granted during the initial stages of the war with a total of 64 million kronor during the budget years 1939/40 and 1940/41. Torpedoes constituted a smaller item of about 22 million kronor, and this too was mainly granted at the beginning of the period.[7]

Of the remaining sum – about 703 million kronor – about 108 million kronor was granted directly to central administrative authorities – and thus not to the branches of the forces – for the acquisition of tools and machinery for the production of ammunition.[8]

Thus about 595 million kronor remained for purchases of ammunition in the strictest sense of the word. This sum was distributed amongst the services as follows:[9]

	1939/40	40/41	41/42	42/43	43/44	44/45	total
army	20	111	97	14	140	24	407
navy	11	12	33	8	7	–	70
air force	16	33	24	15	15	15	118
total	47	156	154	37	162	39	595

In terms of value about one-third of this acquisition of ammunition related to ammunition for small arms, and the remainder to artillery ammunition.[10]

[7] See appendix 1, table 18.

[8] Förteckningar och sammanställningar ... p. 3. Ber.v. Huvudredogörelse: bihang 8. MHA.

[9] See appendix 1, table 18.

[10] See chapter III.

Two traditional groups of materiel have been included under the heading weapons: the army's ordnance equipment (with certain exceptions which are included under other headings) and the navy's gunnery equipment. As is shown below, it is the first group which is dominant:[11]

	1939/40	40/41	41/42	42/43	43/44	44/45	total
army	345	242	536	140	296	162	1,720
navy	78	89	18	17	13	21	236
total	422	331	554	157	309	183	1,956

Many products from tanks to bayonets are included in the army's share of the sum. It is not possible to make a further reliable breakdown of types of equipment. Where it has been possible to do so other equipment has been accounted for as such, but the accounting principles have varied and grants for items which cannot be regarded as weapons in the strict sense still lie concealed in these large sums. It is possible to obtain an impression of the pattern and the quantities of pure weapons amongst the equipment from the list below which shows the increase in certain types of equipment in the army's basic organization between February 1940 and 1/7 1945.[12]

	Stock in February 1940	Stock on 1/7 1945	Increase
rifles and carbines	500,000	547,400	74,400
light machine-guns	8,000	30,620	22,620
sub-machine-guns	800	58,830	58,030
machine-guns	1,700	9,830	8,130
8 cm mortars	900	1,410	510
3.7 cm anti-tank guns	140	902	762
light field artillery, no. of guns	380	1,028	648
heavy field artillery, no. of guns	120	237	117
40 mm anti-aircraft guns	160	924	764
7 cm anti-aircraft guns	85	376	291
tanks	65	766	701

[11] See appendix 1, table 18.

[12] Cronenberg passim.

Thus the growth of the organization meant an increase in traditional equipment as well as reinforcement with new types of equipment.

Tanks and motor vehicles of various kinds constituted an important feature of the acquisition programme. Apart from tanks just over 100 self-propelled guns and 53 armoured cars were acquired. Of the other motor vehicles about 1,000 passenger cars were purchased, half of which were fully mobile across country, more than 8,000 lorries, of which 1,500 were four-wheelers, about 1,000 towing vehicles and 1,200 other special vehicles, 842 tractors and 5,400 motor-cycles. Together these vehicles meant that the Swedish army was motorized to an unprecedented extent.[13]

The tanks which were acquired – just over 700 – cost about 200 million kronor. If the cost of all the other vehicles is added to this, the sum increases to about one-third of the army's total expenditure on mechanical military equipment apart from ammunition.[14]

After this artillery, including anti-aircraft guns, the artillery of the infantry, especially for anti-tank purposes, and small arms were the most important items, in that order.[15]

The equipment intended for ships as well as coast artillery is included in the naval artillery equipment. The coast-artillery accounted for about a quarter of the total sum. Small firearms and fire control equipment are also included here. Thus out of the navy's total grants for "m echanical military equipment" of about 900 million kronor, just over a quarter was used for "artillery equipment" while twice as much was used to acquire ships.

The most important naval gunnery acquisitions for anti-aircraft defence during the period of the war were 308 20 mm automatic guns, 172 40 mm automatic guns and 49 10.5 cm guns. Of the heavier

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[13] Lorries worth 75 million kronor were bought up from civilian owners over and above those shown here.

The plan for the army's acquisition of equipment during the five-year period from the budget year 1942/43 provides a good illustration of the motor vechicle equipment policy. Of the estimated total cost of ordnance equipment of 483 million kronor, 53 per cent, or 257 million kronor, was to be used for motor vehicles. Ber.v. CF I p. 114. MHA.

[14] The approximation is based on KKV's collocations of defence equipment for the organization of 1940 and 1943 (KKV HF:I Div. oreg. handl. tab. och tabs. KrA) and on IK's records of tank orders (IK KA E I:9, 10; IK Kr H 1942. RA).

[15] See notes 13 and 14 above.

guns 24 12 cm guns for destroyers and 24 15 cm guns – 14 of which were for cruisers – and 9 21 cm coastal artillery guns were acquired.[16]

The navy's acquisition of ships was one of the big items in the rearmament of the services. Of the navy's total grants for mechanical military equipment almost half was spent on ships. In comparative terms this concentration was especially predominant towards the end of the period. Deliveries of new ships during the period of the Second World War are shown in table 2.

The armoured vessel "Wasa" was taken out of commission in March 1940. Of the three destroyers which were wrecked in the Bay of Hårs in September 1941 two were repaired and were brought into service again in 1943 and 1944 respectively ("Klas Horn" and "Göteborg"). Two older destroyers were taken out of commission in 1940. The submarine force was fairly well equipped at the outbreak of war but underwent a thorough modernization by virtue of the fact that eight vessels were taken out of commission. However, two of the vessels ("Illern" and "Ulven") were taken out of service because they were damaged. In comparative terms the supply of smaller vessels increased even more sharply than the supply of larger ships. Motor torpedo-boats were completely new to the organization.

Apart from the ships included in table 2, a large number of smaller vessels, picket-boats, tankers et cetera were acquired, as well as special ships such as the mine-cruiser "Älvsnabben" and others. Furthermore a number of civil ships were purchased and rebuilt for military purposes. Armoured vessels and older destroyers were refurbished.

At the end of the war two destroyers were under construction, and in addition work was in progress on two cruisers, the biggest warships ever built in Sweden. After preparations dating back to 1940 and a series of delays the keels of the cruisers were laid in September 1943. The ships were delivered after the end of the war. The total cost of the cruisers was about 150 million kronor, and so they swallowed up almost one-third of the grants for the acquisition of ships. An equally large proportion was spent on the destroyers,

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[16] Important orders for artillery equipment and ammunition for the navy during the period 1/7 1939–30/6 1941, ditto 1/7 1941–30/6 1943, ditto 1/7 1943–30/6 1945. Ber. v. CF III, IV. MHA.

Table 2. *Number of large ships in September 1939 and May 1945 and deliveries of new ships to the navy during the intermediate period.*

Type of ship	In service 1/9 -39	New acquisitions (year of delivery)								Taken out of commission	In service May -45
		1939	-40	-41	-42	-43	-44	-45	total		
Armoured vessels	8	–	–	–	–	–	–	–	0	1	7
displacement in tons	39,000										35,600
Destroyers	15	–	5	2	3	4	1	–	15	3	27
displacement in tons	10,600										23,700
U-boats	15	1	1	4	2	5	6	–	19	8	26
displacement in tons	7,600										13,300
Motor torpedo-boats	–	–	6	4	5	6	–	–	21	1	20
Minesweepers											
large	4	–	4	8	–	–	–	–	12	–	16
small	2	–	6	16	2	–	–	–	24	–	26

Source: Ber. v. CF IV. MHA.

while the balance was distributed amongst the smaller vessels and other expenditure.

At least 80 per cent of the air force's equipment grants was used to acquire aircraft equipment, including armaments. Ammunition was the only large item over and above this (see above). The grants for the purchase of aircraft were rapidly increased during the period around the outbreak of the Second World War. The first budget years of the war also saw the largest figures, while the trend thereafter declined right up to 1944/45.

When war broke out the air force had a total of 195 aircraft, 134 of which were operational – 47 bombers and 33 fighter planes.[18] Most

[17] The information about the acquisition of ships is taken from: Centrala Förvaltningsmyndigheter (Marinförvaltningen). As to the warships' level of armaments and their strategic positioning in readiness for war et cetera Ber. v. CF IV. MHA. Översikt över fartygsbyggnad 1/8 1942. IK KA EI:17 dnr h 492 RA.

[18] The expansion of the Swedish air force during the Second World War has been the subject of two accounts, which have been used here: Norberg, E., Flyg i beredskap, pp. 83, 195, 200–204, 220, Söderberg, N., Med spaken i näven, pp. 315, 327.

The figures for the number of operational aircraft are uncertain. Cf. Böhme's review of Norberg, pp. 306 f.

of these were fairly old and as regards performance they were not comparable with the aircraft of the great powers.

In fact the accelerated rearmament meant that at the beginning of 1942 it was already possible to muster a total of about 450 planes. In all during the war period about 1,000 aircraft were acquired.[19] In the pattern of acquisition the emphasis had shifted from bombers to a more even distribution between bombers and fighters. This was due amongst other things to the impression which the great successes of the English fighters had made on the military experts. There were sufficient aircraft at the outbreak of war to make up 2 bomber wings and 1 fighter wing; in 1945 there were 12 wings comprising 5 fighter wings, 5 bomber wings, 1 long-range reconnaissance wing and 1 torpedo wing.

The grants for many items which have not been included in the groups dealt with above have been gathered together under the heading "other equipment". Thus this applies to a balancing item of fire protection devices, salvage materials, diving equipment, vehicles, beacons, generators for reserve power, barbed wire and fences, telephone and other signalling equipment and coding equipment. The group also constitutes a balancing item in another sense: in many cases there are funds for the same type of equipment within one or more of the groups previously mentioned as well as within the "other equipment" group, and it is not possible to draw a clear line of demarcation between them. This applies, for example, to vehicles which constitute the biggest item – 31.5 million kronor – within the group "other equipment", with 23.8 million kronor for the budget year 1943/44. However, the great majority of the vehicles of the armed forces were paid for out of grants to the army for the acquisition of ordnance equipment. The next biggest item after vehicles is the grants for telephone and other signalling equipment totalling 19.3 million kronor.

C. A war economy?

The expenditure on mechanical military equipment during the first three years of the period amounted to more than half of the total ex-

[19] The wing of American Mustang planes which was purchased at the end of the war is included here. These aircraft are not included in Norberg's collocation, p. 220, but are mentioned in Söderberg, p. 327.

penditure on defence, and thereafter the proportion fell to not quite onethird. Over the period as a whole it amounted to 38 per cent of the defence expenditure. This must be regarded as a high figure. The remarkably large proportion of equipment costs was a natural result of the fact that the armed forces were rearmed rapidly. During periods of more even development or of a decline in the strength of the armed forces the grants have not been used to the same extent to acquire equipment. Furthermore, the period of the Second World War was characterized by breakthroughs for new, technically advanced and expensive weapons. This applied above all to the air force which had the highest proportion of material costs, but the army too, traditionally a branch of the services with low equipment costs, became 'heavy on equipment', primarily on account of the development of air defence and the tank force. For the sake of comparison it may be observed that pay in the armed forces, in spite of the conscription which was heavy at times, only accounted for between 20 and 30 per cent of the total expenditure, and that training costs were just over 10 per cent.[20]

Thus while the defence budget increased tenfold in connection with the outbreak of the Second World War, an unusually large proportion was used for the acquisition of equipment. It is possible to get an impression of the magnitude of the sums if one takes into consideration the fact that the Department of Defence's share of the working budget expenditure in the budget years 1939/40–1943/44 varied between 54 and 63 per cent.[21] Thus from the summer of 1939 and during the five years which followed almost a quarter of the Government's total expenditure went on purchases of ''mechanical military equipment''.

Another method of estimating the size of the expenditure on defence is to compare it with the Gross National Product (GNP). In table 3 this comparison is made on the basis both of the total defence costs and the cost of mechanical military equipment.

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[20] An outline of the distribution amongst wages, training, equipment and other items of defence costs is to be found in: Furtenbach, B., Materielanslagens andel av försvarskostnaderna åren 1901–1955 (Aktuellt och historiskt. Meddelanden från försvarsstabens krigshistoriska avdelning 1955, pp. 125–135). Here equipment also includes quartermaster's equipment et cetera.

[21] Statistik årsbok 1939–1946.

Table 3. *Defence costs and the cost of mechanical military equipment in relation to the GNP in 1935–1945.*

	GNP in milliards of kronor	Defence Costs		Mechanical Military Equipment	
		in milliards of kronor	as % of GNP	in milliards of kronor	as % of GNP
1935	9.8	0.12	1.2		
1936	10.6	0.15	1.4		
1937	11.6	0.17	1.5		
1938	12.2	0.22	1.8		
1939	13.3	0.76	5.7		
1940	14.8	1.65	11.1	0.85	5.7
1941	16.5	1.93	11.7	0.91	5.5
1942	17.8	1.96	11.0	0.70	3.9
1943	19.3	2.04	10.6	0.55	2.8
1944	20.2	1.89	9.4	0.55	2.7
1945	21.9	1.30	5.9		

Source: Johansson, Ö., The Gross Domestic Product of Sweden and its Composition 1861–1955 (Stockholm 1967) p. 151.

Note: The figures for the calendar years have been arrived at by halving the figures for the budget years and distributing them between the calendar years.

On average during the seven years 1939–1945 military expenditure swallowed up 9.3 per cent of the GNP. Throughout the whole of the five years during which the war was in progress in Europe 4.1 per cent on average was spent on the acquisition of military equipment. What this means as regards the call on industrial capacity will be discussed in a later chapter.

Was the Swedish economy during those years a war economy? One way of answering this question is by making comparisons with the countries at war.

The increase in military expenditure during the period before the outbreak of war began first in Germany where there was a gradual increase in the proportion of the GNP devoted to military expenditure from 1933 until 1944. In England and the U.S.A. the increase occurred later and more dramatically when the two countries were

Table 4. *Military expenditure in relation to the GNP in Germany, the U.S.A. and England 1935–1945.*

	Germany			U.S.A.			England		
	GNP in milliards of RM	Milit. expendit.		GNP in milliards of $	Milit. expendit.		GNP in Milliards of £	Milit. expendit.	
		milliards of RM	% of GNP		milliards of $	% of GNP		milliards of £	% of GNP
1935	74	6.0	8	73	0.9	1	4.1	0.1	2
1936	83	10.8	13	83	0.9	1	4.4	0.2	5
1937	93	11.7	13	91	1.0	1	4.6	0.3	7
1938	105	17.2	17	85	1.0	1	4.8	0.4	8
1939	130	30	23	91	1.3	1	5.0	1.1	22
1940	141	53	38	101	2.2	2	6.0	3.2	53
1941	152	71	47	126	13.8	11	6.8	4.1	60
1942	165	91	55	159	49.6	31	7.5	4.8	64
1943	184	112	61	193	80.4	42	8.0	5.0	63
1944				211	88.6	42	8.2	5.1	62
1945				214	75.9	36	8.3	4.4	53

Source: Carroll, B. A., Design for Total War. Arms and Economics in the Third Reich. (The Hague 1968) p. 184.

brought into the war in 1939 and 1941 respectively.[22] Sweden's highest proportion of 10–11 per cent is roughly equivalent to that of Germany in the years 1935–36, of the U.S.A. in 1941 and of England in the years 1938–1939. Thus one can see that the Swedish economy in 1940–1944 was geared to rearmament to the same extent as the economies of England and the U.S.A. immediately before those two countries entered the war. The military share of the GNP in Germany was increased from 13 to 18 per cent in 1938 when she took action in

[22] A somewhat slower increase is shown for the U.S.A. in Purcell, C. W. Jr. (ed.), The Military Industrial Complex, p. 326:

	1939	1940	1941	1942	1943	1944	1945
as a % of the GNP	1	2	6	17	36	38	37

Europe with military support. In the countries at war the military element in the economy was increased during the years which followed, to over 60 per cent in England and Germany and to 42 per cent in the U.S.A. Such high figures are closely allied to a pure military replacement production and the heavy cost of troops which is the result of active warfaring, and therefore Swedish conditions are not comparable.

II

CRUMBS FROM THE RICH MEN'S TABLES
THE IMPORTATION OF MILITARY EQUIPMENT

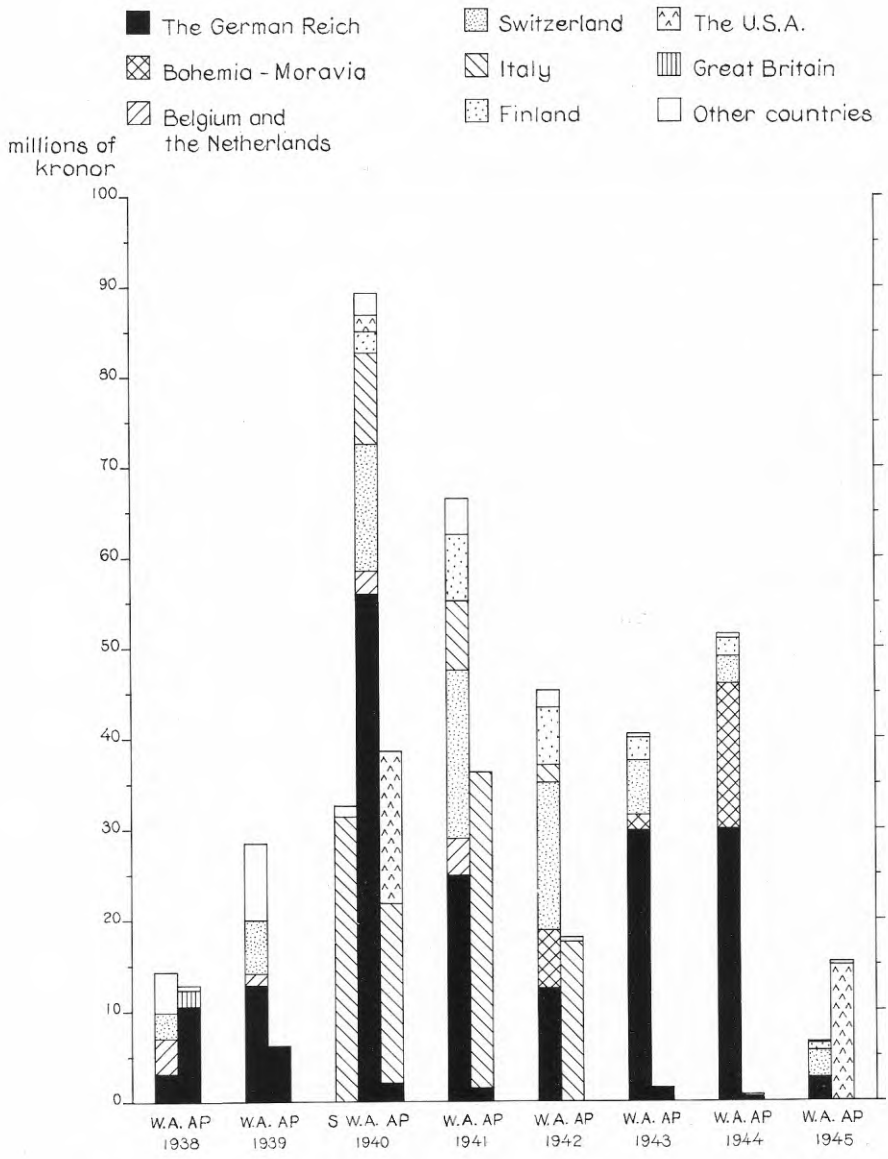
In order to achieve a rapid rearmament of Sweden's forces from the end of the 1930s it was necessary to import equipment. Therefore the defence authorities looked round the world in order to purchase the equipment which it was impossible to produce in the short term in Sweden. In 1938 military equipment, including aircraft, worth just over 20 million kronor was imported, and in 1939 equipment worth just over 30 million kronor (see diagram 2). Gradually, as the world political temperature rose, efforts to import increased. In this connection the events which occurred in the east in the late autumn and winter of 1939–40 were naturally of particular importance. During the Winter War the Finnish armed forces received support inter alia through substantial Swedish deliveries of military equipment.[1] In turn Sweden's imports from the west and the south were stepped up. From a political point of view neither the western allied powers, nor the U.S.A. or Germany had anything against the indirect help which was given to Finland in this way.[2] However, the net result was negative as far as Sweden's military equipment was concerned and her requests to purchase from abroad increased further – the figure of 500 million kronor has been mentioned in this connection.[3]

[1] The value of the equipment supplied by the military administrations has been estimated at 47 million kronor (Carlquist, p. 283). In addition equipment worth at least an equal amount was exported directly by industry under Government licence (Wahlbäck, K., Finlandsfrågan i svensk politik 1937–1940, p. 244). SOS records exports of military equipment worth a total of 42.4 million kronor for the years 1939 and 1940.

[2] Kellgren, H., Sex krigsår i Skölds skugga, p. 100. In the first week in February when the Finnish front was wavering and both the Western powers and Sweden tended to wish to become more deeply involved the Germans adopted a more restrictive attitude towards Sweden. Kellgren, pp. 100, 148.

[3] Hägglöf, G., Svensk krigshandelspolitik under andra världskriget (1958), p. 99.

Diagram 2. Imports of military equipment from various countries.
W.A. = weapons and ammunition; AP = aeroplanes; S = ships.



Source: SOS Handel.

In spite of the fact that these large import requirements could not be met immediately, which was quite natural in the light of the way in which the war had developed, nevertheless there were very extensive imports of military equipment in 1940, amounting in value to about 160 million kronor, which was in a class by itself as the highest figure for any year of the war. The development from 1940 and during the subsequent years of the war will be studied in the text which follows, with the emphasis on the U.S.A. and Germany. Having regard to the way in which matters developed it was those two countries above all which might conceivably supply a wider range of high quality equipment and Sweden's main efforts were also concentrated there.

A. Imports from the U.S.A.

After England and France had been brought into the war the U.S.A. stood out as the most important alternative source to the Axis powers from which to purchase military equipment. The Royal Air Force Matériel Administration (KFF) had already signed large contracts at the turn of the year 1939–1940 through the so-called Swedish Air Commission (Swedaircom) headed by Squadron Leader B. Jacobsson. Amongst other items the contracts related to 120 J9s (Severskys), 52 B6 Severskys (a bomber version of the J9), 144 J10s (Vultees) and also a large number of engines.[4] On 8 January 1940 KFF's orders in the U.S.A. amounted in value to about 57 million kronor.[5] However, it was already quite clear at this point in time that the deliveries would be seriously delayed in spite of strenuous efforts to speed them up.

An outward sign of the importance of the U.S.A. in the situation which had arisen was the fact that on 22 December it was decided to send an official delegation to the U.S.A. to "organize and effect purchases of certain goods of special importance for Sweden's national supply".[6] The delegation consisted of Prince Bertil, G. Hägg-

[4] On the question of the air force's acquisition there are two detailed and to a great extent parallel accounts in Norberg and Söderberg.

[5] PM beträffande materielanskaffningen för flygvapnet från USA. Fst H Mtrlavd. B I:2 KrA.

[6] Kungl. Maj:ts beslut 22/12 1939. UD HP 24 V[1]/Am I. UDA.

löf from the Foreign Office, A. Gabrielsson from Volvo and, as experts, Admiral N. Wijmark, Captain F. A. B. Hård af Segerstad and the marine engineer C. Falkendal. Although attempts had been made to give the delegation a civil appearance outwardly, its main task was to buy military equipment on behalf of the army and navy. Soundings carried out with valuable help from the Finnish military attaché had indicated that there were good possibilities of purchasing a large number of items of military equipment. Furthermore, the National Industry Commission had asked for machinery worth about 11 million kronor for the production of ammunition.[7]

The military request lists for the army included hand-grenades, sub-machine-guns, 3.7 cm anti-tank guns, artillery ammunition of various kinds, anti-aircraft batteries, range-finders, binoculars, searchlights, tractors, jeeps, radio stations, telephone cables, electrical equipment and tanks (100 of them). The navy's most important requests were for automatic anti-aircraft guns (20–25 mm), three batteries (of three guns each), 10.5 cm anti-aircraft guns, two 15 cm mobile shore batteries of three guns each, all equipped with fire control apparatus and ammunition. There was also a large number of additional items: range-finders, cables, towing vehicles, sub-machine-guns, et cetera. The air force asked for fighter planes and parachutes above all.[8] Soundings would also be made about motor torpedo-boats and armoured cruisers.

For various reasons it proved impossible to purchase many of the items which had been requested. During the winter and the spring the world situation became more tense and there were many claims, not least by the U.S.A.'s own armed forces, on the military equipment which was immediately available. Placing orders for production with

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[7] Hägglöf, G., Samtida vittne (1972), pp. 8 f., Hägglöf (1958), p. 100.

Boström till Günther 16/1 1940 angående anskaffningsmöjligheter för viss krigsmateriel i Förenta staterna. Bilaga beträffande anskaffningsmöjligheter för krigsmateriel i U.S.A. upprättad av finske militärattachen Överste Zilliacus 10/1 1940. Tillägg till Överste Zilliacus's PM den 10/1 1940 av den 13/1 1940. Avskrifter Fst H Mtrlavd. F II:3 KrA. Varor och material som böra importeras från Förenta staterna. IK 12/12 1939 Fst H Mtrlavd. B I:2 KrA.

[8] Förteckning över material, som torde kunna beställas i USA för tygdepartementets, marinförvaltningens och flygförvaltningens räkning (Dec. 1939) Fst H Mtrlavd. B I:2 KrA.

industries which were not already engaged in producing military equipment meant unacceptably long delivery periods. In many instances the Swedish military administration became sceptical and abandoned the purchases, probably because it was thought that there were better alternatives nearer to hand (i.e. usually Germany). Inter alia this applied to 100 light (8 ton) tanks about which there were advanced negotiations in progress in March 1940. Without armaments these would cost a total of 12.6 million kronor.

The most important exception to the general negative picture was aircraft equipment, in respect of which substantial orders had already been placed through the air force administration's own bodies. In addition, contracts were made for 4,800 submachine-guns (most of them of Smith & Wesson manufacture) with ammunition. Large quantities of gas masks and telephone cable were also ordered for defence purposes.[9]

When communications to the west were broken off through the German occupation of Denmark and Norway about 30 Seversky fighters of the J9 type had arrived in Sweden. The main part of the equipment ordered in the U.S.A. had not yet been delivered. The question now was how the transport to Sweden could be organized. Several alternative ways were discussed: through a German mine barrage to the Norwegian coast and from there to Gothenburg; via Italy and Germany and as far as the aircraft equipment was concerned by boat to Iceland or England and thence by air.[10] The alternative which was finally chosen was to buy cargo space on board the traffic to Finnish Petsamo, the equipment then being taken by lorry into Sweden. This transport route was in operation from the month of May 1940. Another thirty or so Seversky J9s were able to

[9] VPM angående inköp och undersökningar rörande anskaffningsmöjligheterna för viss materiel verkställda i Amerikas Förenta Stater av Swedish Government Trade Delegation under tiden 24 januari–25 juli 1940. 9/9 1940 F. Hård af Segerstad – C. J. O. Falkendal. Fst. H Mtrlavd. F II:3. KrA. At the turn of the year 1939/40 the orders from KFF in the U.S.A were worth 56,664,005 kronor (including 120 J9 Republics and 52 B6 Republics) and on 29/2 the figure was 53,947,932 kronor. In July 1940 there were orders for 60 J9 aircraft, the 52 B6 planes and 144 Vultee fighters, KFF 30/12 1939; KFF till UD 8/3 1940; KFF till UD 12/7 1940. HP 24 V[1]/Am IV. UDA.

[10] PM från KFF 9/4 and also 30/4, HP 24 V[1]/Am IV. UDA.

be brought in together with some further equipment.[11] The biggest items apart from these were the large consignments of telephone cable and gas masks.

On 2 July 1940 the President of the United States ordered an embargo on the export of military equipment. In spite of efforts by Swedaircom and the members of the delegation who remained (Prince Bertil, G. Hägglöf, A. Gabrielson and N. Wijkmark had gone home on 13/3) as well as the Swedish Embassy, no export licences were obtained for the equipment contracted for. For the time being it was stored in the U.S.A.[12] Sweden's reluctance to abandon the military equipment was due to her worsening position generally vis-a-vis the Western Powers after the transit agreements with Germany. In a conversation with Günther on 7 July Mallet, the British Ambassador, suggested that to counterbalance her concessions to the Germans Sweden should forego her American aircraft contracts, which would then be taken over by the English. In any event the British Government could no longer allow planes to be transported from America to Sweden through the sea blockade of the British navy.[13] It was assumed in Swedish quarters that the English exerted influence over the U.S.A. to prevent military equipment from being allowed into Sweden. Nor did a personal visit to President Roosevelt by the Swedish Ambassador, W. Boström, have the desired effect. The export embargo also applied to licences for the production of the American Twin-Wasp aeroplane engine. Likewise – already in May,

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[11] On 23 November, when the Petsmo traffic had largely ceased, the following items inter alia had been imported via Petsamo since June 1940:
2,300,000 11.5 mm cartridges weighing 53.7 tons bought by KATD
6,500,000 9 mm cartridges weighing 102.25 tons bought by KATD
101,177 gas masks weighing about 236 tons bought by KATD
telephone wire, telegraph and mine cable weighing 355.4 tons bought by KATD, KMF
4,300 9 mm Smith & Wesson machinge-guns weighing 20 tons bought by KATD
Source: Rapport över leveranserna från USA till Sveriges över Petsamo. Ställningen den 23 nov. 1940 (Hedin Ktrk) HP 24 V[1]/Am. UDA.

[12] Norberg, pp. 110–113.

[13] Uppteckning av samtal mellan utrikesministern och brittiske ministern 7/7 1940. HP 24 V[1]/AM V. UDA.
Telegram från sändebudet i London till UD 26 juni 1940. Transiteringsfrågan juni–december 1940. (Handlingar rörande Sveriges politik under andra världskriget. Official documents published by Kungl. Utrikesdepartementet Stockholm 1947) akt 24, p. 22.

incidentally – exports of the important machine tools for military equipment production had been stopped.

In September in Sweden consideration began to be given to a sale of the equipment, since it was realized that it would probably prove impossible to get it released for export. A sale to the American Government was first considered. In the Air Force Matériel Administration hope was not completely abandoned until the American Government introduced a law on 10 October providing for the requisitioning of military equipment. After fruitless attempts to exchange production licences for aircraft engines for licences for the production of Bofors 40 mm anti-aircraft guns, the activity in the U.S.A. changed to long-drawn-out negotiations about economic compensation for the equipment which had not been delivered and the advance payments which had been made.[14]

The extensively planned attempt to import military equipment from the U.S.A. was a mountain which gave birth to a mouse. Certainly sixty or so modern fighter planes were no mean acquisition in 1940, but bearing in mind the hundreds of planes which had been ordered, it was plainly disappointing. Practically nothing else was received.[15] This outcome of the negotiations was serious. After the Western Allies had dropped out by virtue of the fact that they had been drawn into the war or occupied (England, France, Holland, Belgium) the only country outside Germany's sphere of influence which could produce high quality military equipment was the U.S.A. When the U.S.A. also had to be left out of calculations in the middle of 1940, only the Axis powers remained.

B. Imports from Germany and Bohemia-Moravia

Towards the end of 1939 Sweden stepped up her efforts to be allowed to buy German military equipment. In December the King in Council appointed A. Wettermark, a bank director, to be Government negotiator for German military equipment.[16] Wettermark was to be in

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[14] PM 26/7, 5/8, 20/8, 29/8, 3/9, 25/9 1940. HP 24 V[1]/Am VI. UDA.

[15] The value of the 4,800 machine-guns (Smith & Wesson + Thomson) with ammunition 9 mm and 11.5 mm) amounted to about 4.2 million kronor.

[16] Kungl. Maj:ts tillstånd 22/12 1939. HP 24 V[1]/Ty. UDA. Since 1933 Wettermark had held the post of managing director of the Deutsche Unionbank in Berlin.

charge of current operations during the war years which followed, while the large main agreements for trade between the two countries were concluded by the Swedish and German Government commissions. Sweden's main representatives were G. Hägglöf and J. Wallenberg, and Germany's were A. Walter and K. Ludwig. The decisions as to what military equipment could be released by Germany and exported were specially reserved to the Wehrwirtschaftsamt and its head, General G. Thomas, while the direct negotiations were usually conducted by Colonel Becker and Captain Koch (later a certain part was to be played by Speer's Ministry). As a rule the Swedish military attaché in Berlin, Colonel C. A. Juhlin-Dannfelt represented the Swedish forces. Group Captain N. Söderberg often negotiated on behalf of the Swedish air force administration. In certain instances the air force administration went its own way without coordinating its negotiations with those of Wettermark.[17]

At the turn of the year 1939–40 Sweden had asked for equipment worth nearly 170 million kronor.[18] The biggest items on Sweden's request list were:

Equipment	Value
Artillery equipment (10.5 cm howitzers, 3.7 cm anti-tank guns, 20 mm anti-aircraft guns, 3.7 cm anti-aircraft guns, all with ammunition)	100.0 million kronor
9 mm sub-machine-guns with ammunition	4.3 " "
Hand-grenades	0.6 " "
60 Me 109 aircraft	20.0 " "
36 Ju 87 "	14.0 " "
27 He 114 "	11.0 " "

[17] The operations of the Government commission are described in Hägglöf (1958), passim. See also Norberg, passim and Söderberg, passim.

[18] Hägglöf (1958) states (p. 99) that when he was on a short visit to Berlin in the middle of December 1939 he had with him a list of requests from the defence staff for equipment worth "not less than 500 million kronor". The next part of Hägglöf's account (pp. 100–103) is somewhat misleading since he gives the impression that there were no further negotiations in Germany about military equipment. Instead interest is focused on the U.S.A. where Hägglöf went in January 1940.

In addition the army administration also wanted to buy 80–100 tanks made in Czechoslovakia.[19]

The Germans appeared cooperative,[20] and after negotiations in the new year of 1940, in the course of which the aircraft deliveries were postponed, on 4/1 the German authorities gave their preliminary consent to purchases to the value of 74 million kronor.[21] In the majority of cases the negotiations direct with the manufacturers were far advanced and contracts could be signed. Amongst others, negotiations were held with the firm of Českomoravska–Kolben–Daněk (ČKD) in Prague for the purchase of 90 tanks worth about 23 million kronor.[22]

However, no deliveries could be made until agreement had been reached about terms of payment. The Wehrwirtschaftsamt greatly preferred that metals should be handed over in exchange for the military equipment. The Swedish negotiators were only authorised to go as far as offering compensation for the metal which was included in the equipment delivered. The question of the payment for the deliveries of military equipment was linked with the large war trade agreement which was concluded between Sweden and Germany. Under this agreement the payments were made via a clearing account, through which the Swedes now wanted the military equipment to be paid for as well. Ludwig and Walter in the German Government commission maintained that this was not possible since they were not

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[19] PM beträffande inköp av krigsmateriel. Synpunkter av ekonomisk art framförda vid sammanträden 3 januari 1940 med General Thomas i Wehrwirtschaftsamt och med Ministerialdirektor Walter i Reichsernährungsministerium.

Wettermark 3/1 1940. HP 24 V[1]/Ty. UDA.

Juhlin-Dannfelt till Richert 2/1 1940. Fst H Mtrlavd F III:3/Ty. KrA.

Uppteckning av Juhlin-Dannfelt från sammanträffande med Thomas 11/12 1939. HP 24 V[1]/Ty. UDA.

Cf. also Aufzeichnung des Leiters der Wirtschaftspolitischen Abteilung 12/12 1939. Akten zur ... Ser. D Bd VIII Dok. 446.

[20] Juhlin-Dannfelt till generalfälttygmästare H. Gustafsson med uppteckning av samtal med Thomas 15/12 1939. Fst H Mtrlavd. F II: 3/Ty. KrA.

PM över läget i leveransfrågan 16/12 1939 (Juhlin-Dannfelt). Fst H Mtrlavd. F II:3/Ty. KrA.

Uppteckning av samtal med Göring 28/12 1939 (Juhlin-Dannfelt). HP 24 V[1]/Ty. UDA.

[21] PM över läget i vapenleveransfrågan den 4/1 1940 (Juhlin–Dannfelt). Fst H Mtrlavd. F II:3/Ty. KrA.

[22] VPM 6/2 1940 H. Gustafsson, generalfälttygmästare. Fst H Mtrlavd. F II:3/Ty. KrA.

interested in having such large credits in the account. They indicated that they would be unable to use them. They would prefer to be paid in gold or in free currencies.[23] After several rounds of negotiations an agreement was reached at the end of January, and it was signed in Berlin on 27/1 1940. Under this agreement half of the payment for the military equipment was to be made in gold or free currencies, and half through the clearing account. Metals were to be delivered to Germany in the same quantities as those which were estimated to be included in the equipment. Over and above this 500 tons of semi-manufactured copper and brass products, 250 tons of stainless steel and 50 tons of high-speed steel were to be delivered to Germany. The payment for these raw materials was to be made through the clearing account. They amounted in value to between 2 and 4 million kronor.[24]

After this framework agreement had been concluded negotiations continued with firms in Germany and the Protectorate of Bohemia-Moravia, with the result that by the beginning of April contracts totalling 92 million kronor in value had been made. In addition there were in progress negotiations about products worth 26 million kronor, including Czechoslovakian machine-guns and ammunition (9.2 million kronor) and 6 21 cm guns from the Skodawerken for the navy (13.1 million kronor).[25] In April, of this equipment the following items had been delivered to Sweden:

1,800 sub-machine-guns	645,000 kronor
500,000 rounds of 9 mm ammunition	36,667 kronor
Sundry artillery material	12,505,000 kronor
74 guns	4,336,667 kronor
Total	17,523,334 kronor

[23] Brevkoncept Hägglöf till Richert 28/12 1939. HP 24 V[1]/Ty. UDA.
See above, note 19.
PM 11/1 1940. Hägglöf. HP 24 V[1]/Ty. UDA.
Hägglöf (1958), p. 96.

[24] Avtal 27/1 1940. HP V[1]/Ty. UDA.
PM beträffande leveranser av krigsmateriel från Protektoratet Böhmen–Mähren 1/3 1940 (Wettermark). Fst H Mtrlavd. F II:3/Ty. KrA.
Richert till Günther 27/1 1940. HP 24 V[1]/Ty. UDA.

[25] Wettermark till Ihre 3/4 1940. HP 24 V[1]/Ty. UDA.

Thus when the German armed forces advanced into Denmark and Norway only a fraction of the equipment which had been requested had been delivered. The protracted negotiations about terms of payment and the transport difficulties had held up the imports.[26] The Swedish armed forces had counted on receiving the bulk of the deliveries during the first quarter of 1940 but in fact this had not been the case. No aircraft or tanks had been delivered in spite of the fact that there were in existence contracts for 37 Heinkel planes, 18 Dornier planes and 90 Czechoslovakian tanks with machine-guns and ammunition.[27]

Deliveries of military equipment to Sweden were stopped on account of the occupation of Denmark and Norway. In a telegram of 21/4 and a letter of 22/4 Juhlin-Dannfelt announced that on 20/4 the German Ministry of Aviation had seized 40 anti-aircraft guns (Oerlikon), part of an order of 120 guns which were to be delivered during the month of May (the guns had originally belonged to the Czechoslovakian army). The Swedish military attaché thought that the seizure was connected with the German armed forces' increased need for air defence in their battles in Norway, but he did not rule out the possibility that the action was politically motivated.[28] Because of the events in Norway after 9 April, the attitude towards the Swedish representatives had hardened in Berlin. In spite of repeated representations the Swedish Government had in fact refused to forward in transit military equipment to the German forces at Narvik who were cornered and hard pressed by the English. Soon, too, the suspicions of political motives were confirmed: a de facto embargo was placed on deliveries of German military equipment and the forwarding in transit of such equipment across Germany.[29] The

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[26] PM beträffande leveranser av krigsmateriel från Rheinmetall Borsig AG 22/2 1940 (Wettermark). Fst H Mtrlavd. F II:3/Ty. KrA.

PM beträffande användandet av svenska järnvägsvagnar för transport av krigsmateriel till Sverige 27/2 1940. Wettermark. Fst H Mtrlavd. F II:3/Ty. KrA.

[27] Wettermark till Ihre 3/4 1940. HP V[1]/Ty. UDA.

[28] Juhlin–Dannfelt till Sköld 22/4 1940. Juhlin–Dannfelt till Stendhal 22/4 1940. Fst H Mtrlavd. F II:3/Ty. KrA.

[29] Juhlin–Dannfelt till Sköld 24/4 1940. Transiteringsfrågor och därmed sammanhängande spörsmål april–juni 1940 akt 72 pp. 83 f.

The Germans had first tried to see if it would be possible to obtain the desirable right of transit through an approach to the King of Sweden. When this failed they began to

reason for this was the uncertainty about the situation in the Nordic countries. It appeared quite clear that the duration of the embargo would depend on Sweden's actions. At one meeting Field Marshal Goering was quite explicit: if Sweden did not support Germany by allowing the forwarding in transit of weapons to Narvik, "not a single cartridge more" would be delivered to Sweden. On the same occasion Goering took the opportunity to criticize the Swedish armed forces, and pointed out the weaknesses of the air force above all.[30] The political high command in Germany had tightened the thumbscrews. On 7 May Juhlin-Dannfelt and Wettermark visited the Wirtschaftsstab and discussed the list of the postponed deliveries with Captain Koch. Koch's manner was cordial but he could do nothing until a political decision about the lifting of the embargo had been made.[31] Ludwig was able to achieve equally little. He explained that the uncertainty about Sweden's position with regard to the events in Denmark and Norway and the disagreement which had then ensued about the transit traffic to Narvik had brought about the embargo.

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link together the Narvik question and the German deliveries of military equipment. The German embassy took the view that by being helpful in this connection it would be possible to influence the Swedish Government through Sköld, the Defence Minister. (Der Leiter der Wirtschaftspolitischen Abteilung an die Gesandtschaft in Stockholm 22 April 1940. Die Gesandtschaft in Stockholm an das Auswärtiges Amt 24 April 1940 and 27 April 1940. Akten zur ... Ser. D Bd IX Dok. 150, 159, 171). On 30 April the Foreign Minister, Ribbentrop, gave detailed directions as to how far it was thought possible to go and listed considerable quantities of weapons and ammunition (e.g. 2,850 machine-guns with 38 million rounds, 30 20 mm anti-aircraft guns and 20 37 mm anti-tank guns with 1 million rounds). The representatives of the Swedish Government did not succumb to this temptation and the German envoy Wied did not think that they were prepared to modify the Swedish policy of neutrality even if the prospect of further supplies of weapons was held out (Der Reichsaussenminister an die Gesandtschaft in Stockholm 30 April 1940. Der Gesandte in Stockholm an das Auswärtige Amt 7 Mai 1940. Akten zur ... Ser. D Bd IX Dok. 183, 202). In this situation a message came from Ribbentrop saying that the deliveries of military equipment were to be stopped (Das Auswärtige Amt an den Reichsaussenminister 25 Juni 1940. Akten zur ... Ser. D Bd X Dok. 15).

Cf. Carlgren, pp. 150–190.

[30] Rapport av ingenjör Dahlerus 13/5 1940. Angående besök i Berlin lördagen 11 maj 1940. Transiteringsfrågor och därmed sammanhängande spörsmål april–juni 1940 akt 176, pp. 184–189.

[31] Uppteckning av samtal med Kapitän Koch i Wehrwirtschaftsstab 7/5 1940 (Juhlin–Dannfelt). Fst H Mtrlavd. F II:3/Ty. KrA.

Ludwig maintained that from the point of view of her trade policy it was in Germany's interest to sell military equipment since, with the start of the shipping season, large Swedish deliveries of iron ore, wood and cellulose would change Germany's clearing position, which was positive so far.[32] The embargo was still in force in June. At that time preliminary contacts had been made between the Government commissions about the exchange of trade between the two countries. In this respect the question of the military equipment was to play a comparatively important role, usually linked with Germany's emphasis on the iron ore deliveries.[33] After reminders from Sweden, Walter, the German negotiator, stated on 6 June that "the dossier on the Swedish orders for weapons has been sent to Herr von Ribbentrop and has now been placed with the documents on the Narvik question."[34]

However, the picture of the war in Europe changed at the beginning of June. The German blitzkrieg attacks to the west had been extremely successful and resulted in the military conquest of France. The English troops were driven towards the Channel coast and were evacuated from Dunkirk. In this situation the English thought it

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[32] PM beträffande leveranser av krigsmateriel från Tyskland. 15/5 1940 (Wettermark). HP 24 V[1]/Ty. UDA.

[33] Richert till Günther 16/5 1940; Richert till Günther 18/5 1940; Richert till Boheman 30/5 1940. Transiteringsfrågor och därmed sammanhängande spörsmål april–juni 1940 akter 192, 210, 253, pp. 212–215, 231 f., 268–270.

It is possible to discern a certain conflict between the top political leaders in Germany who wanted to act high-handedly and the people responsible for the trade negotiations who wanted to give greater consideration to the negotiating situation as a whole. Sweden's negotiating position was strong inasmuch as good will was required for deliveries to be made via Luleå of as much iron ore as would compensate for the loss of Narvik. The Swedes were keen to make their protection against English air raids on the ore transports dependent on German deliveries of anti-aircraft artillery. It was also an embarrassing fact for the German negotiators that the deliveries of military equipment which had been agreed in January had not been completed while the Swedish undertakings had been fulfilled. Immediately before the start of the negotiations in the last days of May a proposal was made to Ribbentrop that the delivery embargo should be lifted, but because of the situation of the German troops in Narvik this did not take place. Aufzeichnung des Staatssekretärs 21 Mai 1940. Akten zur ... Ser. D Bd IX Dok. 290.

[34] PM angående svenska vapenbeställningar i Tyskland 14/6 1940 (Hägglöf). HP 24 V[1]/Ty. UDA.

impossible to continue the fight in northern Norway, but left in the first week in June, together with the Norwegian Government.[35] Thereafter the German armed forces were in undisputed possession of the whole of Norway, and the transit question which had inflamed relations between Sweden and Germany appeared in a different light. The negotiations about the transit traffic between Germany and Norway across Swedish territory soon led to an agreement, as did the trade negotiations. On 27 June the embargo on the export of weapons to Sweden was lifted.[36]

On 9 and 10 July 1940 negotiations took place in Stockholm between the Government commissions about the completion of the German deliveries and the possibilities of further purchases. A list of the equipment contracted for but not delivered was considered; the goods on the list amounted in value to 75 million kronor. Captain Koch made it clear that certain items on the list could not be delivered. This applied for example to 138 20 mm anti-aircraft guns, 90 tanks, 18 Dornier aircraft with spare engines, 1 torpedo plane and many other items. Koch expressed great doubt on many other points. The 75 million kronor was severely reduced.[37] A preliminary offer was made of 200 3.7 cm anti-tank guns with ammunition, 3,000 light machine-guns (Czechoslovakian but from German supplies) with ammunition and certain other ammunition including 10 million 9 mm parabellum pistol cartridges as new items which might be purchased. The total value of the equipment offered amounted to just over 20 million kronor. Towards the end of July the signing of contracts with the German companies was completed, and the trains with military equipment aboard began to land in Trelleborg again.[38]

[35] Starck, M., Allmän sjökrigshistoria 1930–1945. Del 1 1930–1941, p. 149.

[36] On 25/6 1940 Ribbentrop received a reminder from Auswärtiges Amt about the lifting of the embargo on the export of weapons. An endorsement on this letter shows that on 27/6 at the latest the Feuhrer released the supplies which had been contracted for, inasmuch as only German's own military requirements might consitute an obstacle to the deliveries. Das Auswärtige Amt an den Reichsaussenminister 25 Juni 1940. Akten zur ... Ser. D Bd X Dok. 15.

[37] PM 12/7 1940 (Hägglöf). Redogörelse för förhandlingar beträffande inköp av krigsmateriel från Tyskland i samband med Kapitän Kochs besök i Stockholm den 9 och 10 juli 1940. 11/7 1940 (Wettermark). HP 24 V[1]/Ty. UDA.

[38] PM över uttalanden av Kapitän Koch den 17/7 1940 angående vapenleveranser till Sverige (Juhlin–Dannfelt). 17/7 1940 Fst H Mtrlavd. F II:3/Ty. KrA.

Wettermark till KATD, KFF, KMF 22/7–17/8 1940. Fst H Mtrlavd. F II:3/Ty. KrA.

During the July negotiations the German attitude towards sales to Sweden proved to be much less generous than it had been before the April embargo. It is true that the total value of the military equipment imported during 1940 was to amount to about 76 million kronor, but it had not been possible to comply with Sweden's requests on important points. Artillery equipment had been received in large quantities.[39] The shortages remained, above all as far as

[39] Wettermark till Hägglöf 22/11 1940. HP 24 V[1]/Ty. UDA.

The situation in the middle of November 1940 can be summarised in the following table (in millions of kronor):

	Delivered up to 15/11 1940	Contracted for delivery up to 31/12 1941
Total	70.9	40.8
Including: Artillery equipment (15 cm howitz., 10.5 cm howitz., 4 cm anti-air- cm anti-tank guns, all with ammunition and accessories), Light machine-guns		
Including: Artillery equipment (15 cm howitz., 10.5 cm howitz., 4 cm anti-aircraft guns, 2 cm anti-aircraft guns, 3.7 cm anti-tank guns, all with ammunition and accessories), Light machine-gun ammunition	49.7	5.5
Optical equipment	0.4	6.4
Aircraft (39 Hes)	–	10.5
Other aircraft equipment	7.9	4.4

Source: Sammanställning 22/11 1940 (Wettermark). Missiv till Hägglöf 22/11 HP 24 V[1]/Ty. UDA.

It has proved difficult to calculate the exact value of the imports during the year 1940. Here the sum contracted for on 15/11 1940 has been regarded as a maximum figure for the deliveries up to and including 31/12 1941. From this there has been subtracted the value of 27 He planes which were never delivered (7.3 million kronor) and the value of the equipment delivered during 1941 (28 million kronor). The figure for 1940 will then be 76.4 million kronor. The reasonableness of this figures can be measured against a tabulation from Fst Mtrlavd. of the situation as at 31/12 1940, although in the latter the values are not specified. Fst kvmavd. Övriga handlingar efter ämne. F XI:1. FCA.

The Fuehrer had said that in the negotations with Sweden about military equipment there would be "keine besonders wohlwollende, sondern eher eine zurückhaltende Tendenz." Akten zur ... Ser. D Bd XIII Dok. 92 not 3.

anti-aircraft artillery was concerned. Altogether during the year 60 40 mm anti-aircraft guns and 106 20 mm anti-aircraft guns were purchased. This was far fewer than had been requested and the attempts to purchase heavier guns failed. As regards artillery equipment, mention should be made of the long-drawn-out negotiations for permission to purchase 21 cm guns for the coast artillery. Up to the summer of 1940 there were good prospects of being allowed to buy six of these from Skodaverken, but the matter then lapsed. Not until the year 1944 were nine of these guns delivered.

One of the most serious matters was the tank question. Contracts had been concluded for the delivery of 90 20 ton Czechoslovakian tanks, but in the summer it became clear that they would not be delivered. Instead, on 15 July the Defence Staff asked the Foreign Office to investigate the possibilities of obtaining a licence to produce such tanks in Sweden.[40]

The aircraft deliveries were a further source of disappointment. The order for 18 Dornier planes had had to be cancelled in July 1940, and as regards the modern Ju 87–88 bomber and the Me 109–110 fighter, matters did not even progress as far as concrete negotiations in spite of vigorous lobbying. Of the 39 Heinkel planes contracted for, none were to be delivered during 1940.[41]

Thus the results were modest, looked at against the background of the extensive requests which had been made at the end of 1939. Nor was there a decline in the need for imports. During the spring of 1940 work was carried out on a reorganization of the defence which meant a considerable increase in the demand for military equipment. For this reason a new import request list – "list no. 3", drawn up by the Defence Staff – was produced in May 1940.[42] The list was very extensive and included 360 aircraft. There was a request to purchase 200 Ju 88s and 100 Me 110s, apart from the aircraft already contracted for. In addition they wanted to import a total of more than 700 anti-aircraft guns, especially 20 mm guns.

During the remaining years of the war Sweden's purchases of

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[40] Rappe (Stf C Fst) till UD 15/7 1940. Fst Mtrlavd. B I:2 KrA.

[41] The aircraft deliveries are tabulated in Norberg, p. 220.

[42] Cronenberg, p. 31.
Stendhal till Hägglöf 10/5 1940 med förteckning 10/5 1940. HP 24 V[1]/Ty. UDA.

military equipment in Germany were on a smaller scale and less striking in character. During the year 1941 the contracts signed in 1940 were implemented and goods worth 28 million kronor were imported, mainly artillery equipment. On 8 December 1941 a new military equipment agreement was concluded between the two countries, initially involving about 80 million kronor. In 1942 and 1943 supplementary agreements connected with it were concluded. The total values of the deliveries under these agreements were as follows:

in 1942:	18.0 million kronor
in 1943:	46.5 million kronor
in 1944/45:	about 39.5 million kronor

The item which completely dominated these deliveries was 10.5 cm howitzers with ammunition.[43] Other large items were jeeps, light

[43] The deliveries from Germany to Sweden under the agreements of 8/2 1941, 5/3, 9/5, 7/9 1942, 4/5 1943 amounted in value to the following sums (in millions of kronor):

	31/12 –42	31/12 –43	31/3 –44	Balance	Total ordered
Total	18.0	64.5	92.7	11.3	104.0
Including					
10.5 cm howitzers with ammunition	4.2	30.5	48.1	2.4	110 howitzers 275,000 explosive shells
Hand-grenades	–	2.3	2.8	–	450,000
Light machine-guns with ammunition	6.8	8.3	8.3	–	2,000 light machine-guns 25 million cartridges
Jeeps	3.9	12.0	12.0	–	600 (582) after cancellations
21 cm howitzers with ammunition	–	–	8.2(5)	8.1(4)	9 howitzers 1,800 round
Binoculars and range-finders	0.8	6.4	6.4	–	27,750 pairs of binoculars, 600 range-finders
Radio equipment	1.1	1.4	1.4	0.03	
Aircraft equipment	0.5	2.7	2.7	0.4	

machine-guns, 21 cm guns, field-glasses and range-finders. Apart from these deliveries, during 1943 226 aircraft engines were purchased, including 115 American Twin-Wasp engines which had been seized as spoils of war in France, and 21 Daimler-Benz 605 engines to a total value of about 10 million kronor.[44]

During the years 1940–1945 Sweden imported military equipment worth about 218 million kronor from Germany. Thus Germany was clearly the predominant source of imports (see diagram 2).

Germany's motives in supplying Sweden with military equipment were perhaps partly political – for example, it emerged at times that there was a wish to give Finland indirect support against the Soviet Union by exporting to Sweden – but they were mainly economic.[45] The German imports, above all of iron ore but also, for example, of wood products, cellulose and engineering products, presupposed services in return. Sweden also had a vital need for the imports from Germany, but it soon turned out that Germany found it more difficult than Sweden to fulfil her contractual delivery obligations, and from 1941 onwards there was a deficit in the clearing balance which was very trobulesome for the German negotiators. For example, the strained German economy had difficulties in mining and transporting the coal and coke which constituted the biggest item in the German export quota. It seemed tempting to the German Government commission's negotiators to improve the balance of payments by exporting valuable and not very bulky goods as military equipment, without having to apply for increased credits, which was a

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Source: Sammanställningar av Wettermark 14/1 1943, 8/1 1944, 4/4 1944, HP 24 V[1]/Ty. UDA.

Deutsch-schwedisches geheimes Protokoll uber die Lieferung von Kriegsgerät 8/12 1941. Akten zur ... Ser. D Bd XIII Dok. 565.

[44] Sammanställning 13/10 1943 (Wettermark). Missiv 15/10 till Hägglöf (Wettermark). HP 24 V[1]/Ty. UDA.

[45] Kellgren, pp. 100, 148.

PM över läget i leveransfrågan den 16 december 1939 på e.m. (Juhlin-Dannfelt).

The representatives of Rheinmetall were of the opinion "on the basis of information received in the course of conversations with various military authorities that aid to Finland is implied in the German concessions (to deliver military equipment)." Fst Mtrlavd, F II:3/Ty. KrA.

constantly recurring theme, expecially during 1942.[46] The agreement concluded in January 1940 provided that half of the payment was to be made in gold and free currencies (see p. 32), but all the subsequent agreements for the supply of military equipment stipulated that payment was to be made through the clearing.[47]

One of the factors which hampered Germany in exporting military equipment was her own armed forces' need for equipment. This factor made itself felt more and more after the period of the German "Blitzkrieg" had come to an end and the long-drawn-out Russian campaign began to eat up large resources. In the light of this it was natural that the exports were to consist of equipment which for various reasons was not in such demand by the German armed forces or which was of a standard character and was produced in very large series. Thus on several occasions spoils of war which had been seized by the Germans were exported; these could not be fitted so easily into the German organization. The big items of artillery equipment, small arms and ammunition were goods which were mass-produced and for which there was apparently a significant production capacity in Germany.[48] On the other hand, as regards heavy anti-aircraft artillery, tanks or aircraft for example, the position was different. These were products in respect of which the German armed

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[46] Hägglöf (1958), pp. 197–209.

PM angående svensk-tyska överläggningar i handelsfrågor. Handelskommissionens arkiv vol. 352. RA.

In the autumn of 1941 Walter maintains that it is necessary to have "eine Auflockerung der Kriegsgerätausfuhr nach Schweden". Aufzeichnung des Legationsrat von Scherpenberg (Handelspol. Akt.). Vermark über die Besprechung bei Herrn. Min. dir. Wiehl betreffend Wirtschaftverhandlungen mit Schweden am 28 Aug. 1941. Akten zur ... Ser. D Bd XIII:1 Dok 254.

Cf. Deutschlands Rüstung im Zweiten Weltkrieg, p. 316.

[47] In actual fact about 80 per cent of the deliveries of 1940 were also to be paid for via the clearing. Wettermark till Hägglöf 22/11 1940. HP 24 V[1]/Ty. UDA.

The agreement of 8/12 1941 provided that 10 per cent of the purchase price was to be used freely in Sweden and to be outside the clearing system. 80 per cent of the purchase was to be paid in advance which was also designed to ease the clearing situation for the Germans. PM angående svensk-tyska överläggningar i handelsfrågor. Handelskommissionens arkiv vol. 352. RA. Deutsch-schwedisches geheimes Protokoll uber die Lieferung von Kriegsgerat 8/12 1941. Akten zur ... Ser. D Bd XIII Dok. 565.

[48] Hägglöf till Prytz 19/12 1941. HP 64 Ct. UDA.

forces claimed precedence. From the point of view of foreign policy the exports of such equipment were probably a more sensitive matter; there was always a risk that the German forces would be compelled to face Swedish troops. It was not agreeable to think that the latter would then be equipped with the most modern and effective weapons from the German war industry.[49]

As far as the Swedes were concerned, at the beginning of the war they were very interested in buying virtually all kinds of military equipment from Germany. Up to the summer of 1940 they entertained high hopes of being allowed to buy the equipment which was particularly desirable – tanks, aircraft et cetera, for some of which contracts had in fact already been signed. However, motives of foreign policy and, later, consideration for Germany's needs, resulted in a subsequent moderation of hopes and demands.

However, a collaboration in the field of military technology – and extensive purchases of weapons more or less presuppose this – always involves a relationship of dependence with political consequences. It is possible to discover a natural endeavour on the part of the Swedes to avoid finding themselves placed in such a position of dependence, and one cannot assume that the limitations on the imports of military equipment resulted only from German restrictions. The three month embargo on deliveries during the early summer of 1940 had demonstrated as clearly as could be wished what it meant to be dependent on imports of military equipment. This was a weak point in Sweden's relationship with Germany. On other occasions too Germany's political leaders showed their readiness to use the cancellation of deliveries of weapons as a means of exerting pressure in critical situations. It was one of the "Daumenschrauben" which could be applied.[50]

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[49] Juhlin-Dannfelt till Günther 24/4 1940. HP 24 V[1]/Ty. UDA.

[50] On 31/8 1940 Becker of Wi Rü Amt informed Juhlin-Dannfelt that "difficulties over the weapon deliveries would arise" if the Swedes did not surrender six Norwegian tankers which were lying in Swedish harbours. Juhlin-Dannfelt continues: "The whole method, typically German, of getting their own way by what is in fact blackmail and by threatening to cancel the weapon deliveries is most unattractive, but I assume that in the present situation it is wisest to arrange for the surrender of the ships in question as soon as possible." Juhlin-Dannfelt till fälttygmästaren B. Hedqvist, KATD. Fst H Mtrlavd. F II:3/Ty. KrA.

Cf. also: Die Gesandtschaft in Stockholm an das Auswärtige Amt 2 Juli 1941;

In German industrial and military quarters great interest was taken in placing the Swedish war material industry under the "Grossraumwirtschaft", which it was designed to build up in Europe under German leadership.[51] It was to be the main task of the Swedish engineering industry to act as components sub-contractor to the German rearmament industry.[52] In return the Germans offered licences and drawings. One instance of an offer of collaboration of this kind is the proposal in the autumn of 1941 that the Swedish army be allowed to buy forty or so German tanks, the Swedish companies delivering in return spare parts for tanks in an equivalent sum.[53] This proposal was not accepted, and instead the production of tanks was to take place on Swedish soil under licence. Another instance occurred at the end of 1940 when there were discussions about the production in Sweden of an aircraft engine of the Daimler-Benz type. First of all private German firms, above all Junkers, sounded out Swedish companies about the possibilities of manufacturing engines under direct German supervision. There was interest in such an arrangement, but it was rejected by the Swedish authorities. Instead a proposal was worked out according to which the Germans were to build up an aircraft industry in Sweden with a monthly capacity of 150 engines, 100 of which would be at the disposal of the German Luftwaffe, while 50 would be allocated to the Swedish aircraft manufacturers. The attitude of the Air Force headquarters was

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Aufzeichnung des Legationsrat von Scherpenberg (handelspol. Akt) 10 Juli 1941; Die Gesandtschaft in Stockholm an das Auswärtige Amt 12 Juli 1941; Die Gesandtschaft in Stockholm an das Auswärtige Amt 19 Sept. 1941. Akten zur ... Ser. Bd XIII Dok. 59, 92 (not 3), 98, 336.

The German rearmament situation can be traced in the following works inter alia:
Milward, A. S., The German Economy at War (1967);
Deutschlands Rüstung im Zweiten Weltkrieg;
Janssen, G., Das Ministerium Speer. Deutschlands Rüstung im Krieg;
Carroll, B. A., Design for Total War. Arms and Economics in the Third Reich.

[51] Cf. Hägglöf (1958), pp. 131–132.

[52] Milward (1967), pp. 110–111.

Aufzeichnung des Legationsrat von Scherpenberg. Akten zur ... Ser D Bd XIII Dok. 254.

[53] PM 16/8 1941 (Wettermark); PM angående samtal med major Rodhe i Wi Rü Amt i Berlin 24/10 1941 beträffande upphandling av krigsmateriel i Tyskland (Wettermark); PM angående möjligheterna för fortsatt upphandling av krigsmateriel i Tyskland 6/12 1941 (Wettermark). HP 24[1]/Ty. UDA.

positive, the interest of the Minister of Defence was enlisted, but the Government turned down the proposal in January 1941. In fact in February a German commission toured nine leading Swedish war industries in order to study the prospects of the production under licence of the DB engine, which the Swedes were interested in instead. After long and hard negotiations licences were granted in August 1941. The Swedes were dependent on German know-how, but they defended themselves against the presence of the Germans as far as they could.[54]

Bearing in mind the risk of acts of extortion in critical situations and with them increased long-term pressure to fit into the Greater German economy, it is easy to understand the basic endeavour of the Swedish Government to avoid placing itself in a relationship of dependence on Germany. One of the ways of doing this was to try and base Swedish rearmament on domestic industrial resources as far as possible.

C. Imports from other countries

In terms of value the imports of military equipment from Italy were the next largest after those from Germany, and in 1940–1941 Italy was the dominant supplier (see table 5). However, the purchases from this country were of a different character to the others. Recourse was had to Italy when all other sources dried up. Equipment was bought there in order to make good very acute shortages, while at the same time there was scepticism about models and quality. This applied to a great extent to the purchases of ships which were made in 1940. Around the turn of the year 1939/40 there was discussion of purchases from abroad, above all of cruisers and destroyers. The Naval Matériel Administration was in contact with Italy in relation to certain other purchases – inter alia, of torpedoes – and at the beginning of 1940 an offer to buy four destroyers was made. Two were of the so-called "Stella" type and were fairly old, two were somewhat more modern

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[54] Norberg, pp. 116–119.
Licensavtal 22/8, 25/8 1941. HP 24 V[1]/Ty. UDA.

and were of the "Spica" type. They were comparatively sceptical about the transaction at the navy administration, but the situation was such that they could not afford to be too particular. On 26 April the ships were purchased for a total price of 27 million kronor. During the voyage home from Italy the destroyers were captured by British naval forces near the Faroe Islands, which caused a diplomatic crisis between Sweden and Great Britain. In July 1940 the destroyers put in to Gothenburg. They then underwent an extensive reconstruction of the crews' quarters, the armaments and many other things. The purchase costs were considered high and if these extra costs are added the whole transaction must be considered unfavourable from a purely economic point of view. During the same year four motor torpedo-boats were also purchased in Italy. Apart from the purchase of two English motor torpedo-boats which had taken place earlier, the Italian ships were the only ones purchased abroad during the period of rearmament.[55]

In the difficult situation of the late spring of 1940 contacts were also made with Italian aircraft manufacturers. By then the Air Force Matériel Administration had met with rebuffs from France (Brequet), Germany (Dornier), Holland (Fokker), the U.S.A. (Seversky, Vultee) and even the Soviet Union. The types of plane which were offered in Italy were not the most suitable from the Swedish point of view. Experiences during the following years were also to confirm misgivings that the quality was not of the best. However, there was no choice in 1940. After complex negotiations – to which the Swedish war-time commissions, the Foreign Office and the Swedish ironworks had to be summoned, since the Italians wanted payment inter alia in the form of quality steel, alloy metals, mica and many other things – contracts were signed. During the years 1940–1942 a total of 216 planes were imported, viz. 84 Caproni planes (Ca 313) for bombing and reconnaissance, 72 fighters manufactured by Fiat and 60 Reggiane Falco fighters.[56] As a result Italy was to become completely dominant as a supplier of foreign aircraft to the Swedish air force. After 1942

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[55] H-son Ericson, S., Knopar på logglinan, pp. 138 f.

[56] Thus the total imports of aircraft during the period of the war can be summarised as follows (according to Norberg, p. 220):

no more Italian planes were imported and the country's importance as a supplier of military equipment ceased.[57]

One explanation for the fact that it was still possible to buy equipment in Italy was that she had not yet been drawn into the war in earnest in 1940, and was therefore comparatively speaking well-armed. Indeed, war was declared against England and France when the latter was being conquered by the Germans in the summer of 1940, but this did not give rise to any immediate demand for military equipment. However, Italy soon became involved in the war in earnest. Then it became impossible to count on finding any spare aircraft or other military equipment in Italy.

Up to and including 1942 equipment worth 48 million kronor was purchased from Switzerland. This consisted mainly of 20 mm anti-aircraft guns and ammunition. In addition the other items acquired from Switzerland included range-finders and clockwork devices for fusing grenades.

Before the outbreak of war Sweden had already had a system of weapon bartering with Finland. In certain fields the Finnish military equipment industry had a considerable capacity, and in spite of the fact that domestic demands were, naturally, great, Finland was able to supply Sweden with certain equipment. The most important items were the heavy trench-mortars (12 cm) which were imported in the

type	exporting country	delivery period	number
T 2 (Heinkel)	Germany	Jan 1939–Oct 1939	12
S 12 (Heinkel)	Germany	July 1941–April 1942	12
S 14 (Fieseler Storch)	Germany	June 1938–Sept 1943	20
J 9 (Seversky)	U.S.A.	Dec 1939–Aug 1940	60
J 11 (Fiat)	Italy	June 1940–Oct 1941	72
S 12 (Caproni)	Italy	Oct 1940–Nov 1941	84
J 20 (Reggiane)	Italy	May 1941–Feb 1943	60

In addition of these there were 90–100 American fighters, imported just before the end of the war in 1945 (Söderberg, p. 327).

[57] The aircraft negotiations are described in Norberg, pp. 113–115, Söderberg, pp. 286–293 and Bjuggren, B., Attack, pp. 157–161.

Table 5. *Imports of military equipment (weapons and ammunition, warships and aircraft) from various countries 1940–1945. In millions of kronor.*

	1940	1941	1942	1943	1944	1945	Total
Germany (inc. Bohemia-Moravia)	58	26	19	33	47	3	186
The U.S.A.	17	–	–	–	–	15	32
Italy	61	43	19	–	–	–	123
Switzerland	14	18	16	6	3	3	60
Finland	2	7	6	2	2	1	20
Belgium & Netherlands	2	4	–	–	–	–	6
Others	6	5	3	1	–	–	15
Total	160	103	63	42	52	22	442

Source: SOS Handel 1940–1945.

years 1942–1944, but in addition considerable quantities of ammunition were included in the purchases.

The result of developments in Europe in 1940 was that Sweden became more and more dependent on Germany for her imports of military equipment. Not only was Sweden cut off from all countries which were hostile to the Axis powers, but Germany gained control over the rest: the imports from both Italy and Switzerland were very much subject to German approval. The German influence in Finland also increased.

D. The importance of the imports

There is no clear-cut way of establishing the importance of the imported military equipment for the country's defence forces. The imports can be assessed purely in terms of quantity on the basis of their value in relation to the total of the equipment acquired by the armed forces. Table 5 shows that, according to official statistics, military equipment worth 442 million kronor was imported during the years 1940–1945.

On various grounds there is reason to suppose that the official statistics underestimate the value of the imports of mechanical

military equipment by about 20 per cent.[58] If in addition one takes into consideration the fact that the imports for the year 1939, which were worth a total of 35 million kronor (according to SOS), fell within the war period to a great extent, this will produce a total figure of about 550 million kronor for the whole of the war period. Since the defence's total acquisition of military equipment cost about 4,200 million kronor, this means that about 13 per cent of the new acquisitions took the form of imports. Comparatively speaking the part played by the imports was greatest during the initial stages of the period; in 1940 a quarter of the acquisitions were imported. Thereafter the significance of the imports declined and from 1942 onwards they accounted for around 10 per cent of the value of the year's acquisitions[59] (see diagram 3).

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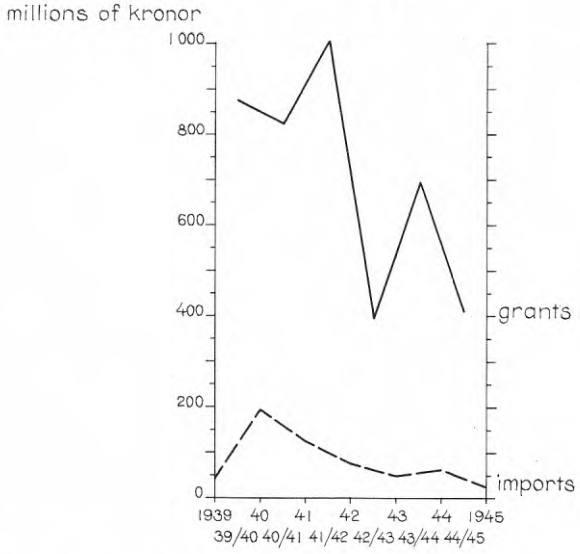
[58] The table is based on the official trade statistics, group XIX (weapons and ammunition) and group XVII: 1,922 and 1,940 (means of transport: aircraft and warships). As regards certain kinds of equipment it is not possible to tell from SOS what had been imported for civil purposes and what was intended for military use. This applies to motor vehicles, for example. For the most important import country, Germany (including Bohemia-Moravia), the figures for the orders from the defence administrations have been used. They amount to about 218 million kronor for the whole period 1940–1945. This should be compared with the figure of about 186 million kronor in the official statistics. Thus table 5 underestimates the value of the imports of military equipment quite considerably. In addition there is the fact that equipment which was of importance for the war was to some extent imported by private Swedish citizens and companies and was then sold to the Swedish defence force. This applied above all to parts for tanks, aircraft et cetera. A rough estimate produces a figure of about 3 million kronor per year in value in 1940–1944, i.e. 15 million kronor (Wettermark till Hägglöf 15/10 1943. HP 24 V[1]/Ty. UDA.). As far as the German imports are concerned it is then necessary to adjust the calculation of the total value by about 25 per cent from about 186 to about 233 million kronor. As regards other countries there is no reason to assume that SOS underestimated the imports of military equipment so greatly. Thus the total value of the imports from all countries in the years 1940–1945 is somewhere between 489 and 553 million kronor.

[59] A rough estimate of the relative importance of the imports can be obtained from the following table (the import from SOS have been increased by 20 per cent):

	1939	1940	1941	1942	1943	1944	1945
	39/40	40/41	41/42	42/43	43/44	44/45	
Total grants, budget year	874	822	1005	395	693	410	
Imports, calendar year	42	192	124	76	50	62	26

Diagram 3. Total grants for military equipment and imports of military equipment



Source: Appendix 1 table 17, SOS Handel.
Note: As to the calculation of the totals, see notes 58 and 59.

In spite of the magnitude of the imports at the beginning of the war period, it is clear that the Swedes did not get the equipment which they had requested. During the winter of 1939/40 the basis on which the rearmament was planned was one of rapid imports which would make good shortages so that the time could be gained in which to build up the industrial capacity and accumulate the know-how which would constitute the foundations for long-term rearmament. It was necessary to make the country self-supporting in the long term as regards military equipment so that there would be a capacity for sustaining a replacement production throughout a longer period of warfaring. Also, at the beginning of the year 1940 negotiations took place, with some success, in both Germany and the U.S.A., and although the equipment was not delivered as swiftly as was desired, there were nevertheless contracts to hand or advanced negotiations in respect of equipment worth a total of 250 million kronor. As a result of developments on the battlefields and in the war at sea in the spring Sweden's

western import routes were cut off. For a time an alternative way round the obstacle via Petsamo made it possible for military equipment to continue to flow in, but political developments in the U.S.A. stopped the flow at source. Parallel with this development political relations with Germany became complicated and the supply from the south was also stopped. In the summer of 1940 it became clear that no reliance could be placed on obtaining the military equipment – which was of a high standard as regards quality and was particularly desirable – from Germany. In any event the price of such equipment would be high: with her monopoly Germany was able to impose political conditions. Thus during the summer the situation for Swedish rearmament was critical. The first stage – of rapid reinforcement through imports – could never be achieved, and the prospects for the second stage, a long-term rearmament based on the country's own resources, had not yet been created.[60]

[60] There will be further discussion of the role of the imports in the course of the account of certain types of equipment in chapter III.

III

REARMAMENT FROM DOMESTIC RESOURCES

The value of the mechanical military equipment acquired during the period of the war amounted to a total of 4,199 million kronor (current money values throughout). As shown in the previous chapter about 13 per cent of this, to a value of about 550 million kronor, was imported. The remainder, i.e. equipment worth about 3,649 million kronor, was produced by the Swedish engineering industry. Evenly distributed amongst the six years of the war this would mean an annual order for a sum in excess of 600 million kronor. In purely quantitative terms these figures do not seem absurd. At the outbreak of war the Swedish engineering industry had an annual production capacity of about 2,000 million kronor. Towards the end of the period under investigation the production had risen to more than 3,000 million kronor a year. However, this did not mean that the rearmament took place without fundamentally interfering with the industry's "normal" way of functioning or without considerable problems. Some of these will be illustrated in this chapter.

In a situation in which there was political pressure from outside, a blockade and a demand for the rapid reinforcement of the armed forces, the authorities intervened to exert control over all the fields of economic life. For industry the National Industry Commission (IK) was set up, and its tasks included the supervision of resources so that military equipment could be produced in the quantity and at the rate which were desired. A rearmament of this magnitude also made completely new demands on the organization which was responsible for the acquisition of the equipment. Coordination and a comprehensive view were required and experience of industrial production on a large scale was necessary. The present chapter

begins with a description of the organizational changes as regards the acquisition of equipment. This is followed by a survey of the general requirements for rearmament from domestic resources, i.e. supplies of raw materials, labour, fuel and power. In addition the supply of machine tools is discussed. The aim is not to deal exhaustively with these large fields but rather to try and make it clear whether shortage situations occurred which were able to affect the progress of the rearmament.

In spite of the fact that the Swedish engineering industry was well developed in 1939 it was not able to adjust in a trice to military equipment production, especially since Sweden had been cut off from normal foreign contacts. The third section of this chapter is devoted to the bottlenecks which occurred within the engineering industry itself when the orders for military equipment increased. The problems are illustrated by giving a description of some of the important sectors of military equipment production which is supplementary to the account given in the first chapter, so that the difficulties become apparent in concrete terms. The prospects of producing arms, ammunition, ships or aircraft, for example, varied very considerably.

A. The acquisition organization is changed

Under the Defence Act of 1936 it was the duty of the army administration's ordnance department to arrange for the acquisition of ordnance equipment for the army and to plan military industrial production. Within the naval administration the various departments and the office for industry's war organization performed corresponding tasks. The air force administration had its own equipment department with similar functions. The planning of acquisitions in a state of war took place mainly through the making of war supply contracts which provided that certain companies undertook, in the event of war or the threat of war, to make certain deliveries to the armed forces. The planning was supplemented by the National Board of Economic Defence (RKE), inter alia through the establishment of a so-called war industry register which began by listing companies with war supply contracts. Factory plans for such companies were

worked out, specifying the staff, raw materials, means of transport and many other items which were required.[1]

When the war broke out machinery which was on the whole new was introduced for the planning of the country's national supply. As regards industry, on 4 September 1939 the Ministry of Commerce and Industry set up a committee of industrial experts to whom was given the task of planning and possibly of bringing into operation a control of the more important raw materials and other requirements of industry, and the additional tasks of following developments and suggesting appropriate measures. This committee drew up plans for a more permanent wartime body, the National Industry Committee (IK) which received its instructions from the King in Council on 27 October 1939 and began to function on 1 November of the same year. Certain parts of the mandate were altered by a decision of the King in Council of 14 June 1940. IK ceased to operate on 31 December 1949 and was replaced by the National Commission for Trade and Industry.[2]

Within IK the work was so organized that, besides certain central bodies, several departments or bureaus were set up with the responsibility for different groups of goods.[3] For example, there was an engineering department to deal with questions of works capacity and machine tools. A war industry department was formed on 15 December 1939 and this was responsible for planning the production of military equipment.[4] The department came into existence by virtue of the fact that the industrial department within RKE was transferred to IK. This was one of the stages in the development which resulted in the newly established body taking over all RKE's planning duties. When military equipment was acquired IK was to participate by organizing the supply of raw materials and the operation of the country's industries. This was made legally possible by the passing

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[1] Betänkande med förslag rörande den ekonomiska försvarsberedskapens framtida organisation (SOU 1946:19), p. 41.

[2] Statsmakterna och folkhushållningen ... (SOU 1941:18), pp. 48–51. Betänkande med förslag ... (SOU 1946:19), pp. 13–19.

SFS 787/39, 582/40. IK Arkivförteckning. RA.

[3] Statsmakterna och folkhushållningen ... (SOU 1941:18), pp. 216–220. Huss, E., Statens industrikommission, pp. 400–411.

[4] SFS 860/39.

of the National Requisitioning Act. It was invoked against Bofors and under its provisions it could be enforced against all the companies which were listed in the war industry register.[5]

A price bureau was also set up within IK on 17 January 1940. Its function was to deal with questions of price, especially in relation to supplies to the armed forces but also in relation to other matters within IK's sphere of operations.[6]

The exceptional demands for supplies of military equipment meant that the civil industry was drawn into the defence plan to an unprecedented extent. As a result certain conflicts which had previously been latent were brought to a head. It became apparent on many occasions in the 1930s that the private sector of the economy was dissatisfied with the way in which the military organization worked in acquiring military equipment. The problems were due in part to the traditional division of the armed forces into different branches of the services which were greatly attached to their independence and which were unwilling to subordinate themselves to central bodies. The establishment towards the end of the 1930s of a defence staff and a supreme commander marked a retreat – albeit with reluctance on the part of the navy and the air force – from the conventional separatism. However, private industry took the view that the military administration as a whole did not act rationally enough and was not sufficiently abreast of the times as far as orders, production and the maintenance of its equipment were concerned.[7]

As a result of the establishment of a war administration in the years 1939–1940, leading spokesmen for the private sector of the economy – in their major roles within the war agencies – were to acquire a greater influence over the whole field of military equipment supplies (see pp. 173 et seqq.). For example IK, through its hold over raw materials and industrial capacity, acquired the real power of decision as far as production was concerned. It had the task of achieving a rational acquisition system without being hampered by considerations of military tradition.

The acquisition of ammunition was the sphere in which the need

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[5] IK KR B:1 dnr h 367, 2532. RA.

[6] Statsmakterna och folkhushållningen ... (SOU 1941:18), pp. 268–269. SFS 293/39.

[7] Månsson, O., Ekonomisk försvarsberedskap inför 2. världskriget.

for a single common body was regarded as most acute. There was often direct competition between branches of the services over ammunition orders. On 1 March 1940 a proposal about the acquisition of ammunition was put forward jointly by IK and the Emergency Expenditure Audit Board. Thereafter the King in Council set up the National Ammunition Board (SAN) which came into operation on 22 April 1940. SAN's task was "to acquire goods which are suited to production in series or mass production, above all ammunition."[8] In consequence the board took over most of the work of IK's war industry department. In addition the board was to assist the administrations in making their purchases, a function which was in the main taken over by IK's price bureau after 1940. By virtue of the fact that SAN was directly responsible to the King in Council it was an ancillary administration for the branches of the services.

The establishment of SAN constituted the first important transfer of the functions of decision-making and purchasing to a body dominated by civilians. Another important step was taken on 24 May 1940 when the engineering committee of the armed forces was set up. The prelude to this was a joint letter of 2 April 1940 from the Emergency Expenditure Audit Board of 1940 and IK to the Ministry of Defence, in which unfavourable comment was made on the great deficiencies in the defence's own production of military equipment. The Secretary of State at once appointed a committee to plan a reorganization. The chairman of the committee was R. Blomqvist, the chairman of the audit board. After a swift inquiry which was very critical of the way in which the defence's own factories and other industrial establishments were run, the board for maintainance of defence equipment was set up as soon as 24 May 1940. Its task was "to take charge, under the King in Council, of the operation, as regards technology and finance," of the following factories and establishments:

armouries belonging to the ordnance depots
land defence ammunition factories
gunpowder factories belonging to the defence organization

[8] Kungl. Maj:ts prop. 247/1940 samt statsutskottets utlåtande över densamma den 28 maj 1940. See also note 5 above.

land defence and air force laboratory and adaptation centres
the Torpedo Works of the National Defence Factories
Carl Gustafs stads munitions factory
the defence organization's chemical establishment

Between 1 January 1941 and 30 June 1942 the Signalverkstäderna (signal works) in Sundbyberg also came under the control of the board. On 1 January 1942 the ordnance depots were handed back to the army administration's ordnance department.[9]

On 29 November 1940 a group of experts within the Ministry of Defence was given the task of drawing up guidelines for a reorganization of military administration. Two of the "more weighty" representatives of the civil war administration, R. Blomqvist and P. E. Gummeson, were included.[10] The Governor-General, T. Nothin, became chairman and there were also four representatives of the military council. Barely three months later, on 24 February 1941, there was produced "a report with proposals about the principles relating to a reorganization of the military administration submitted by the military administration inquiry". In the report much of the criticism of the military administration's handling of equipment matters was repeated. It was a known fact that the small grants of the pre-war period had not permitted the building up of a good stock of equipment and that the enormous increase at the outbreak of war would inevitably cause problems. However, the military administration was accused of declining efficiency, duplication of work, negligence over standardization and a lack of competence on the part of the management and staff within the administration. Centralization, coordination and increased influence for industry were required. The committee of inquiry proposed that a defence administration department of equipment should be set up, to take charge of the production of military equipment apart from ships, aircraft and tanks, and the acquisition, control and storage of all military equipment. The advantages of such a change would include the creation of entirely new possibilities of standardization, and thanks to a better overall view it would be possible to choose

[9] Kungl. Maj:ts prop. 180/1943, pp. 26–28.

[10] Skrivelse från försvarets fabriksstyrelse till gen. Thörnell 13/7 1949. Ber.v. CF I. MHA.

the right priorities over the whole field. It was proposed that "a person who is fully conversant with the problems of industry" should be appointed head of the department. On his recommendation the King in Council would appoint groups of experts recruited from the manufacturing companies. These groups would act as advisors to the head of the department and would participate in the creation and planning of military equipment production. The department would be directly responsible to the King in Council and in the event of disagreement between the department and the defence command, which had to initiate manufacturing or investigation, the question was to be referred for decision to the King in Council.[11]

The proposals of the military administration inquiry of 1940 became the basis for a debate which continued throughout the ensuing period. The main question was whether a central administration should be responsible for ordering military equipment, or whether this responsibility should remain with the military authorities.[12] The civilian representatives had dominated the inquiry and in spite of harsh criticism from military quarters developments during the period which followed meant that SAN was transformed into a central administration for the acquistion of military equipment with an ever expanding sphere of authority. Important steps in this direction were taken from the end of April 1942 when SAN was given new tasks in supplementary instructions and in consequence was renamed the National Military Equipment Board at the turn of the budget year on 1 July 1940. Amongst other things the responsibility for the acquisition of gas protection equipment and quartermaster's equipment manufactured by the engineering industry was transferred to the new board.[13]

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[11] Militära förvaltningsutredningen (1940 års), passim.

Ex. nr 59 Fst H Marinoperationsavdelningen F II:2:4. KrA.

[12] PM angående militära förvaltningsutredningen. Fst H Kvartermästaravdelningen F XI:3 FCA

PM angående professor Woxéns förslag till "Försvarsväsendets krigsmaterielverk" i anslutning till diskusioner under slutet av 1941–februari 1942. IK KR H 8/42. RA.

Betänkande med förslag rörande den centrala förvaltningsverksamheten inom försvarsväsendet avgivet av 1941 års militära förvaltningsutredning den 28 mars 1942 (SOU 1942:16), pp. 23–63.

[13] Kungl. Maj:ts prop. 180/1943, pp. 26, 114–116.

The developments were in line with the new organization proposals which had been put forward on 28 March 1942 by the military administration inquiry of 1941, a one-man inquiry by the Under-Secretary of State in the Ministry of Defence, T. Wärn, set up in the autumn of 1941 (SOU 1942:16). The proposals of the man who conducted the inquiry were in the main based on the inquiry of 1940 and were to form the basis for the fundamental reorganization of the military administration which took place in the years 1943–1944. As regards the acquisition of equipment, a Government department, the Swedish Board of War Supplies (KKV), was set up on 1 July 1943. A Director-General was put in charge of the board, with a deputy Director-General, a chief engineer and three assistant directors who were directly responsible for the five divisions of the Board (see below). Alongside this there was an advisory body, the KKV Council, whose members were appointed by the King in Council and consisted of three members proposed by the commanders-in-chief of the branches of the services, one by the chief of the defence staff, one representative of civil defence, one representative of the Swedish Employers Association (SAF), one for the Swedish Confederation of Trade Unions (LO) and at least six representatives of civil industry. The Supreme Commander had the right to issue directives connected with preparedness for war and military operations. In the event of a disagreement between the Board and the Supreme Commander the question was to be referred by the latter for decision to the King in Council. The main task of the Board was described in the first paragraph of its terms of reference as being "to prepare and implement the measures required for the defence's needs for equipment necessary for its preparedness for war and other requirements to be met in the best way possible in accordance with plans laid down or directions from the authority in question."[14] KKV's work was distributed amongst five divisions: an industrial division, a technological division, a control division, a supply division and an administrative division. The industrial division dealt with questions of war industry planning and the acquisition of military equipment. The planning was designed to create prospects of a viable war industry production, even in war.

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[14] Kungl. Maj:ts prop. 180/1943, pp. 111–170. Provision regulations for KKV were issued on 30/7 1943 and confirmed 15/6 1944 (SFS 339/44).

The equipment to be acquired was equipment which a) was of a mass-produced or standard character, or b) could be regarded as definitive as far as technology was concerned, or c) which it was thought should be acquired centrally if there was to be completely efficient war industry planning. However, the planning for and acquisition of such items as aircraft, warships and tanks remained the task of the respective administrations, as was the case with certain weapons, vehicles, bridge and fortification equipment, et cetera. In fact there had to be collaboration with KKV.[15]

In comparison with SAN, KKV got a more extensive sphere of authority but it did not go as far as the military administration inquiry of 1940 had recommended. After the inquiry had presented its proposals the new shape of the whole defence organization had in fact been made clear by the committee on national defence of 1941 which took the view that less of the responsibility for the military efficiency of the branches of the services should be transferred to the Supreme Commander than had been recommended by the military administration inquiry of 1940. The general centralization of the armed forces constituted a major argument in favour of a central acquisition of equipment. Thus some of the force of this argument abated.[16]

So on 1 July 1943, simultaneously with the establishment of KKV, the National Defence Factories (FFV) with the National Defence Factories, Head Office as the administrative unit, were set up to replace the board for maintainance of defence equipment. The administration was organized in a similar way to that of KKV, i.e. with a Director-General in charge and an advisory body dominated by representatives of ''industrial and technological expertise''. The position of the Supreme Commander in relation to the administration was the same as in relation to KKV.[17] At that stage the following

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[15] Stencilerat föredrag vid krigsindustriombudskonferens 23–28/10 1944, pp. 15–17. IK EI:32 dnr h 711/44. RA.

[16] Betänkande med förslag rörande den centrala förvaltningsverksamheten inom försvarsväsendet. (SOU 1942:16), pp. 36–39.

[17] SFS 559/43, 341/44. For a long time there was discussion as to whether the defence organization's factories should be run by companies or public corporations. When the head office of the National Defence Factories was set up the latter alternative was chosen.

Palme, R., Försvarsväsendets verkstadsnämnd (in:Stv. T. 1942, pp. 286–289)

establishments were included: the ammunition factories in Marieberg, Karlsborg and Zackrisdal, Carl Gustafs stads munitions factory, Åkers powder factory and the gas mask factory associated with it, and the torpedo works of the national defence factory in Motala.[18]

Because of the reorganization enacted by the Swedish parliament in 1943 the system for the supply of equipment for the armed forces took on a different aspect. First of all a centralization took place which was designed to facilitate a broader view, coordination and a rational production. In this connection there was a departure from the traditional distribution of responsibility amongst the different branches of the services. This development was connected with a general tendency within the defence organization which was ultimately brought about by a change in the actual conduct of the war, by virtue of which the branches of the forces had been forced to collaborate in their operations to an ever increasing extent.

The other major change was the increase of the civilian element in the military administration. KKV and FFV were to be dominated by what was often referred to as "technological and commercial expertise". One principle which was enunciated was that "efficient industrialists" were to be appointed to leading posts in the departments to facilitate collaboration with civil industry and to achieve a rational production in accordance with the principles which had been developed there.[19] The increased influence of commercial and industrial life was a reflection of its increased importance for defence. By virtue of the fact that military operations became more and more mechanised and made ever increasing demands on a country's production capacity, industry's potential became directly decisive for the effectiveness of the armed forces. It was natural that the new key figures would acquire greater administrative influence. The blockade of Sweden and her dramatic rearmament placed the country in a situation which was similar to that of the warring countries. The development in the latter countries exhibited similar characteristics and possibly also acted as model for the Swedish organization.[20]

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[18] Skrivelse från försvarets fabriksstyrelse till gen. Thörnell 13/7 1949. Ber.v. CF I. MHA.

[19] Kungl. Maj:ts prop. 180/1943, pp. 27–30.

[20] "As a result the development ... was channelled along a course the practicality of which appears to me to be confirmed by the experience not only of our own country

Ragnar Blomqvist. Managing director of the Thule Group of Companies. Head of the Industry Commission's war industry division 1939–1941, chairman of the National Audit Board of Emergency Expenditure 1941–1943, chairman of the Board for Maintainance of Defence Equipment 1940–1941. (Svenskt Pressfoto).

Per Egon Gummeson. Managing director of Höganäsbolagen. Member of the Industry Commission 1939–1941, chairman of the National Ammunition Board 1940–1943, chairman of the engineering board of the armed forces 1941–1943. (Pressens Bild).

Gustaf Söderlund. Managing director of the Employers Association 1931–1941, chairman of the Employers Association 1943–1946. Chairman of the Industry Commission 1939–1942. (Svenskt Pressfoto).

Sven Schwartz. A director of Bolidens Gruv AB, managing director of Stockholms Bryggerier from 1941. Chairman of the Industry Commission 1942–1946. (Pressens bild).

The photographs on this page are of representatives of the private sector of the economy who were appointed to leading positions within bodies set up to control industry and the acquisition of military equipment.

Germany's development was of particular interest, and to a certain extent it ran parallel to the development in Sweden.[21]

After the reorganization on 1943 the development became stabilized, but this did not mean that the traditional conflicts disappeared.[22]

B. General conditions for rearmament

1. *Raw materials*[23]

During the pre-war period Sweden's supplies of iron and steel were based to a great extent on collaboration with countries abroad. Imported coal and coke were used in the steel works, as were considerable quantities of foreign pig-iron. Quality steel and ore were exported from Sweden. The most important partner in this collaboration was Germany, and since trade with this country continued comparatively undisturbed, the outbreak of war did not affect the supply of iron and steel. In order to compensate for the disappearance of imported fuel it became necessary to change over to charcoal and

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but also of the countries at war. Thus in certain foreign countries, as far as the acquisition of military equipment is concerned, an ever increasing influence has had to be accorded to the technologists.'' Kungl. Maj:ts prop 180/1943: Departementschefen angående förstärkningen av centrala anskaffningsmyndigheter, p. 28.

[21] The German development was also noted in military quarters but there it was manitained that it meant no significant reduction in the military authorities. En orientering av arméns tekniska upprustning, föredrag av Fälttygmästaren, Översten m.m. B. Hedqvist nov. 1942, Arméförv. Tygdep. F II KrA.

[22] The criticism of KKV which came from military quarters was often very harsh. Protokoll vid sammanträde 13/10 (1944) inför ÖB med representanter för försvarsgrensförvaltningarna angående utvidgning av KKV:s befogenheter.

Douglas, A., Jag blev officer, p. 389.

[23] Except where otherwise stated this section is based on the following accounts:

Björnberg A., (red.), Hur Sverige ordnade folkförsörjningen under andra världskriget, pp. 110–111.

Schwartz, S., Den svenska industrien och kriget. Föredrag hållet i Utrikespolitiska Institutet 15/12 1943.

Råvaruförsörjningen PM 28/2 1945. Fst kvmavd.: Övriga handlingar efter ämne F XI:2. FCA; Kristidspolitik och kristidshushållning i Sverige under och efter andra världskriget I (SOU 1952:49), pp. 464–523.

See also Kristidspolitik och kristidshushållning I (SOU 1952:49), pp. 457–459.

wood to a great extent – a change which was costly but not impossible; by 1945 large parts of industry had made this change. Exporting steelworks had to adjust their production so as to compensate on the whole for the disappearance of the imports. Through these measures the Swedish market was able to be supplied with about a million tons of iron and steel a year, which was the normal consumption. Through IK's allocation of the deliveries from the steelworks according to priorities the most urgent needs were met, e.g. for military equipment, and no shortage of iron or steel occurred. There was in fact an exception to this in the case of ship plate, but this was due to a shortage of rolling-mill capacity.

The position was more problematic as far as steel's alloy metals were concerned. Before the five-year construction period 1942–1946 the demand for alloy metals was estimated as follows (figures in tons):

Table 6. *Estimated metal requirements for military acquisition of equipment 1942–1946.*

	Army admin.		Naval admin.	Air Force admin.	SAN–KKV	Total
	Ordnance dept.	Quarter-master dept.				
Antimony	3.9	3	9	4	255	279
Cadmium	6.9	–	–	4.8	–	12
Magnesium	22	–	1.5	222	–	246
Chromium	196	630	187	112	40	1 165
Manganese	201	5	154	83	365	808
Molybdenum	30	2.5	24	5.6	–	62
Nickel	333	225	131.5	65	–	755
Titanium	–	–	5	6	–	11
Vanadium	9	–	0.7	1.8	–	12
Tungsten	–	–	3.9	16	–	20

Note: The metal required for the manufacture of 6,500 3-ton Volvo lorries has been included for KATD; it was not expected that they would be purchased by KATD, but it was thought necessary to manufacture them to provide a basis for recruitment.

Source: Metal requirements for the military acquisition of equipment during the five-year period 1942–1946. IK KR H 73/42 Fst Marinop. avd. F II:2:2 KRA.

As is shown, there was no question of large quantities, but because they were necessary for the manufacture of certain qualities of steel, e.g. armour-plate, the metals were in fact of great importance. In normal circumstances they were imported into Sweden. Before the war broke out small quantities of manganese and tungsten were mined domestically, and during the war new mining of nickel, vanadium, cobalt and tungsten was started. Up to the time when this mining produced results reliance was placed on the fairly large stocks accumulated by the National Reserve Supply Board. Thanks to strict rationing and mutual exhanges of alloy metals, the most vital needs could be met. The most important example of the fact that problems still existed was the discussions about the molybdenum which was required in connection with the plans for building cruisers.

Before the cruisers (Tre Kronor and Göta Lejon) were built, discussions had been going on ever since 1940 between the naval administration and IK about raw material requirements. On 23 September 1941 the naval administration made a request to the Reserve Supply Board that certain quantities of alloy metals, including molybdenum, should be placed at the disposal of Bofors for building cruisers. The matter was remitted to IK who turned down the application for the time being. Even the Minister of Defence was of the view that the decision ought to be postponed until the middle of 1942 (when the new resolution on defence would be to hand and inquiries into the matter would have been concluded).[25]

Sweden's supply of molybdenum was based on imports from Norway, where Swedish-owned mines produced about 55 tons a year. Bombing and threats of seizure (which were implemented in 1943) made the supply uncertain. The results of attempts to step up the Norwegian mining and to introduce domestic mining were discouraging.[26] In the autumn of 1941 it was estimated that about 50

[25] PM för sammanträde samt protokoll 8/12 1941 från sammanträde på IK den 25 november 1941 angående större marina byggen. IK KR PM 15/41. RA.

[26] The naval administration participated in the search for workable deposits. The reference to one of these in December 1941 was prompted by a desire to justify the granting of permission for the war reserve of molybdenum to be used. PM angående molybdenfrågan. 14/12 1941. Y. Schoerner (head of the naval administration's engineering department) Fst H Marinop. avd. F II:2:2. KrA.

According to SOS Industri no molybdenum was mined until 1945 when 7 tons of ore concentrate are recorded.

tons of molybdenum could be made available for military requirements. It was estimated that 21 tons would be used in building the cruisers. In this situation it was necessary, said the planning authorities, that allocations according to priorities should be made to the various defence requirements. The other large field in which armour-plate was needed was tank production and the question was whether a greater – and in any event more rapid – growth of the defence potential might not be achieved by giving priority to this. But even within the framework of the naval production programme equal advantages might be gained by concentrating efforts on building modern destroyers instead of cruisers. IK took the view that the choice between these priorities must be made in the first instance by the Supreme Commander, but did not conceal its opinion that the building of the cruisers ought to be postponed. In naval quarters this argument found no favour. They offered to exchange the molybdenum in the armour for nickel which was a metallurgically inferior solution.[27] However, IK was still sceptical; the cruisers would require 9 per cent of the estimated total supply of nickel during the five-year period 1942–1946.[28]

It is difficult to determine whether the shortage of molybdenum was in fact the decisive reason for the postponement of the cruiser programme; there were also other misgivings about this big project. However, it is quite clear that the shortage of alloy metals was an important contributory factor, and this question was to a great extent at the centre of the debate from the autumn of 1941.[29]

Of the other metals it is copper which is primarily of interest, since it is a strategically important metal, especially for the manufacture of ammunition. Before the outbreak of war Sweden produced about 11,000 tons a year, which constituted about a quarter of the country's consumption. During the war years it proved possible to increase production so that the following figures were achieved:

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[27] C. G. de Mare till Henning Quistgaard 23/12 1941. Fst H Marinop. avd. F II:2:2. KrA.

[28] Thörnell till konungen angående fartygsbyggnader för flottan 3/4 1942. Fst H Marinop. avd. F II:2:2. KrA.

IK till konungen 9/6 1942 + bil. 1, Metallbehov för militär materielanskaffning under femårsperioden 1942–1946. 11/5 1942 (Ericson). Fst Marinop. avd. F II:2:2. KrA.

[29] Cf. Ericson, pp. 154–159.

	1940	1941	1942	1943	1944	1945
tons	12 887	13 507	16 666	16 667	16 357	20 649

This increase was achieved by increasing the mining at Government as well as privately-owned deposits in the mining district of Västerbotten. Large costs were incurred in expanding the mining. Amongst other things a cableway 100 kilometers long was built for transport between Kristineberg in Lycksele and Boliden. Since the imports of copper were so insignificant, stringent controls had in fact to be imposed on the consumption of copper. The civil sector was of course primarily affected. Attempts to replace copper were made in several ways, e.g. by using scrap metal in the manufacture of brass, using other metals for electric wire, and manufacturing casings of steel instead of brass.[30] Thanks to measures of this kind, in the years 1943 and 1944 the annual consumption fell to about 20,000 tons. At that time 9,000 tons were kept in reserve, 5,000 of which were intended as a war reserve.[31] Against this direct military requirements amounted to about 3,500 tons a year – up to 70 per cent of it for the production of ammunition (it was estimated that for the rearmament over the five-year period 1942–1946 about 14,000 tons were required).

There is little reason to suppose that the shortage of copper constituted a serious threat to Swedish rearmament. In fact the electrification of Sweden's rural areas continued during the war, to a great extent in accordance with the long-term plans, which proves that margins still existed.

During the years before the war and during the war itself the supply of aluminium was of importance for all countries with their own aircraft industries, which require supplies of this metal.[32] Sweden's initial position was not ideal, since there was no aluminium production based on domestic raw materials before the outbreak of the war.

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[30] KKV: Utkast till redogörelse 1944. Ber.v. CF I. MHA.

[31] Råvaruförsörjningen. PM 28/2 1945. Fst kvmavd.: Övriga handlingar efter ämne F XI:2. FCA.

Thörnell till konungen angående fartygsbyggnader för flottan 3/4 1942. Fst H Marinop. avd. F II:2:2. KrA.

[32] Cf. Milward, The Fascist Economy in Norway (1972), pp. 171–208.

The domestic production, which then catered for about one-third of the consumption, was based on a semi-manufactured product, aluminium oxide, which was brought in from Norway. Apart from this the demand was met through imports. Because of the needs of the aircraft industry, great activity took place after the outbreak of war so that the country would achieve a secured domestic production of aluminium. After negotiations IK made an agreement with Svenska Aluminiumkompaniet in 1941, and in June 1943 a new establishment was opened in Kubikenborg. There aluminium oxide was produced from andalusit, a mineral which was mined in Boliden. Aluminium was produced in the same place in a new factory which, together with the old one in Avesta, had an annual capacity approaching 4,000 tons.[33] As a result it was possible to reverse the downward trend in production:[34]

	Annual production of aluminium						
	1939	1940	1941	1942	1943	1944	1945
tons	2 788	2 276	2 589	1 572	3 857	3 914	3 540

It is estimated that the aluminium required for military purposes during the period 1942–1946 amounted to a total of 3,532 tons. Thus the domestic production capacity was sufficient, with a good margin for military requirements.

It also turned out that the international supply of aluminium was not as short as had been feared. Thus large quantities could be imported into Sweden, and no direct shortage situation ever arose.[35] It was already possible to abolish rationing in 1944.

The initial position as far as lead was concerned was somewhat like the initial position as regards copper and aluminium. There was no domestic production of lead before the war, but there were raw materials available for production. The comparatively large stock of

[33] As regards cryolite and electrodes, which were necessary for the production of aluminium, the country became self-sufficient somewhat later in the war.

[34] SOS Industri.

[35] In 1943 about 3 million tons were imported and in 1944 about 1 million tons, practically all from Norway.

lead, about 30,000 tons, dwindled during the first two years of the war to about 12,500 tons. On 1 November 1941 the country's lead was requisitioned and strict rationing was introduced. In the meantime extensive work was carried out to achieve a domestic production. IK and private companies collaborated in this work. A deposit in Norrbotten in Lapland was prepared, industrial buildings and houses were erected, a power station with cable was built, and a smelting plant in Rönnskär was able to function at the end of 1943. With this the critical period was over. During the final years of the war the following quantities of lead were produced:[36]

	1943	1944	1945
tons	4,615	13,975	17,167

In spite of the fact that the strictest economy in the use of lead had been ordered during 1942 and 1943, it was possible to allocate to defence the quantity of about 10,000 tons which had been requested for the five-year programme.

The supply of tin was more problematical, in that there were no domestic deposits of ore to build on. Thus the economic administration of tin was a question of how rapidly one dared to reduce the stocks. When the possibilities of imports ceased at the beginning of 1940 the country's stocks of tin amounted to about 3,500 tons. Two years later this had been halved to about 1,800 tons. When estimates were prepared in 1942 IK reduced the military allocation to 265 tons from the 450 tons which had been requested. In fact a further 65 tons were added in 1944 for the cruisers. In spite of the shortage the armed forces considered it possible to meet the most urgent needs. Tin could often be replaced by other metals. This applied to a great extent to bearing metals for slide bearings, the most important field of application for tin. Instead it was possible to transfer to ball and roller bearings to a large extent.

As far as zinc was concerned, the supply was never seriously threatened. Thanks to imports from Germany the comparatively large stocks which were available at the outbreak of war could be

[36] SOS Industri.

kept intact. A cloud appeared in the sky when trade with Germany ceased towards the end of 1944, but the situation did not have time to become serious before the advent of peace.

Summarising the situation, it can be established that the supply of raw materials for the production of military equipment during the first years of the war was hardly threatened. Thanks to imports which were stepped up until the blockade of 1940, large reserves were available both at the National Reserve Supply Board and in private companies. In 1941 the position became more serious. The civil consumption of metals was cut down and the list of goods requisitioned was increased by the addition inter alia of copper, tin, lead, zinc and (in the spring) chromium. In connection with the discussions of the Committee on National Defence in 1941 several lists were made of the armed forces' requirements of raw materials, and IK examined these lists and expressed its views on them. It then came to light that the greatest problems existed in relation to alloy metals for armour, and in relation to copper, tin and lead. In addition, the rubber situation presented difficulties. During 1942 and 1943 IK made plans for the supply of raw materials. At the same time the commission took action by working from the beginning of the war for the utilization of domestic resources of raw materials, and to this end entered into a large number of production agreements with private companies. The agreements contained guarantees of work and prices and, in certain cases, subsidies. Guarantees were also given for the allocation of energy and release from the war-profits tax (appendix 2 contains a list of such agreements).

Because there was rationing and increased domestic production the situation in relation to steel and metals never became so grave that urgent military production would have to be cancelled on that account. Rearmament requirements were naturally given the highest priority.

Certain other requirements of raw materials which were important for rearmament have been omitted from this account because they only concerned the engineering industry indirectly. For example, this applies to the production of explosives, in relation to which the domestic production had to be increased; but here there were no bottlenecks in ammunition production. Nor has there been a more thorough treatment of the rubber supply. The supply was very short

and was to a great extent dependent on uncertain imports from Germany. This resulted in restrictions on the transport of the armed forces, tyres of lower quality and a depleted war reserve. However, the rubber shortage also did not in itself restrict the rearmament of the services.[37]

2. *The labour force*

The development of the Swedish labour market during the war years is a large and very interesting field of study, which well deserves an account of its own. In this context the subject will only be touched on, and only in relation to those parts of it which concern the engineering industry, particularly the question of the supply of military equipment.

The war years as a whole were characterized by a big demand for labour. From an economic point of view 1939 was a good year, with the lowest unemployment for two decades. The first months of the war constituted a period in which there was an almost hectic upward economic trend. Because of the blockade in 1940 problems arose for the export industries and other sectors of the economy which were in one way or another dependent on free contacts with the West. The result of this was a slowing down of the demand for labour. However, fairly soon new demands manifested themselves: the replacement industries began to function, military equipment was to be produced, the adjustment from imported fuel to wood made heavy demands on labour in the forests and for transport.[38] In addition there was extensive conscription for emergency service duty; even during periods when the tension was comparatively relaxed around 200,000 men were taken away from the civil labour market.[39]

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[37] Råvaruförsörjningen. PM 28/2 1945. Fst Kvmavd. Övriga handlingar efter ämne F XI:2. FCA.

[38] The labour market during the war years is discussed inter alia in:

Utredningar angående ekonomisk efterkrigsplanering: I (SOU 1944:7). 1. Industriens arbetskraftsförhållanden 1/9 1939–1/9 1943:

Schwartz, passim;

Kristidspolitik och kristidshushållning I (SOU 1952:49), pp. 1135–1158.

[39] The highest call-up figures, of over 300,000 men, were recorded in the summer of 1940 and in February–March 1942. A figure of somewhat under 200,000 men was normal for the war years. Björkman, L., Operation Barbarossa, p. 473; Uhlin, A., Februarikrisen 1942, p. 196.

Thus the level of employment rose further after the "adjustment unemployment" of 1940 and 1941, and the unemployment figures fell to a level which was entirely comparable with that recorded in the post-war boom period.[40] During 1942 one could speak with justification of a real shortage of labour – towards the end of the war there was again something of a decline in demand. Throughout the whole period there was remarkable mobility on the labour market.

For reasons which will be dealt with more thoroughly in a later chapter, the engineering industry was one of the few branches of industry which asked for an increasing number of workers throughout the whole period of the war. In consequence the level of unemployment recorded within the engineering trade union was low.[41] Chapter IV will show how that branch expanded sharply during the first year of the war while the number of workers in the country as a whole declined.

Thus there was an influx of labour into the engineering industry from other branches of industry. In December 1939 the Swedish Metal Trades Employers Association already asked its member companies to train reserve staff in order to meet the growing demand. The labour market commission's adult training programmes for "the rehabilitation and training of semi-skilled workers for the engineering industry" was of great importance in increasing the engineering labour force. From April 1940 onwards such training courses were organized in Stockholm, Gothenburg and about fifteen other places. Those taking part were unemployed people aged sixteen and over. One condition was that the men were exempt from military service. In addition certain men over the age of forty who were liable for military service did in fact take part, as did women and – after 1942 – foreigners (above all Norwegians). The programme reached its peak in 1941 when 2,771 people were discharged on completing the course.[42] A total of about 10,000 people completed such courses.[43]

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[40] Holmberg, P., Arbete och löner i Sverige, p. 32.

[41] In 1940–1941 the unemployment figure was about 5 per cent which was somewhat higher than the figures for 1936–1939. Thereafter the level of unemployment fell and in the years 1942–1945 the figure fluctuated around 2–3 per cent. Olsson, U., Lönepolitik och lönestruktur, p. 20.

[42] Kristidspolitik och kristidshushållning I (SOU 1952:49), pp. 1149–1150.

[43] Öhman, B., Svensk arbetsmarknadspolitik p. 119.

Thus the engineering industry was apparently able to attract a large number of new workers during the war years. Nor did the greatest shortage of labour occur in this sector of the labour market, but rather in forest felling and to a certain extent in the steel works.[44]

However, there was an additional factor, viz. conscription. Although generally speaking there would have been labour available, conscription, which occurred periodically and unforeseeably, must have disrupted industry severely. However, with regard to the part of the engineering industry which was engaged in the production of military equipment, there were possibilities of avoiding these problems. Before the war there had already been provisions for the exemption of certain people from military service if it was in the interest of society that they continued their civilian duties instead.[45] From June 1940 the procedure in such matters was centralized in the National Board of Economic Defence, and in September of the same year they were taken over by the newly established national labour market commission, statens arbetsmarknadskommission (SAK). The transfer of this task from military to civilian authorities illustrates the increased importance which was attached to the nation's total economic activity for the defence forces.

The basis in constitutional terms of SAK's deferment activity was the so-called deferment proclamation of 1940 (no. 717 in SFS). The second paragraph provided that "the deferment of conscription for military service may only be granted to conscripts whose employment in civilian occupations is unavoidably necessary in order to secure the smooth running of the national economy or to avoid changes which would be more keenly felt in society generally or to maintain operations at plants listed in the register of war industries or which are otherwise of extreme importance for the country's military or economic preparedness."[46]

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[44] The female element in the industrial labour force increased within the ore-mining and metal industry group from 10,275 on 1/9 1939 to 15,796 on 1/9 1943. Above all it was the engineering and electrical works which employed women. On the other hand the total number of female workers in industry did not increase during the same period, which was due mainly to falling employment in the textile and clothing industry. Utredningar angående ekonomisk efterkrigsplanering: I (SOU 1944:7), pp. 12–25.

[45] On the exemption system see Betänkande med förslag till det militära uppskovsväsendets ordnande (SOU 1944:63), pp. 9–14, 35–47, 82–85, 123–128 et passim.

[46] SFS 1940 nr 717.

The register of war industries mentioned in the constitution included about 400 engineering works when the war broke out, and later further additions were made to it.[47]

Apart from the question of deferment SAK was to deal with matters involving terms of respite and the granting of home leave. These exemptions from military service were of a more temporary nature and were for a maximum period of six months. A further form of short-term exemption from service was the collective granting of home leave. In reaching its decisions SAK collaborated with the recruiting and replacement office of the armed forces, and when assessing the degree of urgency, collaborated above all with KKV and the mobilization division of IK.

It is not easy to gauge the extent of the exemptions which were granted or the way in which the practice developed as far as they were concerned. It has become apparent in various ways that it was the normal practice for companies which were involved in the production of military equipment to apply for exemption from conscription for sections of their personnel. There is nothing to indicate that their requests were not met to a great extent. There are good reasons for assuming that these engineering works were given high priority in SAK's decisions.[48]

What is apparent from the foregoing is that the production of military equipment in general terms does not appear to have been hampered by a shortage of labour. However, this does not exclude the possibility that difficulties may have arisen in special cases which could not be solved by retraining courses or exemptions. For example, when it was a question of stepping up the construction and production of complex and new military equipment, a shortage of personnel with experience and knowledge in these fields naturally occurred on numerous occasions. As regards the production of aircraft the problems were accentuated by the fact that a large number of American tecnicians returned to the U.S.A. at the outbreak of war.[49] Likewise, it is apparent that the supply of design engineers and

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[47] IK KA EI:6. Akt 69 dnr h 418. RA.

[48] Sammanfattande historik ... Ber.v. CF I, p. 17. MHA.

SAK's report governed the department's attitude in cases in which an application for exemption was made on the ground of work. See Kellgren, pp. 22–24.

[49] Söderberg, p. 253.

draughtsmen constituted a bottleneck in the building of new destroyers and cruisers.[50] Thus in certain cases a shortage of labour did occur, involving qualified personnel who were necessary for the bigger projects.[51]

3. *Fuel and power*[52]

During the period between the wars the Swedish economy became more and more dependent on imported fuel. Imports of coal, coke and liquid fuel played an ever increasing role, not least for industry. The balance between imported and domestic fuels can be summarised as follows for 1938, the last pre-war year:

Imports	*Domestic production*
6 million tons of coal	17 million cu.m. firewood
2 million tons of coke	430,000 tons of coal
740,000 cu.m. petrol	25,000 tons of fuel peat
720,000 cu.m. heavy oils	22,000 cu.m. motor spirit

Expressed in comparable fuel values these figures mean that out of a total consumption equivalent to about 13 million tons of coal, about 4 million tons were provided by domestic production. Thus the basic features of Sweden's fuel supply problems were clear: to make it possible to secure fuel for heating and fuel for transport and industry it would be necessary on the one hand to maintain the imports as far as possible and on the other hand to replace imported fuels with domestic fuels.

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[50] PM 11/5 1942 (IK) Fst H Marinop. avd. F II:2:2. KrA.

[51] Steckzén, B., Bofors, en kanonindustris historia, pp. 721–724.

[52] Except where otherwise stated this section is based on the following works:

Kaijser, F., Bränsle- och kraftförsörjningen (in: Hur Sverige ordnade folkförsörjningen under andra världskriget), pp. 117–132;

Schwartz, passim;

Statsmakterna och folkhushållning ... (SOU 1950:50), pp. 117–132.

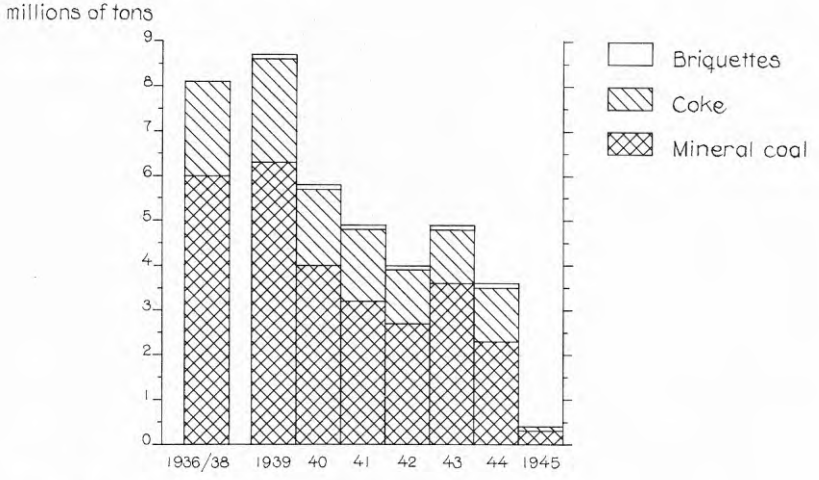
Kristidspolitik och kristidshushållning I (SOU 1952:49), pp. 800–802, II (SOU 1952: 50), p. 883.

Research into the fuel supply during the war years has been carried out at the Institute of Economic History at Gothenburg University. The coal imports inter alia have been investigated by Sven-Olof Olsson.

In the years 1936–1938 the coal fuel which was imported amounted to 8,1 million tons a year, about 75 per cent of which was mineral coal and the remainder coke. Transport difficulties and keen competition for the product prevented a stockpiling during the period of grace up to April 1940 such as had occurred with metals; thus the development of the war on the Continent and the western blockade rapidly brought about a threatening supply situation. Before the war Poland and Great Britain had accounted for 90 per cent of the imports of coal. In the war trade negotiations with Germany coal from Germany and Poland was to become one of the most important items; considerable quantities were also imported during the following years (see diagram 4).

As diagram 4 shows, the annual import figures fell to about half of the pre-war level. Stringent economizing and a change-over to other fuel still made it possible to build up stocks which were to prove extremely valuable at the end of the war. From September 1944 until after the end of the war in May 1945 the imports of coal fuel had in fact ceased completely.

Diagram 4. Imports of coal fuel.



Source: Kristidspolitik och kristidshushållning II, p. 704.

The bulk of the imported solid fuels was consumed by industry. Before the war about two-thirds of the imported fuels went to industry. At the same time coal fuel constituted three quarters of industry's total fuel consumption. Through substitution the dependence on imports was forced down to about 40 per cent in the years 1942–1944 (see table 7). By then the total fuel requirements had declined somewhat because of the fact that certain sectors whose demands for fuel were very heavy, such as the cellulose and paper industry, worked at a reduced capacity. Technologically and economically the substitution demanded great efforts but it was quite possible to implement it as long as it was not a question of producing very high temperatures, as was sometimes the case in the steel industry for example.

Thus wood felling in Sweden during the war years became one of the principle fields of operations in the national fuel supply. It required an extensive organizational apparatus and a large work effort. In order to get the felling done it was necessary during the most

Table 7. *Industry's consumption of fuel 1938–1945.*

	mineral coal and coke in thousands of tons	peat in thousands of tons	charcoal in millions of hecto-litres	wood and other fuel in thousands of stacked cubic meters	liquid fuel in thousands of tons	gas in millions of cu.m.	Total with conversions into mineral coal: in thousands of tons
1938	5,138	16.3	21.6	8,421	118	40.4	6,694
1939	5,341	16.4	20.0	9,280	142	36.3	7,021
1940	4,383	57.5	23.2	10,053	74	27.0	6,192
1941	2,539	99.1	23.1	15,223	6	26.0	5,084
1942	2,353	275.0	24.3	19,479	5	25.0	5,629
1943	2,052	538.5	26.9	17,792	5	26.8	5,252
1944	2,057	565.2	25.7	17,282	10	28.6	5,210
1945	1,747	552.6	24.2	19,940	23	25.1	5,178

Note: The following conversion figures have been used: coke 1.05; charcoal: 0.017; wood: 0.17; other wood fuel: 0.1; petrol: 1.15; motor and fuel oil and paraffin-oil: 1.5; coal gas: 0.72.

Source: SOS Industri 1938–1945.

Table 8. *Wood felling in 1937 and 1939/40–1944/45. In millions of cu.m. of piled wood.*

	1937	1939/40	1940/41	1941/42	1942/43	1943/44	1944/45
Pulpwood	25.4	12.3	9.6	9.4	15.1	12.6	10.4
Coal and fuel wood	7.9	20.0	35.2	35.2	37.3	29.1	24.6

Note: Wood for domestic use is not included.
Source: Kaijser, F., Bränsle- och kraftförsörjningen pp. 117–132.

critical period 1942/43 to conscript compulsorily for work in the forest a whole year's age group of men liable for military service. The total felling for the period is shown in the following table, in which the division from 1939 onwards has been made in terms of fuel years, i.e. from July in one year up to and including the month of June in the following year.

During the 1930s imports of liquid fuel had increased rapidly, and in the last years before the war they had amounted to more than a million tons a year, of which about 70 per cent was used for the civilian vehicle traffic. The blockade in this fuel sector had more serious consequences than the blockade in the solid fuel sector. This was due to the fact that the areas controlled by Germany could not replace the suppliers of the pre-war period so easily. Oils were bought from Rumania and the Soviet Union (1941) and from the West through the so-called safe-conduct traffic. The volume of imports during the war can be gauged from diagram 5.

The barely adaquate rations of imported liquid fuel were shared out amongst the armed forces; the navy received the black oils, and the air force and army the petrol. The same applied to a great extent to the extraction of oil and petrol from alum shale, which was started in Kvarntorp and Kinnekulle.

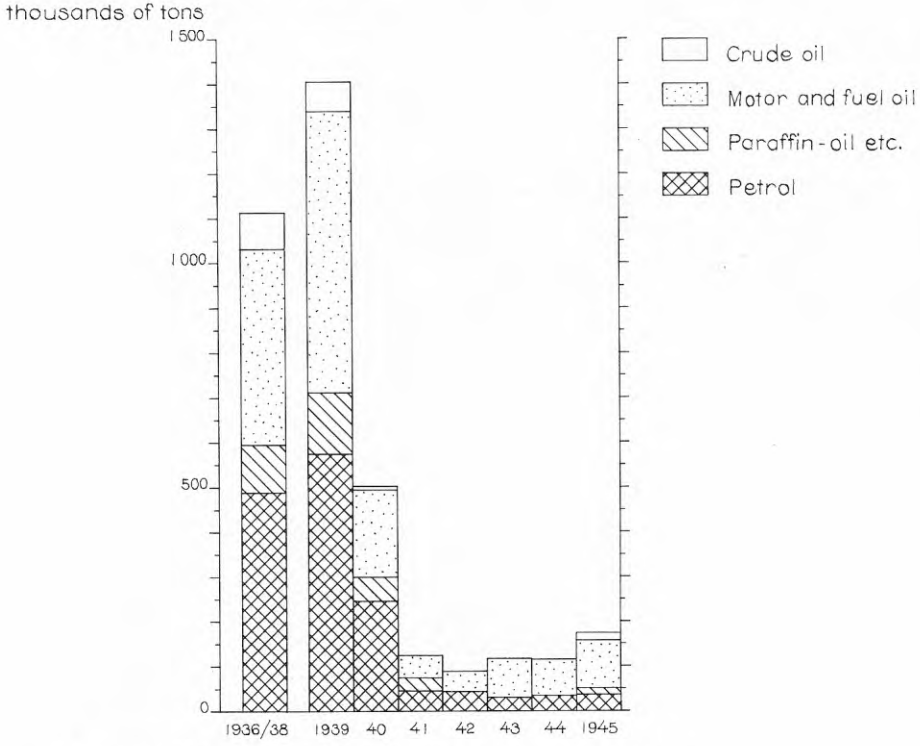
The civilian consumers of liquid fuel had to rely on substitutes. Installations of producer-gas generators were needed in industry to a great extent in order to replace oil with wood fuel. This also applied to vehicle traffic which was completely dominated by producer-gas powered vehicles from December 1940 onwards. Swedish industry rapidly produced the necessary units. Already in the spring of 1941

it was not the fuel factor which limited the motor vehicle traffic but the uncertain supply of rubber and lubricants.

For the controlling authorities industry's need for transport was the main consideration. Thus transport by lorry, expecially over short distances, e.g. to the nearest railway station, was allowed even during the period of most severe restriction. On the whole it was almost exclusively private cars which were brought to a complete standstill.

That part of industry's energy which was produced from hydraulic power – to some extent directly but mainly through electricity – was not dependent on the country's foreign trade. Thus here was a girdle

Diagram 5. Imports of liquid fuels.



Source: Kristidspolitik och kristidshushållning II, pp. 800–802.

of strength which, with its impressive extensions of power stations and electricity supply mains, became of ever increasing importance. The total supply of hydraulic power rose from about 8,700 milliard kWh a year at the end of 1939 to about 12,600 milliard kWh at the end of the war. The rapid expansion during the war years meant an invaluable supply for industry which accounted for two-thirds of the total consumption of electric power. In 1939 industry consumed 6.2 milliard kWh and in 1945 8.1 milliard. The big consumers were the paper industry and the metal industry, where the steel works played the major role. The ore mining and metal industry group consumed about 40 per cent of the whole of industry's electric power which was a greater proportion than during the pre-war period.

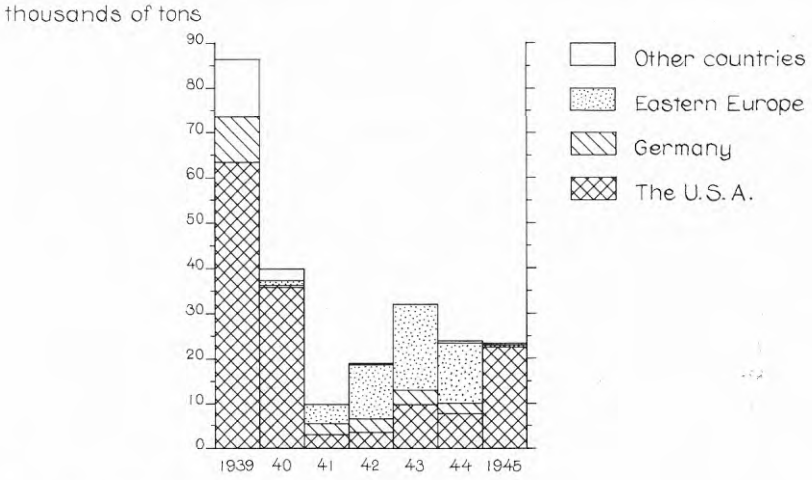
Restrictions on the consumption of electric power – for the heating of buildings, the lighting of shop windows, advertising and the like – were in force at certain periods during the war years. In the autumn of 1942 the mains voltage was reduced by 5 per cent in certain areas. The autumn of 1942 was the most critical period when the supply was threatened because the water supply had run exceptionally low. Power rationing, for which preparations had been made long in advance, came into force on 28 October. For practical reasons the rationing was imposed on the big consumers, which included industry. However, in the days which followed there was a heavy rainfall in Sweden and the rationing was already lifted on 3 November, so that it had not had time to become of any practical importance.

4. *Lubricants*

Finally, the question of lubricants will also be touched on.[53] The yearly pre-war consumption of around 60,000 tons was met entirely through imports, and therefore when the country found itself blockaded the situation looked grave. However, an inventory carried out in June 1940 showed that there were in the country stocks totalling 78,000 tons, which in spite of everything provided a fairly favourable basis, having regard to the fact that the annual consumption could be reduced to around 25,000 tons. As is shown in diagram 6, during

[53] Kristidspolitik och kristidshushållning II (SOU 1952:50), pp. 861–884.

Diagram 6. Imports of lubricants.



Source: Kristidspolitik och kristidshushållning II, p. 863.

the war years the imports amounted to about one-third of those of the pre-war period.

The domestic consumption was reduced in various ways. In this respect the most important factor was the sharp restriction of motor vehicle traffic. By collecting and purifying waste oil a considerable quantity of oil was recovered.

Large research resources and much work were invested in the production of lubricating oil from domestic raw materials. There was little success when shale was used as the basic material. After protracted attempts it became possible to extract tar fat oil from stumps of resinous pine trees; after refining it also proved useful in the more demanding of the many varied lubrication functions required in modern economic life. The tar fat oil was first blended with the lubricants in the spring of 1943, but it did not acquire any appreciable importance until the following year. In all about 12,000 tons of tar fat oil were used. Bearing in mind the extensive work which had been carried out, the results were not very impressive, and the oil also became very expensive to produce.

In fact, on the whole the lubricant problem was solved during the war years. At times the transformer oil situation was grave, with demand increasing as electrification spread, and so was the situation as regards oil for the journal boxes for the railway wagons, but in neither case did developments lead to a crisis. Allocations were made amongst industries which used mineral oils in their manufacturing, priority being given to use for food and defence. On the other hand no machine in the country had to stand idle for lack of lubricants.

5. *Machine tools*

A central preoccupation of the engineering industry was the supply of machine tools for cutting in metalwork. This applied above all to machines for drilling, grinding, turning, planing and milling. The supply of these machines to the Swedish market is shown in table 9.[54]

The pre-war period was characterized by extensive imports of machine tools, while the bulk of the Swedish production was exported. In a blockade it was not possible to channel the Swedish export production onto the domestic market since the exports and imports consisted of different types of machines which were not interchange-

Table 9. *Production, exports and imports of machine tools 1938–1945. In thousands of kronor.*

	production	imports	exports	supplied to the Swedish market
1938	13,463	10,494	7,088	16,869
1939	12,561	12,946	8,539	16,968
1940	20,276	11,764	8,415	23,625
1941	21,664	11,669	12,450	20,883
1942	30,887	11,522	17,206	25,203
1943	36,245	13,967	14,560	35,652
1944	33,238	10,730	8,843	35,125
1945	27,351	4,094	7,251	24,194

Source: SOS Industri, SOS Handel.

[54] The prices of machinery increased by about 50 per cent in 1939–1943 and were fairly stable after that. SOS Statistik årsbok.

able. The manufacturing of machine tools is a complex process; the manufacturing companies are highly specialised, and are not able to alter their production from one year to the next. Thus the outbreak of the Second World War constituted a threat to the very important supply of machine tools. What did this mean for the Swedish engineering industry and its prospects of fulfilling the military orders?

During the period before the war the imports came mainly from three countries: Germany, the U.S.A. and Great Britain.

Table 10. *The value of the imports of machine tools distributed amongst the countries of origin. In percentages.*

	The German Reich	The U.S.A.	Great Britain	Others
1938	46	30	14	10
1939	51	28	9	12
1940	50	31	–	19
1941	62	3	–	35
1942	65	–	–	35
1943	69	–	–	31
1944	68	–	–	32
1945	21	26	3	50

Source: SOS Handel.

As soon as war broke out difficulties arose as regards the imports from the West. The English at once stopped delivering machine tools, irrespective of whether they had been ordered before or after September 1939. The Swedes made vigorous but unsuccessful attempts to get the machines released. Amongst other things threats of cancelling Swedish exports of machine tools to Great Britain were made. It was also contended that Finland's need for military equipment ought to be taken into consideration, and that accordingly Swedish industry should be assured of mechanical equipment.[55]

The blockade in April 1940 made the situation worse. A comparatively large quantity of machines manufactured in the U.S.A. were received via Petsamo, but the trading/political attitude towards Sweden hardened in Washington in 1940 and during the second

[55] PM 14/2 1940 (Leire) IK VE BI:4 UT H. RA.

half of the year in practical terms only Germany and the areas which she controlled remained as alternative sources for imports. During the years 1941–1944 only Switzerland, which accounted for 10–15 per cent in value of the imports, was a source of imports which was comparatively independent of German dominance. Therefore, in the war trade negotiations with Germany machine tools were to become one of the most important objectives, just as they were to become a weighty item in the exchange of goods. In terms of value the approximate figures for the machine imports from Germany herself were as follows: 1940: 6 million kronor, 1941: 7 million kronor, 1942: 7 million kronor, 1943: 10 million kronor, 1944: 7 million kronor.[56] Although these imports were to decline in importance in comparison with the total addition to the Swedish market the picture of a Sweden dependent on German machine tool production remains. This became clearly apparent when the more long-term rearmament of the Swedish forces gathered momentum from 1942 onwards. This was the case, for example, just before the new production of engines for the air force. In February 1942 it was estimated at IK that the cost of expansion of the machine park in this connection would amount to about 7 million kronor in a single year.[57] At Svenska Flygmotor AB the prospects of acquiring machines for the Daimler-Benz 605 production were assessed as follows:

a) Machines which are necessary and which are not being produced domestically at present: 43.
b) Machines which have been ordered from abroad and which are not being produced domestically: 25
c) Machines which are desirable but which can be replaced by machines of domestic manufacture: 8.[58]

The Hesselman Motor Corporation which was to deliver injection pumps for the DB-605 engines mentioned above needed some seventy machine tools, of which 14 were ordered in Germany, for this engine. Grinding and milling machines above all, but also planing and drilling

[56] SOS Handel.
[57] PM (Mattsson) 10/2 1942. IK KR B:I 13/1942. RA.
[58] Svenska Flygmotor AB till IK 29/1 1942; Svenska Flygmotor AB till IK 23/2 1942. IK KA EI:12 dnr h 71, 105. RA.

machines, with specific dimensions and performance, had to be imported.[59] The imports did in fact materialize, mainly in the course of 1942.

As is shown in table 9, the domestic production capacity increased rapidly and sharply during the war years. Conscious of the fact that the supply of machine tools created a bottleneck, the authorities supported an extension of this capacity. Through a grant of 5 million kronor which was allocated in the budget year 1938/39, "a debenture credit for the acquisition of certain machinery and other items for industry" was created, which was allowed to be used by companies in relation to investments which were of importance for the production of military equipment. An equally large sum was allocated in the following year, but loans could now be granted to industries other than engineering works. In accordance with the recommendations of the Board of Trade and the proposals of the King in Council, the Parliament of 1940 increased the loan fund by 2 million kronor.[60]

Interest in obtaining loans from the fund had declined by this time.[61] The heavy demand for machinery e.g. for the production of ammunition, was met through the Government authorities buying machines outright and hiring them out to industry (see section C1). Nor did private industry's problems relate primarily to economic resources, but rather to an insufficient production capacity and interrupted import routes. The public fund for the acquisition of machinery does not stand out as having borne a particularly heavy burden if it is compared with the total investment within the engineering industry (see chapter IV). Because of the fact that the authorities responsible for the planning of the war industry had great influence over the distribution of the funds, it can still be assumed that they were of importance during the period before and surrounding the actual outbreak of war.

IK was also involved in the machine tool question by virtue of the

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[59] Agreements between KFF and Hesselman Motor Corp. 3/5 and 4/5 1943; Hesselman Motor Corp. till IK 10/3 1943. IK KA EI:26 dnr h 136. RA.

[60] Statsmakterna och folkhushållningen ... (SOU 1941:18), p. 283.

Handelsdep. till fullmäktige i riksgäldskontoret 30/10 1942 m.fl. IK KA EI:13 dnr h 142. RA.

[61] KATD, industribyrån. Protokoll 3/10 1940. KKV H F:1. Oreg. handl., prot. och rapp. utan dnr. KrA.

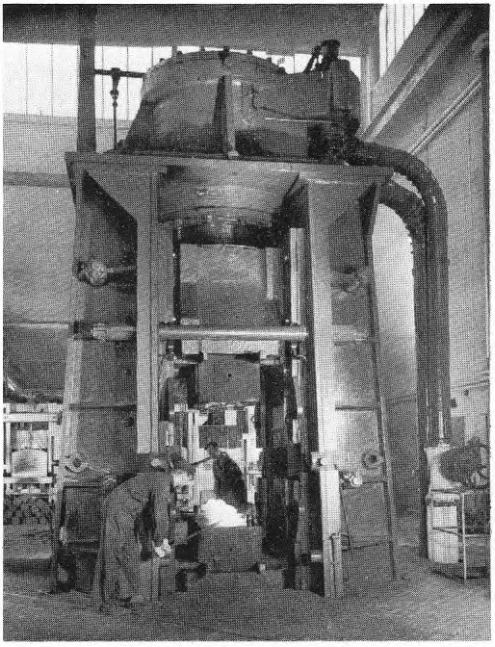
fact that the commission acted as a sort of clearing centre for machines in order to ensure that the maximum use was made of them. Before the war the National Board of Economic Defence had set up a register of engineering works machinery. This was taken over and kept up to date by IK, and it was later also to be used by KKV.[62]

From 1943, because of the increased production capacity and the fact that tools and machines had been acquired for the heavy new items of military equipment, a comparatively secure situation had been achieved as far as machine tools were concerned. In estimating what would happen if there was a total blockade of the country, IK wrote in July 1943 that, in spite of the fact that a certain quantity of imports were still desirable, it would be possible to cope with the situation through a rational use of the available machinery. It was then a known fact that the peak load limit for the engineering industry had passed and a certain general decline in the employment situation was expected.[63]

The figures in table 9 indicate that after the year 1943 there would be a surplus capacity in the domestic production of machine tools. The production capacity amounted to between 30 and 40 million kronor, while the demand fell after the peak of 1943. One estimate of Sweden's potential export capacity for 1944 came out at about 25 million kronor, while the actual figure was to be about 9 million kronor, a much lower figure than the corresponding figure for the period 1941–1943. The decline is a reflection of the problems on Sweden's most important export market, Germany, where the setbacks in the war left their mark.[64]

One great problem which affected the supply of military equipment during the first years of the war was the country's lack of capacity for heavy drop forging. When the war broke out the only really large drop hammers were to be found at Bofors, viz. one of 12 tons and one of 8 tons. The load on these was very great and for certain manufacturers of military equipment the drop forging constituted a real bottleneck. Thus vital parts of engines for tanks, torpedo boats and aircraft had to be drop forged at Bofors. In June 1940 the 12 ton drop

[62] Betänkande med förslag rörande den ekonomiska försvarsberedskapens framtida organisation (SOU 1946:19), p. 82.
[63] IK KA EI:21 dnr h 900. RA.
[64] IK KA EI:29 dnr h 759. RA.



During the first years of the war the lack of capacity for heavier forging proved troublesome. The situation was greatly improved after the installation of a 20 ton duplex hammer at Svartå. Here a crankshaft for a diese engine is being drop forged (Bofors).

hammer had to be repaired and this caused serious disruptions. Just before the more intensive rearmament programme began to be stepped up after the turn of the year 1941/42, representatives of the Defence Staff, the military administrations and the leading suppliers of military equipment met at Bofors and, with IK, drew up plans for Bofors' deliveries. Twelve days later the 12 ton drop hammer had one of its breakdowns, and was out of action for repairs for the following six weeks. In relation to the plans which had been drawn up the delays were estimated as follows: for aircraft about nine weeks, aircraft engines (STW C3) eight weeks, propellers about eight weeks, tanks between four and sixteen weeks, marine engines twelve weeks. Thus the situation had been brought to a head. Attempts were made in various ways to mitigate the effect of what had happened and to

avoid a recurrence of the same situation. An inventory of the country's other drop forging capacity yielded disappointing results, although it was possible to transfer certain forgings to the 5 ton drop hammer at Kohlswa and to Atlas Diesel. In the renewed priority agreement the needs of the air force were on the whole to be given precedence over other manufacturing objectives.[65]

A new drop hammer of 12 tons was made ready during the summer and autumn of 1942, and with active support from IK the construction of a 20 ton drop hammer was stepped up, and this was completed in the autumn of 1943. Both belonged to Bofors but for strategic reasons the latter was installed at Svartå. In this way the bottleneck was widened during the year 1943, and thereafter the drop forging capacity was perfectly adequate for the country's needs.[66]

6. *Conclusions*

The development of the war outside the borders of Sweden tried the country's production apparatus severely in many ways. Sales markets disappeared and supplies of raw materials, labour, energy and machinery were interrupted. This was due to the fact that the country's economy was linked to a high degree to the outside world by virtue of the size of its foreign trade. However, the present survey shows that industry was far from stagnating in a lack of production resources as had been feared at the start of the war.[67] Instead one finds great activity, with solutions to, or ways round, all the problems which threatened to halt operations. There are several reasons for this development.

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[65] Prot. från IK:s sammanträde 11/2 1942. IK KR B:2 dnr h 25/42. RA; KFF till ÖB 19/2 1942, KFF till AB Bofors 19/2 1942. IK KA EI:16 dnr h 64. RA;
PM (Faerden) 17/3 1942. IK KR B:2 dnr h 26/42. RA.
Cf. also Norberg, p. 104.

[66] PM (Faerden) 23/4 1942. IK KR B:1 dnr h 38/42. RA;
IK KR till IK:s byggnadsavd. 1/2 1943. IK KR B:1 dnr h 4/43. RA;
Steckzén, p. 718.

[67] One question has hardly been touched on, viz. the supply of capital. This production factor was hardly affected by the events of the war. There was a good supply of capital in Sweden during the war and interest rates were low. In addition, as will be seen below (pp. 000 f.) the companies financed their investments without needing to resort to external sources to any significant extent.

First of all, Sweden was not cut off to the extent which is sometimes supposed. The period up to the establishment of the western blockade was used to build up stocks which provided a foundation for the wartime economic administration and a breathing space to try and find new solutions. But Sweden was not cut off after April 1940 either. The foreign trade continued to a great extent although the trade routes went largely southwards. Thanks to the fact that both of the warring parties – for partly different reasons – were interested in the continued functioning of the Swedish economy, and thanks to her iron ore, Sweden was able in no small measure to import the products which were required to keep up her production: metals, oil, chemicals, machine tools, et cetera.

Furthermore, Swedish industry acquired a significant "surplus capacity" when the blockade was set up, due to the fact that to a high degree export markets disappeared. This capacity could be passed on to areas in which new needs were now making themselves felt. An example of this is the transfer of both labour and electric power to other sectors, e.g. the engineering industry, from the paper and cellulose industry which had been concentrating largely on exporting to the west. One form of "surplus capacity" was also utilized when less essential consumption was restrained by rationing, e.g. lighting for advertising, or journeys in private cars, in favour of more urgent requirements, or when mechanical resources were transferred to the manufacturing sectors which were given the highest priority.

To a great extent domestic resources, which it had not been economically profitable to make use of during the pre-war period, were also now being utilized. It was a condition of such developments that there should be – as well as the actual resources of the raw materials – the necessary skills, displayed for instance in metallurgical, engineering and chemical research and industry.

The readjustment of industrial production did not take place overnight. In many cases it took a very long time, for example as regards increasing the level of self-sufficiency where raw materials and energy were concerned. This time aspect is important in assessing the situation of economic preparedness. Nor could the readjustment take place without a large measure of control by the authorities. During a period of a few months from the outbreak of the war to the spring of 1940 an apparatus which was unique in modern Swedish history

was built up, for the central Governmental control of commercial and industrial life. The cost of the readjustment was also very high, and it strained the economy, both as regards the national budget and private companies.

This was the price which had to be paid. In return, employment in the country could be maintained on a high level and the national economy made secure in all essentials. Finally, the question of the purely military rearmament will be dealt with in greater depth in the text which follows. So far the most serious difficulties have manifested themselves in relation to machine tools, where supply problems meant delays with regard to certain types of equipment. On the other hand the lack of raw materials, labour or energy should not seriously have hampered the work of the rearmament industry.

C. Some important types of equipment

The types of equipment to be discussed in this section have previously been touched on in chapter I. These rank as major items in the rearmament, but the list is by no means complete. However, the intention is merely to give a concrete picture of the conditions of rearmament; an increase in the number of examples would not alter this picture significantly.

1. *Ammunition*

Perhaps the most urgent need as regards rearmament in Sweden after the outbreak of war was for ammunition.[68] Here Sweden was not completely unprepared. Out of the first special grants for strengthening preparedness for defence, which were approved in July 1938, 4.1 million kronor was reserved for industrial preparations for war. The drafting of so-called war supply contracts relating to ammunition formed part of this. The contracts were detailed agreements between industry and military customers for deliveries in the event of war, and they were drawn up in collaboration with the National Board of Economic Defence (cf. p. 58). The orders, which related to machines, work tools, measuring tools and surveying instruments, and which were necessary in order to be able to increase the ammunition production, proved to be of great importance. Through KATD,

which was responsible for the orders of equipment which was common to all the armed forces, a total of about 14 million kronor was invested in preparations for manufacturing ammunition during a period of two years from the middle of 1938. This sum included about 6 million kronor which was the cost of two new gunpowder factories.[69]

Thus certain preparations had been made, but they were far from adequate having regard to the enormous new requirements which arose during the autumn and winter of 1939–1940. The requirements were of course connected with the increasingly tense political situation abroad and the greater degree of preparedness which followed from it, but they were also connected with the new and greatly expanded organization of the armed forces, with the transition from the organization of 1936 to that of 1941. In addition there was a further factor, viz. the deliveries of ammunition to Finland during the Winter War from 30 November 1939 to 13 March 1940. Such deliveries had been discussed for several years, and preparations had already been made in that the Finnish armed forces had adjusted the calibre of their arms to conform with the Swedish calibration and the Swedish arms industry had established itself in Finland.[70]

Without precise figures it is only possible to form a rough estimate of the extent to which the deliveries of ammunition to Finland depleted Swedish stocks and constituted a burden on Sweden's production capacity. It is reasonably certain that the total value amounted to at least 25 million kronor. About half of this ammunition was delivered through Swedish military bodies. This figure can be compared with the figures given below for the orders from the Swedish armed forces.

On 26 January 1940 the military administrations received the consent of the King in Council to the placing of orders, in consultation with IK, in accordance with the plans for industrial production for war which had been drawn up.[71] It was the so-called supple-

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[68] See for example Burman, F. F:son, Född till soldat, p. 94.

[69] Hedqvist, B., En orientering om arméns tekniska upprustning. Manuskript till föredrag, (nov. 1942). KKV H Fälttygmästarens handl. F II. KrA.

[70] Wahlbäck, pp. 11–36.

mentary budget 4 which now had to be brought into operation, and this meant that – eventually at any rate – economic resources no longer constituted a limiting factor. Now the planning was to prove of value in certain cases. Thus, for example, it was possible in a short time to set up a factory in Stockholm for the assembly of fuses.[71] However, the magnitude of the requirements was such that RKE's plans, in many cases very detailed, did not prove of great assistance. A rational planning of the ammunition production was made difficult on account of the fact that different branches of the forces often competed for industrial capacity, not infrequently in conflict with Finnish orders too. The rapid establishment of SAN after a request by IK and the National Audit Board of Emergency Expenditure on 1 March reflects the strongly felt need for supervision and coordination. SAN went into operation on 22 April 1940. Its primary task was to acquire ammunition on behalf of all the armed forces. Ammunition meant firearms ammunition, mine ammunition, bomb ammunition, torpedo ammunition, special ammunition and packaging for this ammunition.[72] Later SAN was transformed into the National Military Equipment Board and the Swedish Board of War Supplies (KKV) and was given more extensive duties (see section III A). SAN took over from the administrations of the branches of the forces all the contracts under which the final deliveries were to take place after 1 July 1940.

The total cost of the ammunition acquired for the armed forces during the whole period of the war amounted to 802 million kronor (see p. 18). The value of the imports of ammunition over the same period can be estimated at about 185 million kronor, of which more than half related to the years 1940–1941, and so the Swedish production capacity bore a load of deliveries worth about 617 million kro-

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[71] Hedqvist, B., En orientering om armens tekniska upprustning, p. 17. KKV H Fälttygmästaren handl. F II. KrA.

[72] Kungl. brev inrättande av statens ammunitionsnämnd den 21 mars 1940. IK KA EI:6 dnr h 367. RA;
VPM angående am-kommittens utredning rörande am-anskaffning. 17/10 1940.
KKV H F:I Oreg. handl. PM 1940–1943. KrA;
Appelqvist, oral information.

nor.[73] If those parts of the production which fell on the chemical industry and other sectors of industry are disregarded, just over 80 per cent of the value – or a total of about 500 million kronor – is left for the engineering industry.[74] In terms of time the production of ammunition was stepped up during 1940 and reached its peak in 1941 with deliveries worth about 170 million kronor from the engineering industry. Thereafter the production was gradually slowed down.

Thus the major part of the ammunition which was acquired was produced domestically. Thanks to the fact that the orders were divided up in SAN-KKV into different groups, it is possible to gain an impression of the way in which the totals for equipment ordered in Sweden were distributed amongst the main departments. Firearms ammunition accounted for one-third of the total, and missiles for almost as much. Bofors' production alone approached 20 per cent, and consisted mainly of grenades of various kinds. In addition there were detonators and special cartridge cases from other companies.[75]

Thus the two big items of ammunition were firearms ammunition and artillery ammunition. Before the outbreak of the war the former had been produced mainly in the state's own factories, above all one in Karlsborg. Private industry was gradually brought in for the manufacturing of bullets, cartridge cases and charges. Cartridge case production – a fairly difficult process technically – was to constitute the main bottleneck. In 1940 it was not possible to reach the target which had been worked out by the military "requirement committee" during its period in operation from July to October 1940 (MB1), viz.

[73] Imports of ammunition 1939–1945. In millions of kronor.

Year	1939	1940	1941	1942	1943	1944	1945
Imports	12	58	39	29	28	23	3
Including small arms	0.5	11	20	12	2	0.2	0.1

Source: SOS Handel

[74] Underlag för statsrådsrapporter 1940–1943. KKV H F:II. KrA.

[75] The distribution relates to the total quantities up to and including February 1942. Underlag till statsrådsrapporter 1940–1943. KKV H F:II. KrA.

stocks for "six normal war months" over and above the equipment requirement.[76] Insufficient machines had been acquired, and the bulk of the machine park was very much out of date.[77] Further machines could be bought from Germany, but at the beginning of 1940 a delivery period of six months was specified.[78] In the main it would be necessary to resort to domestic production, but even this took time. In fact, through strenuous efforts the renewals were accomplished with comparative speed. The machines were acquired via the authorities and were farmed out to suitable industries. At the beginning of the year 1941 the country's firearms ammunition production capacity was fairly good, as the compilation in table 11 shows. The most important private industries included there are Svenska Tändsticksbolaget, with factories in Jönköping, Lidköping and in Tidaholm, Norrahammars Bruk, Svenska Metallverken in Västerås and Norma Projektilfabrik. The state-owned production was carried out at the ammunition factory in Karlsborg (Amf. K.).

With the increased machine capacity it was possible in the course of 1941 to reach the target for the inventory of firearms ammunition. The remaining requirements related above all to 8 mm armour-piercing ammunition for light machine guns and 9 mm parabellum ammunition, the demand for which increased as the armed forces were supplied with sub-machine-guns on a large scale. In other respects the rate of production could be reduced. Training ammunition which had been fired would still have to be replaced, just as production was maintained in order to train personnel and put machines in good trim. A certain production was also maintained on purely social grounds; at the turn of the year 1941/42 about 3,300 workers were directly

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[76] Protokoll inom nämnden 4/8 1940. KKV H. KrA.

VPM angående am-kommitténs utredning rörande am-anskaffning 17/10 1940. KKV H F:I Oreg. handl. PM 1940–1943. KrA.

This was based on the fact that industry needed about 6 months to achieve a full war supply capacity. SAN ang. underdånigt utlåtande över betänkande, avgivet av 1941 års försvarsutredning. 18/2 1942. IK KA EI:13 dnr h 39. RA.

[77] PM. Anteckningar från sammanträde hos ÖB den 8/7 (1940); KKV H F:I Protokoll och rapporter. Div. år. KrA.

[78] PM rörande erforderlig maskinanskaffning för utökning i krig av tillverkningskapaciteten för handvapens- och kulspruteammunition. 5/3 1940. KKV H F:I Oreg. handlingar, protokoll och rapporter utan dnr. KrA.

Table 11. *The small arms ammunition production capacity in February 1941.*

	Machine units									Total capacity per month and shift. In millions of		
	Bullets			cases			charges					
	old	new	total	old	new	total	old	new	total	bullets	cases	charges
Calibre 6.5 mm												
Private	10	8	18	10	8	18	11	5	16	11.0	11.8	13.8
Amf K	2	–	2	2	–	2	1	–	1	1.3	1.3	1.6
Total	12	8	20	12	8	20	12	5	17	12.3	12.1	15.4
Calibre 8 mm												
Private	4	6	10	4	8	12	2	4	6	6.0	7.3	7.8
Amf K	2	2	4	2	–	2	1	2	3	2.6	1.3	3.6
Total	6	8	14	6	8	14	3	6	9	8.6	8.6	11.4
Calibre 9 mm m/07												
Private	–	2	2	–	2	2	–	1	1	1.2	1.2	1.4
Amf K	2	–	2	2	–	2	1	1	2	1.2	1.2	1.4
Total	2	2	4	2	2	4	1	2	3	2.4	2.4	2.8
Calibre 9 mm m/39												
Private	–	6	6	–	6	6	3	3	3	2.4	3.6	4.2

Source: PM angående maskiner för tillverkning av handvapenammunition. KKV H F I Oreg. handl. PM 1940–1943. KrA.

employed in the manufacturing of ammunition, consisting of 1,360 in state-owned industry and 1,940 in private industry.[79]

Now that the stocks began to be replenished all was not well. They were still only prepared for a war of short duration, while industry lacked the capacity to replace consumption as it occurred in the

[79] Rapport till chefen för försvarsdepartementet nr 12. Am-läget 31/12 1941. IK H KA EI:16. RA.
SAN:s planer för tillverkning 1942 och 1943 i anledning av 1941 års försvarsutredning. 7/4 1942. IK H KA EI:17. RA.

course of a war, and thus a shortage of ammunition would arise after a certain period. The expansion of the ammunition industry to a war capacity meant large new investments in buildings and machinery. So-called shadow factories for firearms ammunition were established, SAN-KKV renting suitable premises and setting up their machines there. The private companies undertook to provide a certain production when required. [80]

The production of artillery ammunition, i.e. ammunition with a calibre larger than 20 mm, is a fairly complicated process with several stages. No special equipment is required for the turning of shell bodies, and so a very large number of engineering works could be called on early on for such production. According to a rough estimate in July 1940 90 per cent of the country's lathes were being used for the production of artillery ammunition.[81]As soon as there was a breathing-space special comparatively simple lathes were manufactured at Bolinder–Munktell and were set up in large numbers in suitable places, chosen primarily for the short distances involved in transporting materials.[82] Cartridge cases were manufactured by Svenska Stålpressnings AB in Olofström, Norma Projektilfabrik, Guldsmedshytte AB and many other companies. Private industry was also brought in to a great extent for fuses and other mechanical components, e.g. Lux, Svenska Metallverken, Finspångs metallverk, Optimus and Primus. At Bofors there was an extensive production of a large number of types of artillery ammunition, all stages of production taking place there except the manufacturing of cartridges. Thus shells were also adapted; apart from this, the adaptation of shells, like the laboratory work on fuses, was carried out by the state's own engineering works. Bofors also provided the patterns which were distributed by the Government authorities to the private manufacturers of artillery ammunition who had been called in.[83]

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[80] PM angående de för skuggfabrikerna tillämpade kontraktsformerna. KKV H F:I Oreg. handl. PM 1940–1943. KrA.

[81] PM. Anteckningar från sammanträde hos ÖB den 8/7 (1940). KKV H F:I Protokoll och rapporter. Div. år KrA.

A series of reports of travels in southern and western Sweden in April 1940 gives a vivid picture of the dispersal of the production. IK KR B:1 PM 1940 nr 714. RA.

[82] Appelqvist oral information.

[83] SAN's planer för tillverkning 1942 och 1943 i anledning av 1941 års försvarsutredning. 7/4 1942. IK H KA EI:17. RA.

The total production of artillery ammunition was about twice as large in terms of value as the production of ammunition for firearms. In stepping up production during the first year of the war difficulties were encountered because of the fact that there were not enough of the necessary measuring tools and surveying instruments. SAN arranged for the acquisition of the necessary equipment by placing orders, mainly with Svenska Kullagerfabriken. The industries had to buy the measuring tools and the surveying instruments remained the property of the state.[84]

The inventory which the requirement committee of 1940 considered essential was achieved more rapidly than was the case with firearms ammunition. The target was the equipment which was required plus a reserve for six normal months of war, but the calculations were also based to a certain extent on the number of aircraft and the number of barrels.[85]

During the first quarter of 1942 the total labour force engaged in the production of artillery ammunition amounted to 10,370 people, about 8,000 of whom worked in private industry. However, during the course of the year the labour force was cut down by more than one-third.[86]

With regard to artillery ammunition it was also necessary for there to be a planning of the production which would supply fighting forces. When the organization of the armed forces was set up in 1942 new figures were worked out for the ammunition requirements, and as regards artillery ammunition these figures were much higher than those put forward by the requirement committee in 1940. Extensive investigations were carried out within SAN-KKV to determine what the planning of industrial war production of this magnitude would

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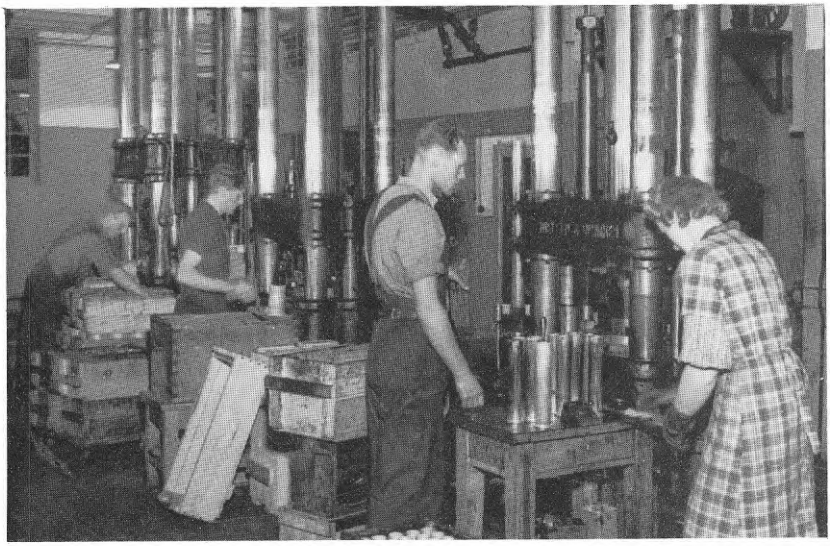
[84] Protokoll inom nämnden 7/4, 17/4, 16/5 1940. KKV H. KrA.

Between September 1940 and April 1942 purchases worth 575,000 kronor were made from SKF, purchases worth 100,000 kronor were made from C. E. Johansson in Eskilstuna and purchases worth 40,000 kronor from Elektroskandia. Förteckning över SAN:s inköp av mätverktyg. KKV H F:I Div. oreg. handl. 1940–1942. KrA.

[85] Rapport till chefen för försvardepartementet nr 12. Am-läget 31/12 1941. IK H KA EI:16. RA.

[86] SAN:s planer för tillverkning 1942 och 1943 i anledning av 1941 års försvarsutredning. 7/4 1942. IK H KA EI:17. RA.

Skrivelse till Konungen angående åtgärder för utökning av den för ammunitionstillverkning avsedda kapaciteten 24/4 1942. IK KA EI:17 dnr h 223. RA.



The throttling and drawing of cartridge cases at the ammunition factory in Marieberg in June 1940 (Fst pressdetalj).

mean, and in a series of proposals in 1942 and 1943 money was requested to increase the capacity. A total of almost 120 million kronor was involved. The biggest items were machines and tools for various kinds of mechanical production. In addition there was the erection of new buildings for the production of ammunition and of establishments for the manufacture of explosives. Before 1942 the Government investments for these purposes had been modest – about 14 million kronor up to the middle of 1940 and thereafter money from the so-called 13 million grant.[87] Although the proposed sums were not granted in their entirety the total for the period as a whole involved very large investments. About 91 million kronor (out of a grant of 113 million kronor) was used through SAN-KKV to increase the industrial capacity. Of this sum about 42 million kronor was used for the acquisition of machinery, 24 million kronor for the acquisition of raw materials and semi-manufactured goods.[88] The importance of the

[87] Försvarsdepartementet till KKV 15/10 1943. IK KA EI:22 dnr h 657. RA.
[88] Ber. v. KKV:s berättelse CFI. MHA.

investments for the Swedish engineering industry lay in the fact that the equipment supplied, e.g. the machine tools, came mainly from Swedish manufacturers. To a great extent the investments could also be used in civilian production. However, this did not apply to highly specialized equipment for firearms ammunition or establishments for the manufacture of particular explosives. On the other hand a large number of machines were acquired which could easily be used for the production of goods other than military equipment. For example, a large part of the production of artillery ammunition consists in the turning of granades or components of fuses. The automatic lathes and the turret lathes were not limited in their use to the manufacturing of ammunition. The same applied to the steelworking machines for the ball jacket materials et cetera. It was part of the planning to facilitate civilian use of the investments. The production units were placed in direct contact with other industries and the terms of the contracts allowed for utilization by renting or taking over buildings and equipment.[89] The form of contract recommended by the King in Council as far as buildings were concerned meant that in the industries in question premises were set up which were not only suitable for the production of ammunition would have cost, while the company company for its production. The Government only contributed funds equivalent to what the buildings which were necessary for the production of ammunition would have cost, while the campany invested the rest. During the period of the contract, 15–25 years, the company undertook when called upon to manufacture ammunition with the aid of the machines owned by the state. If the company itself was able to make use of the premises it did not have to pay rent, and after the period of the contract had expired the premises went to the company. SAN-KKV considered that this form of contract was less favourable for the customer buying ammunition, but it was expressly dictated by the fact that the investments were not to be wasted in case a military production was not called for.[90]

Up to and including 1943 a total of 38 agreements were made with

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[89] Skrivelse till Konungen angående åtgärder för utökning av den för ammunitionstillverkning avsedda kapaciteten 24/4 1942. IK KA EI:17 dnr h 223. RA.

[90] PM angående de för skuggfabrikerna tillämpade kontraktsformerna. KKV H F:I Oreg. handl. PM 1940–1943. KrA.

regard to so-called shadow factories, apart from deposit agreements relating to machines.[91]

To summarise the position, it can be established that the production of ammunition was an important feature of the rearmament, above all towards the end of 1940 and during 1941. Private industry's production on behalf of the nation began towards the end of January 1940. Partly as a result of the deliveries to Finland, Sweden was then poorly supplied with ammunition. Industry's expansion to full capacity was delayed by the shortage of machinery and tools but towards the end of 1941 demands were on the whole met, if they are defined as the equipment required plus a reserve of six war months.

During the second half of the war the orders for ammunition were much smaller, but on the other hand there was a large increase in the puchases of equipment for industrial production for the war. Apart from the direct effect which this had on the machine tool manufacturers and other mechanical industries, it meant that the Government was responsible for extensive investment which were partly of benefit to civilian industry. Thus, apart from Bofors, the ammunition production – in spite of the fact that the orders involved large sums – was not to bring about any new private investments of a significant size.

2. *Tanks*

At the outbreak of the war the Swedish tank force was still weak and comparatively undeveloped.[92] This was due both to a lingering doubt about the usefulness of the force, and the shortage of the economic resources for acquisitions. In fact the Defence Act of 1936 did provide for the setting up of certain tank units, and after a long-drawn-out process of acquisition it was possible to muster 64 modern tanks in the summer of 1939. 48 of these were bought in Czechoslovakia. They were known as AH-IV-S or m/37, they weighed 4.5 tons and were equipped with submachine armaments. The tanks were imported in parts and then assembled, and they were supplied with armour plate

[91] Ber. v. KKV:s ber. C FI. MHA.

[92] An account of the acquisition of tanks up to the autumn of 1942 is to be found in Stade, A., Stridsvagnsvapnet under 1936 års försvarsordning, passim.

from Avesta Jernverk and engines from Volvo at Jungnerverken in Oskarshamn. The other 16 tanks (L-60-S or m/38) had been manufactured by Landsverk in Landskrona. They weighed 8.5 tons and were equipped with a 37 mm Bofors gun and an engine from Scania Vabis. In the main the design of the m/38 was Swedish, but certain parts were German and the armour plate was imported from Austria.

When war broke out and reports were received from the Polish campaign, the Swedish tank force revealed itself in all its frailty. Rapid reinforcements were plainly necessary, but how were these to be obtained? First of all work was carried out along the old lines: by making use of Landsverk, whose experience of production was now extremely valuable but whose manufacturing capacity was very limited, and by importing from abroad. Thus in December 1939 a further 20 tanks were ordered from Landsverk. At the same time action was taken on several fronts to acquire tanks rapidly from abroad.

9.5 ton m/41 tanks on exercises on Gärdet in Stockholm in September 1943. (Fst press-detalj).

As already described, the negotiations proceeded farthest in Czechoslovakia, where a contract to purchase 90 tanks of the TNH type was signed with Českomoravska–Kolben–Daněk (ČKD) in Prague, the firm from which previous purchases had been made. When it became clear in the summer of 1940 that the Germans were not going to allow this transaction to go through, negotiations began instead for the grant of a licence for the tanks which had been requested.[93]

In the autumn of 1940 the tank acquisition situation was very precarious. In one and a half years no tanks had been supplied to the defence. There were no possibilities of imports and the domestic capacity was limited. The organization which was already in operation asked for almost 400 more tanks, and in addition these were to be better equipped and armoured than the old ones. It was plain that the domestic capacity would have to be increased, and new companies which concentrated on engine production, vehicle production and work on heavy plate called in.[94]

To begin with an order for a further 100 tanks (m/40) was placed with Landsverk in October 1940. Delivery of the 20 tanks which had previously been ordered had not yet begun, and the newly ordered tanks were not ready until the beginning of 1942. Money for the 100 tanks, 20 million kronor, was raised by using the grant for the Czechoslovakian tanks.[95] In December 1940 a licence was obtained for the Czechoslovakian TNH tank. Three companies were asked to submit tenders for the production before 21/5 1941: Jungner, Scania Vabis and Volvo. After IK had expressed its views Scania Vabis received an order for 116 TNH-Sv (m/41) tanks weighing 9.5 tons. The final contract was signed on 6–7 October 1941. The purchase price totalled 18,061,200 kronor. KATD undertook to supply weapons, gun mountings, electrical equipment, radio apparatus and tools

[93] See p. 44.

Fst till UD 15/7 1940. Fst H Mtrlavd. BI:2. KrA.

[94] Chefen för armén till Konungen 21/8 1940. Fst Mtrlavd. BI:2. KrA. In the letter it is assumed that two battalions are to be set up, which would call for about 470 tanks, taking into account the six months replacement requirement. There were 84 tanks available, including the 20 which were under construction at Landsverk in the autumn of 1940.

[95] A survey of the acquisition up to the turn of the year 1941/42 is to be found in PM beträffande stridsvagnar och pansarbilar 12/3 1942. IK KR B:2 dnr h 32. RA.

for the tanks. The total cost came to about 25 million kronor. It was proposed that the deliveries should take place in 1942.[96]

At the same time as the orders for the 9.5 ton tanks were placed, there was discussion of the problems relating to the larger 22 ton m/42 tanks, of which KATD wanted 160 as soon as possible. This model, the "Lago", had been developed by Landsverk, and since this firm had begun to be ready with its series of a hundred m/40 tanks towards the end of 1941, it was natural for the major part of the order to be placed there.[97] On 3 November 1941 a contract for 100 "Lago" tanks was concluded. The delivery period agreed on was October 1942–April 1943. The remaining 60 tanks were ordered from Volvo. The engines came from Scania Vabis save for 5 tanks which got engines from Volvo. Volvo's production was based on licences acquired by KATD from Landsverk.[98]

At the beginning of 1942 military circles had concentrated their attention on the "organization of 1943" as drawn up by the Committee for National Defence in 1941. This involved a continuing expansion of the tank force. Thus 9.5 ton as well as 22 ton tanks would be built.[99] After taking stock of the resources, in March 1942 IK suggested that Scania Vabis and Jungnerverken should be invited to tender for the lighter tanks, while Landsverk and Volvo should initially continue to manufacture 22 ton tanks.[100] After the tenders had been considered in April and preliminary orders placed in May, final contracts were signed in June 1942 which provided as follows:

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[96] Protokoll fört vid öppnandet av anbud å tillverkningen av strv TNH-Sv.
Kontrakt mellan KATD och Scania Vabis;
In an edict issued by the King in Council on 21/11 1941 KATD was authorised to pay 25 million kronor to complete the payment in advance. IK KA EI:9 dnr h 275. RA.

[97] Sammanfattning av diskussionen å IK 16/11 1941, mellan dir. Leire, IK och civiling. Forslund, Tygdep.;
Div. korrespondens ang. "Lago" mellan IK, KATD, Volvo, Landsverk i oktober och november 1941. IK KA EI:9 dnr h 493. RA.

[98] Div. korrespondens och kontrakt angående strv m/42.
IK KA EI:10 dnr h 10. RA.

[99] Anteckningar, förda vid sammanträde på IK 19/9 1941. IK Kr B:I dnr 6. RA;
KATD till IK 4/3 1942. IK KA EI:10 dnr h 10. RA.

[100] PM beträffande stridsvagnar och pansarbilar 12/3 1942.
IK KR B:2 dnr h 32. RA.
IK till KATD 14/3 1941 ang. stridsvagnar. IK KA EI:10 dnr h 10. RA.

80 22 ton m/42 tanks to be manufactured by Landsverk
42 22 ton m/42 tanks to be manufactured by Volvo
80 9.5 ton m/40 tanks to be manufactured by Landsverk[101]
122 9.5 ton m/40 tanks to be manufactured by Scania Vabis

The delivery times were fixed so that the final deliveries were to be made before the end of 1943.[102]

However, the acquisition of tanks as a whole was characterized by big delays in the implementation of the production plans. The previous orders had already been delayed for various reasons. The main reason seems to have been the fact that the deliveries of armour plate from Avesta lagged behind. Because of a lack of works capacity the working of the plate could not be carried out rapidly enough. In the summer of 1942 there was talk of delays of up to six months on the terms of delivery in the contracts. Attempts were made in various ways to increase the capacity; there was even discussion of having the plate worked in Denmark. Other parts of the tanks – e.g. gearboxes and drop forged crankshafts – were subject to delays. At this point in time Bofors was inconveniently behind schedule, and so the gun production programme was held up.[103]

Tank production has a distinctive character structure. The manufacturing firms mentioned above to a very great extent received complete components from sub-contractors. For example the most important manufacturers of components for Landsverk's "Lago" tanks were as follows:[104]

Armour plate from Avesta Jernverk
Driving gears and gearboxes from Hedemora verkstäder
Engines from Scania Vabis
Runners and crankshafts from Jonsereds fabriker

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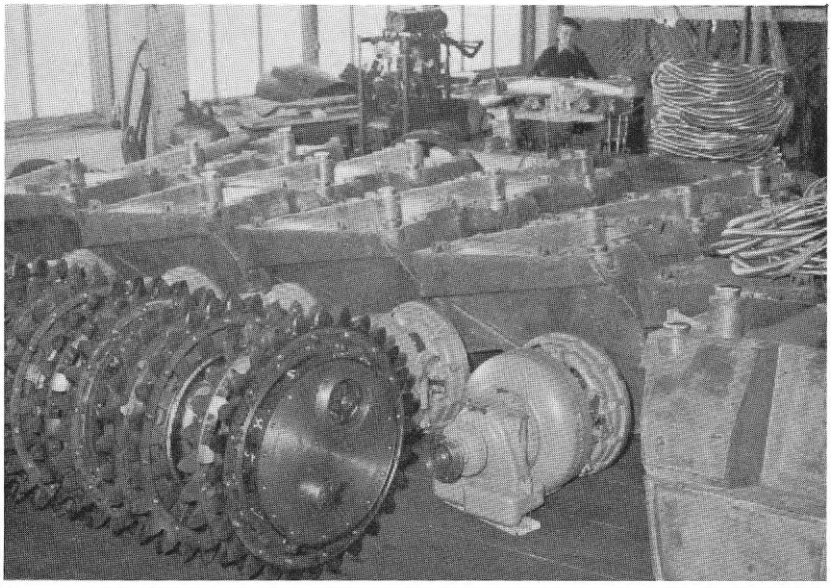
[101] The 80 m/40 tanks were to be produced at Karlstads mekaniska verkstad but with Landsverk in charge of the production.

[102] Anbud, div. korrespondens och kontrakt. IK KA EI:17 dnr 191. RA.

[103] During 1942 IK's war industry department carried out an extensive investigation of the reasons for the difficulties in producing tanks and the possibilities of overcoming them. IK KR B:2 dnr h 53, 68, 85, 87, 100, 106;

Protokoll från sammanträde i IK 24/7 1942 angående leveranser av stridsvagnar. IK KR B:1 dnr 52b. RA.



The tank production was based on a network of sub-contractors. Parts awaiting assembly at Landsverk. Driving gears, gearboxes, petrol tanks and electric wire can be distinguished. June 1941. (Fst pressdetalj).

Turrets from Eriksbergs mekaniska verkstad
Optical and electrical equipment and weapons from other manufacturers via KATD

Volvo and Scania Vabis had similar networks of sub-contractors attached to them. Thus all the available capacity in the country for engine and vehicle production was being used. The rational coordination and spreading of the load over the country, while at the same time taking other important war production, e.g. of vehicles and of engines for aircraft and ships, into consideration was an immense task. This was one of the major tasks for IK. When at several points one banged one's head on the ceiling which was the upper limit of the country's total production capacity, there was nothing else one could do. The shortages in equipping the defence with tanks – either in terms of the organization's requirements or a general estimate of the defence potential which was desirable for the country –

were considerable. Throughout the whole of the critical year of 1940 strenuous but vain efforts were made to make good these shortages. Not until 1942 did the army begin to receive m/39 and m/40 tanks from Landsverk. In March 1942 120 tanks of these models were delivered and the number of tanks was increased to 184.[105] Thus two and a half years had then passed since the outbreak of the war. During the winter of 1942/43 the measures which had been taken to increase capacity proved really fruitful and m/41 and m/42 tanks began to be delivered to the armed forces from various quarters at a more rapid rate.[106]

3. *Ships*

At the end of the 1930s there was a considerable difference between the basic position with regard to shipping equipment and the position

[104] Landsverk till KATD 28/10 1941. IK KA EI:9 dnr h 493.

[105] Materielläget 20/9 1942. Fst kvmavd. Ö.h.e.ä. PM och planer F XI:1 FCA; Stade, p. 86.

[106] A summary of the orders for tanks which were placed during the war period and which have been mentioned above:

Number	Model	Weight in tons	Date of order order	Manufacturer
20	m/39	9.5	Dec. 39	Landsverk
100	m/40	9.5	Oct. 40	Landsverk
116	m/41	9.5	June 41	Scania Vabis
100	m/42	22	Nov. 41	Landsverk
60	m/42	22	Nov. 41	Volvo
80	m/42	22	June 42	Landsverk
42	m/42	22	June 42	Volvo
80	m/40	9.5	June 42	Landsverk (KMV)
122	m/41	9.5	June 42	Scania Vabis
720				

The total value of the orders placed with the manufacturers listed above came to about 170 million kronor (the lighter tanks cost between 155,000 and 170,000 kronor and the heavier ones between 320,000 and 365,000 kronor). In addition to this there were weapons and certain other equipment, and so the total cost was somewhat over 200 million kronor.

as far as tanks and aircraft were concerned. Within the country there was an old tradition of shipbuilding and a significant production capacity. The navy had experience of shipbuilding and at Karlskrona naval shipyard they were able to do fairly extensive work – and also to carry out comparatively large new shipbuilding. As a result of previous military orders serveral of the civilian shipyards were familiar with the production of warships, and those which lacked this experience were able to adjust without too much difficulty; there are no decisive points of difference between civil and military shipbuilding. During the period of rearmament it did not become necessary to create any new shipyard capacity.

In the middle of the 1930s the Swedish navy's complement of ships was worn and outmoded – most of the vessels originated from the period before the First World War, and some of them were badly maintained. In comparison with aircraft or tanks, for example, the age factor made less difference, since the technological development had been slower. Comparatively speaking the Defence Act of 1936 meant a small reinforcement of the navy. However, during the years 1938–1939 several ships were built, thus scrapping the previous agreement. Behind what was an improvement in the situation from the point of view of the naval administration there lay a certain change in the view which was taken of the importance of the navy. It is thought that the new Minister of Defence, P.-E. Sköld, who replaced Janne Nilsson in December 1938, played a major role in this process.[107] Before the outbreak of the war one destroyer was delivered from Eriksbergs mekaniska verkstad and two U-boats from Kockums mekaniska verkstad. Of the larger minesweepers (of the "Arholma" type) two were delivered from Karlskrona naval shipyard. Thus drawings and other basic data were available for all these models, and new orders could be placed immediately.[108]

However, the need for new ships increased sharply when the war broke out, and attempts were made to find ways to reinforce the navy rapidly. In many cases extensive design work had to be carried out before orders could be executed, and this would involve an awk-

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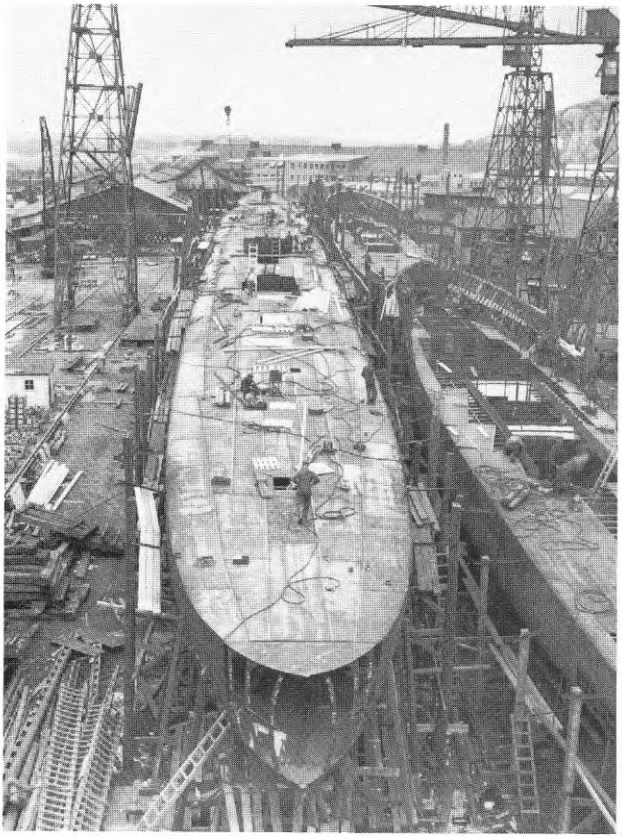
[107] Holmquist, A., Flottans beredskap 1938–1940, pp. 75 f.

[108] The information about the acquisition of ships is taken from Redogörelse beträffande marinens materiella utveckling 1/7 1937/30/6 1945. Ber. v. CF IV MHA.



The building of smaller naval vessels was able to expand rapidly after the outbreak of war. In the picture the destroyer Gävle is crammed in on Götaverkens' slipways with the minesweepers Vinga and Ven in July 1940 (Götaverken).

ward delay. One way of accelerating the process of acquisition was to import warships. During the first phase of the war when the Swedish armed forces wanted to puchase many kinds of military equipment from abroad, suitable naval vessels were also sought. It was the task of the delegation to the U.S.A. (see p. 32) to see how the land lay as far as motor torpedo-boats and armoured cruisers were concerned. However, the American negotiations were abortive. Instead, an approach was made to Italy where the navy bought 4 destroyers in

1940 (''Puke'', ''Psilander'' and the somewhat smaller ''Romulus'' and ''Remus''), and also 4 motor torpedo-boats. These ships cost a total of just over 31 million kronor.[109] Two motor torpedo-boats had previously been imported from England. These 6 motor torpedo-boats formed the basis of the torpedo-boat fleet which was built up in Sweden during the years 1940–1943 (on the acquisition of ships see p. 23).

The imports of naval vessels were limited. In terms of time the imports took place during the first year of the world war. In terms of value they accounted at most for 10 per cent of the total cost of the ships acquired in 1939–1945. The balance, around 450 million kronor, was spent on domestic acquisitions.

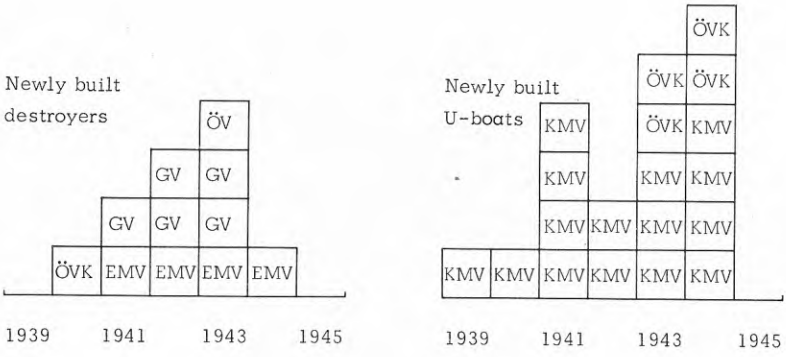
Another way of cutting down the time it took to acquire warships was to buy and rebuild civil ships for military use. This method was followed with various kinds of special ships, the most important of which were the mother ship ''Patricia'', the hospital ship ''Prins Carl'' and the communications ship ''Marieholm''. In the main private shipyards were used for the reconstruction, as well as for the rebuilding and improvement of older naval vessels.

Most of the ships were acquired through new shipbuilding in Swedish shipyards. As far as destroyers were concerned (see diagram) the two Gothenburg shipyards Eriksbergs mekaniska verkstad (EMV) and Götaverken (GV) accounted for the majority. Before the war they had already gained experience of this type of ship, and, with their total of nine ships, they became specialized to a certain extent. One destroyer was also built at Karlskrona örlogsvarv (ÖVK). However, the shipyard was saddled with a large number of tasks, and once the destroyer had been delivered in 1940 after a lengthy period of construction – the keel had been laid as long ago as 1936 – the yard was not called on to build any further destroyers. A smaller destroyer (''Munin'') of the so-called coastal destroyer type was delivered from Öresundsvarvet (ÖV) in Landskrona.

U-boats were built mainly at Kockums mekaniska verkstad (KMV), which specialized in this type of ship. In addition 4 U-boats were built at Karskrona örlogsvarv.

Amongst the various types of ship the minesweeper was a com-

[109] Ericson, pp. 138 f.



parative newcomer. Orders were placed for a further 12 of the larger type of minesweeper which had been delivered from Karlskrona naval shipyard shortly before the outbreak of war; these orders were distributed amongst a large number of private shipyards, which included a few smaller yards – Oskarshamns varv, Lindholmens varv and Finnboda varv – apart from those mentioned above. The deliveries already took place in the years 1940–1941. A total of 24 smaller minesweepers of the fishing boat kind were built by several small yards during the years 1940–1942.

Another type of smaller naval vessel which made something of a breakthrough during the Second World War was the motor torpedo-boat. 15 of these were built in the years 1941–1943 under the supervision of the naval administration's engineering department. The hulls were constructed at Kockums mekaniska verkstad, while the engines were partly imported and partly manufactured at Atlas Diesel under an Italian licence.

Of the other large naval vessels which were built, mention should certainly be made of the minelaying cruiser "Älvsnabben", which was delivered from Eriksbergs mekaniska verkstad in 1943.

Two larger destroyers were under construction at the end of the war. The contracts for these had been made respectively with Kockums verkstad in July 1943 and Karskrona naval shipyard in December of the same year. As a result the 'regular' manufacturers of destroyers were made available for the construction of the two cruisers "Tre Kronor" and "Göta Lejon" the keels of which were

U 1 is launched at Kockums in Malmö in 1941. It was the first of a series of small so-called coastal U-boats (Fst pressdetalj).

laid at Götaverken and Eriksbergs mekaniska verkstad respectively in September 1943, and which were launched but were far from ready for delivery when peace came.

The summary review of the distribution of orders for the building of new ships has shown that the private shipyards carried out the lion's share of the work. Of the larger ships, the navy's own shipyard in Karlskrona delivered one destroyer and 4 U-boats, while the other shipyards accounted for the rest, amounting to more than 90 per cent of the total sum in terms of value. The navy's own capacity was increased mainly in relation to certain central functions, such as construction, purchasing and coordination. A special new building centre was set up in Gothenburg to maintain close contact with the large shipyards there.

If an assessment is to be made of the role played by the shipyard industry in relation to orders for warships it must be made quite clear that the shipyard's share of the total sum involved in an order for a

warship was only about 30 per cent. Other branches of the engineering industry, including arms manufacturers, accounted for 50 per cent, while the balance of about 20 per cent went to completely different industries, including the wood industry.[110]

Thus, of about 450 million kronor allocated to the acquisition of ships within Sweden during the years 1939–1945, 135 million kronor went to the shipbuilding industry, while 225 million kronor went to engine manufacturers, the electrical industry, gun manufacturers and many others. Here there were areas in which there was competition from other sectors of the rearmament programme. It was within these sectors rather than within the actual shipbuilding industry that the overcrowding occurred. As a result the navy's demands had to take second place when competing with other vital needs.[111] Such a situation will be described in greater detail below, but in other cases too, e.g. with regard to engines for the motor torpedo-boats, there can be found similar tendencies in the priorities determined by IK.[112]

A striking feature of the naval rearmament was the concentration on smaller vessels. The explanation may well lie in the changes in naval strategic thinking, where there was a clear trend away from large armoured ships with heavy artillery towards lighter units with greater mobility. A debate between naval men of the 'old' and 'new' schools continued throughout the whole of the 1930s.[113] The plans for the building of light cruisers (and hence a cancellation of the plans for large armoured vessels) constituted a retreat from the tenets of the old school, although "Tre Kronor" and "Göta Lejon", with almost 8,000 tons, were to become the largest naval vessels which had been built in Sweden. However, the reasons for the fact that no ships larger than the 1,200 ton destroyers of the city class had been completed before the end of the war were not only strategical ones.

In December 1940 Parliament granted money for the commencement of work on two cruisers. By then the preparations had been under way for some time, in the form of planning and drawing work

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[110] IK KA prot. 25/9 1942 bil. 3. RA.

[111] "In the majority of situations the navy had to struggle against a fierce head wind of lack of sympathy, shortage of money, competition with industry, ignorance and isolation". Ericson, p. 156.

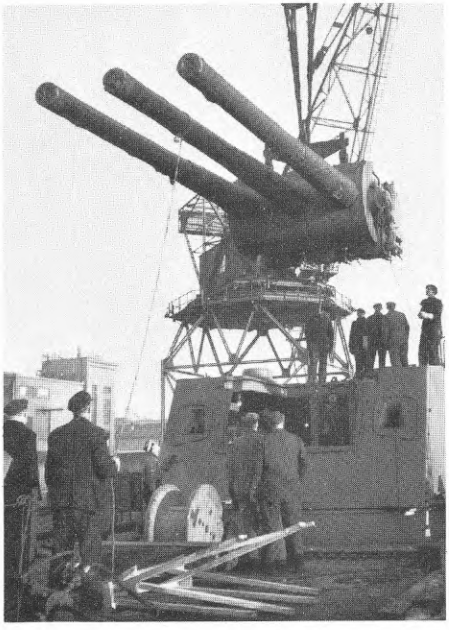
[112] As to the drop forging capacity cf. p. 92.

[113] Ericson, pp. 120–125.

at Cantieri Riuniti dell' Adriatico in Trieste. This work was completed during 1941 and the naval administration was able to place certain orders, e.g. for turrets, electrical installations and optical and nautical equipment. The design and drawing work was taken over by Götaverken in accordance with a special agreement with the naval administration.[114]

However, now that the time for the actual start of the shipbuilding was drawing near, difficulties arose. IK raised objections to the plans. In the autumn of 1941 there was a very tense situation in several sectors as regards the work of rearmament. For example, both engine and gun production wrestled with great difficulties. The two cruisers would mean increasing the burden on the engineering industry by between 5 and 7 per cent.[115] The supply of design personnel was very small. IK took the view that in this situation it was better to use the limited resources on smaller vessels, primarily destroyers, which could be completed in a significantly shorter time than the cruisers.[116] IK raised even stronger objections when it came to the question of raw materials. The consumption of copper, chromium and nickel would be great and would impose a serious strain on the limited resources. However, the really critical factor was the requirement of molybdenum for the production of armour plate (see pp. 70–71). The orders which the naval administration had placed for armour for cruisers were stopped after intervention by IK. Armour plating was also needed for other purposes, e.g. for shells and bombs. However, the most urgent need related to armoured vehicles for the army. In September 1941 it was estimated that about 3,650 tons would be required for this purpose during the coming five-year period. It was estimated that about 2,600 tons of armour plate would be required for the cruisers.[117] In IK's view these requirements could not be met at the same time, by virture both of the molybdenum consumption and the production capacity of the steel works. They therefore wanted to postpone the decision about the building of the cruisers until the navy's entire requirements of materials had been clarified and a review of the consequences of the new Defence Act had been re-

[114] Erfarenheter beträffande fartygsmaterielen. Ber. v. CF IV. MHA.
[115] IK till KMF 3/2 1943. IK KA prot. bil. pag. 65. RA.
[116] IK prot. 31/5 1940 bil. 4 pag. 230 IK KA prot. RA.
[117] Anteckningar förda vid sammanträde i IK 10/9 1941. IK KR B:2. RA.



In October 1943 the hull of the cruiser "Tre Kronor" began to take shape. Just over two years later it was time to put the main armaments into position: 15 cm guns in elevating triple gun mountings, manufactured by Bofors (Götaverken).

ceived, which could not be expected to occur until the middle of 1942. With this the matter came to a head, and a regular struggle for power began between IK and the naval administration which wanted to press on with the building of the cruisers at any price.[118] Both the Defence Minister and the Supreme Commander were forced to make their positions clear, with the result that the cruiser plans were shelved for the time being.[119]

It was not until 4 September 1942 that the naval administration received the consent of the King in Council to the conclusion of agreements for the construction of two cruisers at a maximum cost of 74 million kronor each. On 5 February 1943 agreements were made between the naval administration and the two Gothenburg shipyards, and work began towards the end of the year. The contract price was 24 million kronor for each cruiser.

When the building of the cruisers was really under way, the period of the most intensive rearmament had already passed. The rate of shipbuilding had been reduced; the annual expenditure had been halved from more than 100 million kronor in the years 1940–1942. There was now scope for the wider, more long-term objectives which it had not previously been possible to accommodate within the large rearmament pattern.

4. *Aircraft*

The expansion of the air force after the passing of the Defence Act of 1936 took place with the aim of establishing five wings with a total

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[118] "Samtal med amiral Tamm 9/12 1941." IK KA PM 19 IK KR B:1. RA.

A statement from the head of the naval administration Admiral G. Bjurner at a meeting about the building of the cruisers at IK on 2/1 1942 provides an example of a discussion which bears a natural resemblance to that which took place 30 years before about the question of the armoured ships: "It is basically a question of priorities. I would like to emphasise that it is not the Industry Commission nor the Minister who decides the priorities. An edict from the King in Council is needed. The matter must be dealt with without fail. As to the building of the cruisers there are no obstacles in the way of the ships which are currently under construction. It is true that it is not possible to stop up the rate which would be desirable, this is not possible but it ought to be possible . . . for it to be possible!!!" IK KR B:2. RA.

[119] PM för sammanträde den 26/11 1941 angående större marina byggen. Prot. fört vid sammanträde på IK 26/11 1941. IK KR 15/41, 16/41. RA.

of 257 aircraft in 1942/43, and it was estimated that this would cost a total of about 70 million kronor.[120] Both the Government and the air force desired the creation in Sweden of a qualified aircraft industry which could in the long term secure the supply of equipment, since the building-up of an air force had now become one of the most important aims of the Defence Act. The end of the 1930s brought about a complicated game with many turns, in which several of the country's leading industrial groups were involved. In 1939, as a result of an agreement about capacity expansion, an aircraft manufacturing company, Svenska Aeroplanaktiebolaget (SAAB), acquired a position approaching a monopoly within the country. The company embraced within itself the production capacity in Trollhättan which was created by the Wennergren-Bofors group, as well as plants in Linköping which had come from AB Svenska Järnvägsverkstäderna – a company which had close connections with Stockholms Enskilda Bank. There was an equivalent concentration as regards aircraft engines. NOHAB's Flygmotor AB in Trollhättan, a subsidiary of Nydqvist & Holm AB (NOHAB) was clearly dominant. In 1941 the company changed its name to Svenska Flygmotor AB (SFA) when Volvo bought the majority shareholding. A minority holding (three-eighths of the share capital) was retained by NOHAB, which was in turn a subsidiary of Bofors (cf. p. 131). SAAB and NOHAB's Flygmotor-SFA were to dominate Swedish aircraft production completely during the years to come.

When war broke out none of the aircraft which had been ordered in accordance with the Defence Act of 1936 had yet been delivered. Slowly, between 1934 and 1938, 45 light bombers (B 4 Hawkers) were completed under licence. The production under licence of B3s (Junkers) and B5s (Northrops) was under way but deliveries did not begin until well into the year 1940. This constituted a delay in relation to the plans which had been drawn up, but before the war had broken out it was possible to overlook it, since it was fairly easy to make it up by purchasing from abroad a greater proportion of the new fleet of aircraft than had previously been thought possible. With the comparatively generous funds which had been allocated to the air force,

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[120] For this chapter generally the references are to Norberg, Söderberg, Kindberg and Flygmotor 1955:4, passim.

between the autumn of 1937 and the autumn of 1939 a total of 106 planes were purchased, consisting of German bombers and torpedo carriers and English fighters. In addition a number of German reconnaissance planes were acquired. Including older planes as well, the air force was able to muster about 195 aircraft when war was approaching.

As described above, there was an alarming decline in opportunities to import aircraft during the autumn of 1939 and the first six months of 1940. The situation in 1940 was similar to the tank situation which has already been described; while the need for equipment increased to such a degree that the air force administration and the Government ordered acquisitions without regard to the adaptation of the aircraft within the organization, the possibilities of importing were stifled and the domestic production capacity proved completely inadequate. The imports from Italy which were described above (p. 51) constituted an emergency solution which involved a compulsory choice of aircraft which were not altogether desirable either as regards type or quality. During 1940 it became quite clear that a reinforcement of the domestic aircraft industry was probably the most important factor in the whole of the Swedish rearmament.[121]

It is against this background that the establishment of the so-called framework agreement in the autumn of 1940 should be viewed. Dissatisfaction with the performance of the aircraft industry led IK and the Government to the conclusion that the aircraft industry must be strongly reinforced with Government participation. In practice the framework agreement gave the companies involved a complete monopoly over domestic supplies to the air force for the next five years, and formed the basis for a vigorous expansion. According to IK the main motive for the agreements between KFF and SAAB and NOHAB's Flygmotor respectively, and between NOHAB's Flygmotor and its sub-contractors was that they constituted the most economical way of preserving the country's aircraft manufacturing

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[121] Cf. the view expressed in Söderberg, p. 279.

In his proposal of 8/8 1940 the Supreme Commander recommended an extension of the air force by 5 wings over and above the 9 which were already under construction. For this 1,555 aircraft would be required over a five-year period, and it was thought they could be manufactured within the country. VPM 8/8 1940. Fst Kvmavd. F XI. FCA.

resources.[122] There was a particular shortage of draughtsmen and designers, and splitting the resources amongst several parties would involve wastage. The framework agreement structure meant that prices were not fixed, but that instead regulations were laid down for writeoffs, profits et cetera so that prices could be determined when the manufacturing was complete. The companies were exempt from the war tax on excess profits. The profit was to amount to 10 per cent of "the works cost price" which meant that changes in the cost of materials and wages were taken into account.

SAAB undertook to deliver aircraft of its own design in accordance with the following schedule: 260 of type 17 before 1 April 1943, 88 of type 18 between 1/1 1943 and 1/7 1944, and a number of SK planes in addition. According to this plan the total number of aircraft up to the middle of 1946 would be about 1,100. New buildings and new equipment worth about 5 million kronor were to be written off before the end of 1946. For existing assets, valued at 12.76 million kronor in November 1940, the following yearly rate of depreciation was fixed:

Airfield buildings	15 %
Buildings	5 %
Equipment	10 %
Shelters, roads	10 %
Machines	10 %
Tools and workshop inventories	20 %
Office inventories	50 %
Cars and tractors	33 %

NOHAB's Flygmotor's undertaking involved deliveries of about 1,360 engines, mainly Twin Wasp and Double Wasp, before the end of 1946. The structure of the agreements was the same as for SAAB. It was estimated that new investments – mainly machines – would cost 2.1 million kronor and would be written off before the end of 1946. The existing capital assets were valued at 3.5 million kronor and would be written off at the same rates as applied to SAAB. The co-

[122] PM angående utvidgning av den inhemska flygmaterieltillverkningen 27/11 1940. IK KA EI:6 dnr h 735. RA.

suppliers, Volvo-Pentaverken and Bolinder-Munktell, were each to account for 25 per cent of the value of NOHAB's Flygmotor's deliveries. Volvo's new investments were estimated at 1.6 million kronor and Bolinder-Munktell's at 1.8 million.[123]

It soon became apparent that the plans which had been drawn up towards the end of 1940 could not be adhered to. The delays were to a certain extent connected with personnel difficulties with regard to design work, but the most serious problems were still to be found on the engine side. The expansion of the engine manufacturing capacity required many extra machine tools. Many of the machine were impossible to obtain in Sweden, and imports were uncertain and time-consuming. In other cases machine tools had to be newly manufactured within the country, often by industries without experience of the models in question. The limited drop forge capacity – in spite of the fact that deliveries to the air force were given priority – also held up engine production as well as actual aircraft manufacturing.[124] In the autumn of 1941 IK assumed firmer control of the aircraft production. During conferences at SAAB in Linköping there was discussion of the reasons for the delays, and there was harsh criticism from the air force administration. SAAB presented a new and much less optimistic plan than the one that had been put forward a year earlier. The promises of deliveries which the company had given in connection with the framework agreements had obviously been unrealistic. Now someone from IK was given the task of supervising the progress of the production, allocating the distribution of labour according to priorities, keeping an eye on sub-contractors, et cetera.[125]

According to the defence resolution of 1942, 16 or perhaps 17 wings were to be set up. In this connection SAAB was asked if it could undertake to supply the planes which would number about 1,250 during the five-year period 1/7 1942 to 1/7 1947. SAAB said it thought

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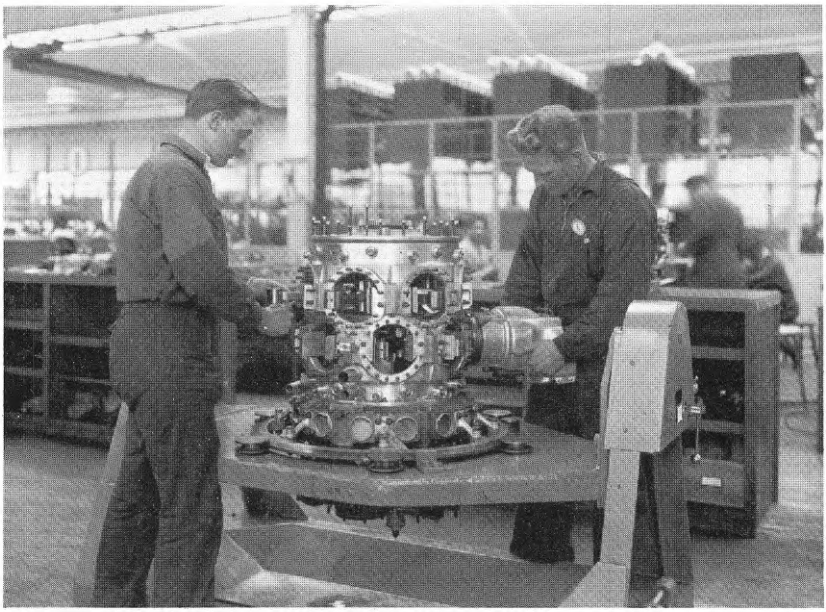
[123] Ramavtal med bilagor. The framework agreements were approved by Parliament 19/12 1940. IK KA EI:6 dnr h 735. RA.

[124] KFF till Bofors, KFF till ÖB 19/2 1942. IK KA EI:16 dnr h 136. RA.

[125] Anteckningar förda vid konferens hos SAAB i Linköping 17/9 1941. IK KR 8/41;
Konferens hos SAAB i Linköping 13–14/11. IK KR 13/41;
IK:s uppgift i samband med leverans från SAAB. PM 12/9 1941. IK KR 7/41. RA.



An STW C3 is assembled at Svenska Flygmotoraktiebolaget. About 430 of these 14 cylinder radial engines were manufactured in 1943–1945 and were installed in the B/S 17 and J 22 planes amongst others (Volvo Flygmotor).

it would be able to do this.[126] Problems still remained on the engine side, for when deliveries of the My XXIV – an English engine various versions of which had for a long time been standard in aircraft manufactured in Sweden – were completed, the aim was to be able in June 1942 to begin to produce the American Twin Wasp (STW C3) in series. 470 of these engines were required. After that they would concentrate on the Daimler-Benz engine for which a licence had been obtained in August 1941. In February 1942 the aim was to begin this production in January 1944 and from then onwards to produce 1,230 before 1/7 1947. After 1/7 1947 the capacity was to be 40 engines a month. Svenska Flygmotor (SFA), Volvo and Bolinder-Munktell said they thought they could achieve this aim. A new framework agree-

[126] KFF till SAAB 28/1 1942, SAAB till KFF 4/2 1942. IK KA EI:13 dnr h 39. Prot. KFF 19/2 1942. IK KA EI:16 dnr h 133. RA.

ment within these guidelines was also made with SFA. The long period of time between the obtaining of the licence and the start of the DB production was needed for the manufacturing of tools, machines and the basic materials for the production. IK estimated that 0.5 million working hours – or 250 workers for ten months – were required for the production of tools and 1 million working hours for the production of machines.[127]

Thus in relation to the plans of November 1940 there was a delay of 2–3 months for the My and TW engines. In fact there was an even greater delay in the production of the DB engine which was not able to start until 1944. Finally, the problems went back to the difficulties of importing from the U.S.A. in 1940. According to an agreement the Twin Wasp and the much more powerful Double Wasp were to be manufactured under licence. When contact with the U.S.A. was broken off in the summer of 1940 existing Twin Wasp engines in Sweden were copied and production was able to begin without a licence but subject to certain delays.[128] In Sweden it proved impossible to get hold of a Double Wasp engine, and the air force administration had to cast around for an alternative engine with a development potential approaching 2,000 h.p. which was required for SAAB's project 18 and for new fighter plane designs.[129] After long-drawn-out negotiations from December 1940 onwards, a licence for the German Daimler-Benz 605 engine was obtained in August 1941. Great difficulties arose in getting the production of this engine started. No aircraft delivered before the end of the war were equipped with the DB engine, which was first installed in the B version of SAAB's 18 series and in the J 21.

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[127] PM beträffande maskinkapacitet för tillverkning av DB-605 (SFA). IK KA EI:16 dnr h 105;

Div. materiel ang. DB-motorn. IK KA EI:16 dnr h 133, 136, 149, RA.

Chefen för flygvapnet till chefen för försvarsstaben 3/11 1942. Fst Kvmavd. F XII:1. FCA.

[128] Thus the copying was carried out without any data in the shape of drawings, material specifications, tolerance tables et cetera, and this was a complex task which was in fact performed with great success. After the end of the war the American manufacturers, Pratt & Whitney, were offered compensation for the licence and royalties under the agreement which had been worked out when the negotiations were broken off in 1940. The offer was declined. Söderberg, pp. 332–333. Flygmotor 1955:4, p. 21.

[129] Söderberg, pp. 297 f.

SAAB 18 Bs under construction in Linköping. The engines are DB 605s which differ greatly from those previously manufactured in Sweden. Inter alia they had hanging cylinder blocks with 12 cylinders forming a V and a fuel injection pump (Övl. Kindberg, Flygstaben).

SAAB's contribution to the building up of the air force during the period from the commencement of the framework agreement in 1940 up to the middle of 1944 consisted mainly of 102 B5s and 322 B/S 17s manufactured under licence.

At about the same time as SAAB's B 18 As began to be supplied to the formations – in the summer of 1944 – another aircraft of Swedish manufacture was also to be found there. This was the J 22 fighter which had begun to be designed within the air force administration at the start of 1941. It was manufactured outside the framework agreement and, with its limited engine power (Twin Wasp engines), it was an "emergency project" intended to fill an acute need but with no development potential. The design involved a steel framework and supporting wooden panels, an old-fashioned method of construction

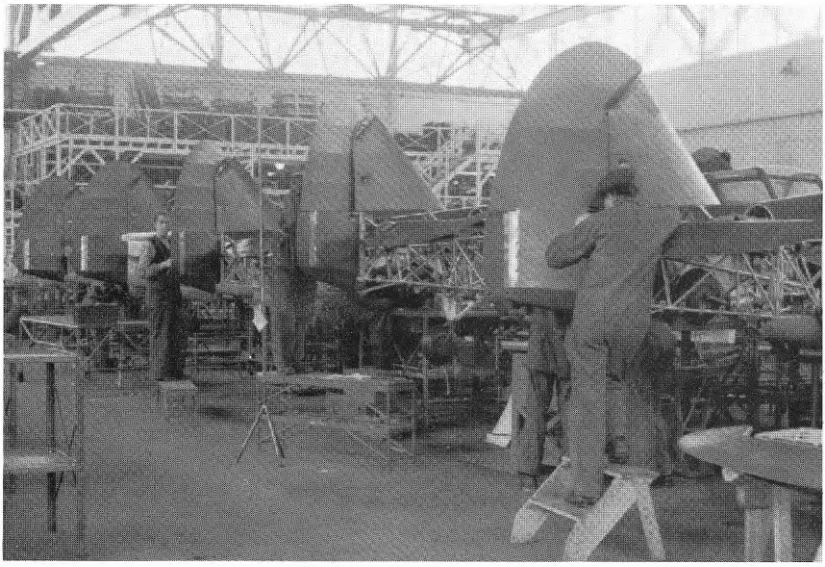
which had been outmoded by the aluminium structures. The production was based entirely on ready-made parts which were assembled by KFF in rented premises. Thanks to the construction of steel and wood it was possible to avoid the imposition of a burden on SAAB's sub-contractors. In spite of its almost improvised origins the J 22 was regarded as being a very good plane of its time, and one which played an important role in bridging the gap between the imported fighter planes and SAAB's J 21s which came into service long after the end of the war. A total of 198 J 22s were delivered, 180 of these before May 1945. After that the air force administration's activities as an aircraft builder ceased.

Summarising the acquisition of aircraft during the war, it can be established that it was not until 1944 that a satisfactory situation was achieved. Then it proved possible to deliver both fighters and bombers which had been designed and produced in Sweden. The aircraft industry's capacity was then such that it could supply a fighting force, which imports were unable to do. During the last six months of the war the bulk of the total of just over 600 aircraft which had been manufactured in Sweden were delivered. The balance of about 400 planes were imported, above all during the first years of the war.[130] Thus the period up to 1944 was a period of expansion for the Swedish aircraft industry during which, with Government support, it developed new types of aircraft and made large investments the fruits of which ripened mainly after the period described here. Even under normal conditions it would have taken a considerable time to develop

[130] During the period 1939–1945 the following aircraft were manufactured in Sweden:

number	type	period of delivery
16	B 3 (Junkers)	Aug. 1940–Oct. 1940
102	B 5 (Northrop)	April 1940–April 1943
322	B/S 17 (SAAB)	Dec. 1941–1944
198	J 22 (KFF)	Aug. 1944–1947
240	B/S/T 18 (SAAB)	May 1944–1948

Information from Norberg, p. 220, Kindberg, passim. Norberg's information about the period of delivery for SAAB's type 17 (Oct. 1944–Aug. 1947) is plainly misinterpreted. Cf. Söderberg, p. 280 and Kindberg, pp. 114–116. There are also other small differences between the authors with regard to dates of delivery.



Assembly work on the J 22 in the premises rented by the air force administration in Ulvsunda, Stockholm in 1944 (Övl Kindberg, Flygstaben).

a viable aircraft industry. During the years 1940–1944 many problems arose, connected with the World War and the blockade, which contrived to make aircraft production perhaps the most problematic sector of the whole rearmament.

5. *Small arms and gunnery equipment*

There were two motives for acquiring small arms during the rearmament period.[131] First of all there was a sharp increase in the war units, which resulted in a demand for traditional weapons such as rifles. In addition 64,000 rifles were transferred to the National Home Guard and a similiar number to Finland, which created further gaps. The production of this kind of standard equipment was based on existing

[131] The figures given on p. 000 indicate the size of the most important items. The figures are minimum figures since they do not include the period September 1939–February 1940 and only relate to the army.

designs and these could easily be supplied by Swedish companies. Secondly, however, there were requests for more modern automatic weapons: automatic rifles, sub-machine-guns and light machine-guns. The shortage of these was keenly felt and the domestic models which were available were unsatisfactory. Imports were desirable, but were not altogether easy to obtain, since the international demand was also great. As far as sub-machine-guns were concerned, during the years 1939–1940 German as well as Finnish and American models were imported (see chapter II). Gradually a domestic production was started, and before the war was over it was possible to supply the armed forces with a total of about 60,000. 3,000 Czechoslovakian sub-machine-guns (7.92 mm) were purchased in 1940. After that this type of weapon was also produced in Sweden. The development of the automatic rifle was under way in many places towards the end of the 1930s. In 1941 a commission was set up in Sweden to choose between the alternatives which were available. The result was the m/42 automatic rifle, a total of 23,000 of which were produced and supplied to the units from 1943 onwards. The very large number of light machine-guns which were acquired (including 9,000 machine-guns for the army) were also produced in Sweden.

The purchases from several different foreign sources resulted in a troublesome confusion as regards models of weapons and ammunition. It was not until later that the situation was stabilized by virtue of the fact that domestically produced series began to predominate.[132]

In terms of volume the importation of small arms constituted a small part of the total acquisition and was limited to the initial stages of the war. Swedish industry accounted for the bulk of the small arms. In terms of value the annual production of small arms and light machine-guns during the years 1940–1943 amounted to about 50 million kronor. Carl Gustafs stads gevärsfaktori, the state's own industry, bore the main responsibility for design and coordination but only accounted for about a quarter of the actual production. Husqvarna Vapenfabrik,

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[132] See p. 20.

Hedqvist, B., En orientering om arméns tekniska upprustning. Fälttygmästarens handlingar F II. KrA;

Översikt över läget beträffande viss krigsmateriel. 31/12 1940. Fst Kvmavd.

PM och planer 1939–1944. F XI:1. FCA;

Ber. v. KATD:s redogörelse. CF 1. MHA.

Telefon AB L. M. Ericsson, Industri AB Svenska Automatvapen and G. Arehns mek. verkstad – on a sharply declining scale – bore the responsibility for the bulk of the remaining three-quarters. In addition a large number of sub-contractors were involved.[133]

The production of small arms attracted no great attention from the authorities which planned the equipment rearmament. Nor did the lighter gunnery equipment cause any serious difficulties. There had been previous experience of such designs and production. The character of this type of production is such that it presents no great difficulties in the adaptation of civilian industry for the production of military equipment. A light engineering industry, producing telephones or office machines for example, is well suited to the production of parts for light weapons.

Heavier weapons were also purchased for the defence on a large scale. There is a description on p. 20 above of how the army acquired more than 3,000 guns of various kinds in 1940–1945: mortars, anti-tank guns, field artillery and anti-aircraft guns. During the same period the navy ordered about 600 guns, mainly anti-aircraft artillery but also heavier naval artillery and coast artillery (see p. 21–22).

Guns had been produced for a long time in Sweden. In spite of an uncertain basis of domestic orders, AB Bofors had managed to maintain a considerable military production capacity during the period between the wars. During the most difficult years, in which there was a tendency towards a limitation of armaments both internationally and in Sweden, valuable support was received from the Kruppverken in Essen with whom a close technological and financial collaboration had been established. As a result significant export markets were opened. Through the nominee company Boforsintressenter Krupp had a dominant proprietorial influence in Bofors. This became an embarrassment in the 1930s but it was not until 1935 that the German interests could be persuaded to sell their shares. By that time Bofors' lean years had passed. New establishments in Tidaholm and Trollhättan (NOHAB and the subsidiary NOHAB's Flygmotor AB) were purchased and heavy investments were made in mechanical equipment. There was a very powerful expansion up to the outbreak of

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[133] Redogörelse för läget inom byrå 3, Handvapen och kulsprutor 19/2 1940, 23/10 1941, 4/11 1942. IK KA EI9 dnr H 309, 466, EI:16 dnr h 106, EI:37 dnr h 110. RA.

15 cm turret guns for naval artillery were also produced at Bofors (Bofors).

war: in 1935 military equipment worth 23 million kronor was produced, and in 1939 equipment worth 78 million kronor. Almost 90 per cent of this production was sold on the export markets. The trump card in the range was the newly designed 40 mm automatic gun which caused something of a sensation on the weapon market in the 1930s, but there was a very wide selection: anti-aircraft and anti-tank guns of various calibres, field artillery, heavy coast and naval guns.[134]

Bofors' resources at the outbreak of war were placed at the disposal of the Swedish armed forces. With the support of the general disposition legislation Swedish orders were given priority. Equipment contracted for by foreign customers but not yet delivered was requisi-

[134] Steckzén, pp. 323–565, 692–733.

For the Kruppverken the collaboration with Bofors meant that as far as weapons were concerned the work of development in the field of technology was also able to continue during the years when the prohibition on the manufacturing of weapons in the Treaty of Versailles was respected. Manchester, W., The Arms of Krupp 1587–1968, pp. 392–394.

tioned as it was completed. The following guns were requisitioned during the years 1939–1940:[135]

number	type	original customer
181	40 mm automatic gun	Holland, England, Argentina
52	7.5 cm field gun	Argentina, Siam
20	7.5 cm anti-aircraft gun	China, Siam, Iran
32	10.5 cm field howitzer	Siam, Holland
8	15.2 cm gun for coast artillery	Holland

In addition a considerable number of guns were purchased abroad in order to achieve a rapid increase in artillery equipment. These guns came almost exclusively from Germany. The most important purchases were of 142 10.5 cm howitzers, 110 of which were in fact ordered later on during the war (see p. 45). During 1940 60 40 mm automatic guns were purchased as well as 102 20 mm guns, while a total of 210 3.7 cm anti-tank guns were acquired during the same year. The heavy 21 cm coast guns from Skodaverken were delivered in 1944. Apart from Germany gunnery equipment was only acquired from Finland (219 12 cm mortars in the years 1942–1944) and Switzerland (450 20 mm anti-tank guns and 300 20 mm anti-aircraft guns).[136]

The overwhelming majority of the imports of gunnery equipment took place during the period up to and including 1941. During this period the reinforcements were based mainly on requisitions from Bofors and imports. This was followed by a period in which Bofors alone accounted for by far the greatest part of the contribution. This made the company's position as the sine qua non of the rearmament quite apparent. For all the branches of the services and a large variety of products the defence was dependent on its production capacity (cf. above as regards ammunition production and heavy forging). Total deliveries to the Swedish Government amounted to the following:[137]

[135] Viktigare beställningar av artillerimateriel för marinen 1/7 1939–30/6 1945. Ber. v. KMF CF III. Vid Aktiebolaget Bofors för tygavdelningen beslagtagen materiel. Ber. v. KATD. CF. I. MHA.

[136] See p. 000.

[137] Steckzén, p. 711.

	1939	1940	1941	1942	1943	1944	1945
millions of kronor	115		109	145	111	113	71

In 1942 the company, including its subsidiaries, had about 11,300 employees, which meant an increase of 3,300 since 1938.[138] During those years Bofors worked close to the limit of its capacity, reaching a peak in 1940.

6. *Summary*

The important examples of the acquisition of equipment which have been discussed here show that the years 1940–1941 meant above all an intensive production of the lighter and simpler equipment for which a production capacity was available. The ammunition production and the weapon production are representative. Alongside this attempts were made to buy foreign equipment to fill the gaps. In the long term the problematic shortages proved to relate to tanks and aircraft with their fittings, above all engines. On the whole it was impossible to import such equipment and experience of production within the country was very limited. Efforts were concentrated on these areas. Private domestic companies which were suited to this type of production were supported in every possible way. However, it was not until the most acute threat of war had already been removed that it proved possible to deliver modern tanks at a steady rate, and by the time that domestically designed aircraft which were technologically satisfactory emerged from SAAB's assembly halls the war was practically over.

If a comparison is made between Sweden's war industry before and after the war the difference is striking: before the war it was possible to produce within Sweden traditional small arms, guns and warships of a good international standard. After the war the obvious lost ground in relation to automatic weapons, tanks and aircraft had been made up.

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[138] Steckzén, p. 727.

IV

THE ENGINEERING INDUSTRY BLOCKADED AND MOBILIZED

A. The role of the military orders in terms of quantities

The plans which were made had for a long time taken into account the fact that in the event of war or a situation of similar gravity Sweden would have to rely on her domestic private engineering industry to a high degree. It was not practically possible to make sure of supplies by stockpiling, and it was unrealistic to count on uninterrupted imports in such a situation. The Swedish engineering industry, which was on a high level as far as quality was concerned and was richly diversified, constituted a great potential armament industry which had to be adapted to the production of military equipment. The availability within the country of technical expertise in the form of an established war industry was of special value for such an adjustment. During the 1930s the only specialized industry of any significance in this sector was Bofors, and on the whole the Government viewed the expansion of this company with satisfaction. There were discussions about a Government takeover of the company at the beginning of the decade, but this idea was rejected by the military equipment commission of 1932. Bofors concentrated to a marked extent on exporting. This gave the company a large volume of production and hence opportunities for technological development work which led it to a position of international preeminence above all in the sphere of artillery gun design. It was maintained that a state-owned company would not be able to count on large exports, and the company's value as far as defence potential was concerned would be drastically reduced. Quite simply Bofors was too valuable to tamper with. Nor were plans for a state monopoly, which had on occasions been mooted as far as the aircraft industry was concerned, put into effect. The military equipment commission's report resulted

solely in increased Governmental control through the setting up of the military equipment inspectorate in 1935.[1]

The more imminent appeared the risk that Sweden would be drawn into an armed conflict, the less inclined the Government probably was to transfer the responsibility for military equipment to Government establishments. In any event radical interventions in that direction would mean problems of adjustment which from the point of view of both time and cost would constitute an inferior alternative to relying on an already existing capacity. As the previous chapter showed Government operations during the war period were limited to manufacturing within traditional areas: ammunition, firearms and to a certain extent warships – apart from repairs and design work. An interesting phenomenon, and what may also be regarded as something of an exception to the rule, was KFF's production of fighter planes (see p. 127). It was regarded as profitable to build aircraft independently of SAAB under Government supervision. However, the operation can hardly be regarded as a major departure from the main principle of distribution between Government and private military equipment production. First of all, the actual production was carried on entirely by private companies; the role of the air force administration was limited to design and assembly.[2] Secondly, it was clear throughout that it was a question of a project of a temporary nature, motivated by the shortage of aircraft, before the aircraft industry had reached full capacity. There were never any plans for a continuation of Government aircraft production, and this is underlined by the fact that the J 22 was a blind alley technologically, with no development potential.

If one includes the production of the J 22, the Government's new production in terms of value can be assessed at around 10 per cent

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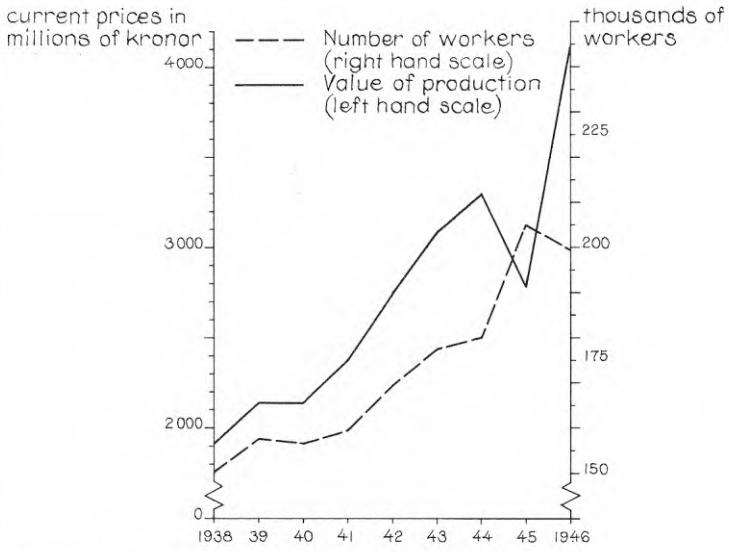
[1] The main features of the military equipment commission's report are covered by Government Bill no. 87 of 1935, pp. 1–36. The debate in the Upper House took place at the beginning of the month of April. Fk prot. 22:2 d, 25:11 d; Ak prot. 24:4 d, 26:20 d.

[2] The maximum number of workers at KFF's assembly factory was 467. KKV till chefen för försvarsdepartementet 31/1 1945. IK KA EI:37 dnr h 110. RA.

Diagram 7. The value of production and the number of workers in the engineering industry.



Source: SOS Industri.

of the total value of the war period.[3] The balance of about 3,300 million kronor went on private industry.

Diagram 7 shows how the Swedish engineering industry developed during the years 1938–1946 in terms of production value and the number of workers. State-owned industry is not included in these figures.[4] The production is expressed in terms of current prices, as is the case throughout this account. If the changes in the value of money are taken into consideration the picture alters somewhat, since prices

[3] The estimate is based on figures for the value of the new production in relation to small arms and ships and figures for the numerical distribution of workers in Government and private industry in the manufacturing of small arms ammunition and missiles. The rough figures are: small arms: 50 million kronor, ships: 50 million kronor and ammunition: 150 million kronor. Cf. pp. 00–00, 000, 000.

[4] The engineering industry means group 1 of the Official Statistics, ore mining and metal industry, with the exception of mines, ore concentration plants, iron and steel works and metal works.

shot up during the period 1939–1941. Expressed in index figures (1938 = 100) the production, in fixed prices, was as follows:[5]

1938	1939	1940	1941	1942	1943	1944	1945	1946
100	111	97	101	111	122	130	109	157

The development within the engineering industry will be the subject of more detailed comment later. First the military orders' share of the total production for the war period will be established. One basic factor for this is the grants for mechanical military equipment which were calculated in chapter 1 (see p. 17).

After deductions for imported equipment and state-owned companies a balance of about 3,300 million kronor remains. A simple comparison with the total production of the engineering industry over the same period shows that the armed forces bought 23 per cent of the total production.[6] When it is a question of distributing the production intended for the armed forces over the whole period it is not possible to use the allocation of grants as a basis, for these give no direct information as to when the production took place. However, sources are available for such a distribution over the period in question in the form of a number of studies which were carried out through IK during the period 1939–1945. Through a census which was carried out twice a year the work done by the companies in a certain month was established, and records were therefore kept of the distribution of the work between military orders, export orders and other orders.

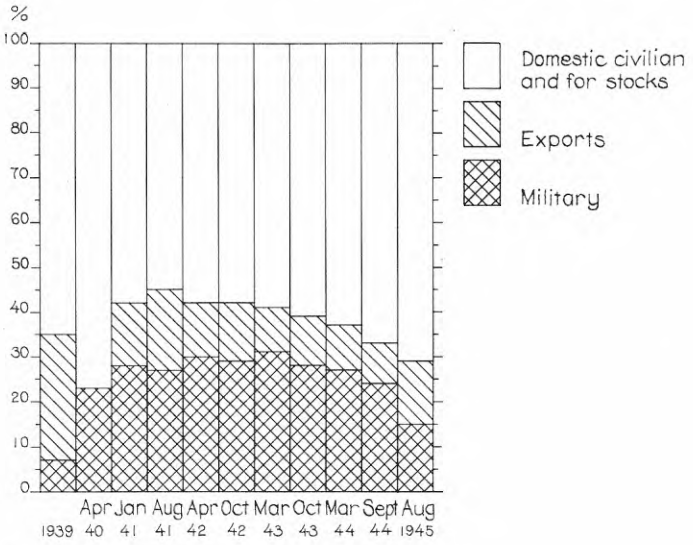
[5] The conversion has been based on the wholesale price index of the Board of Commerce for machinery and means of transport (1935=100):

1938	1939	1940	1941	1942	1943	1944	1945	1946
113	114	131	140	147	150	150	151	155

Source: Statistisk årsbok 1939–1945.

[6] The total value of the production 1/9 1939–30/5 1945 can be estimated at 14,656 million kronor.

Diagram 8. Production in the Swedish engineering industry in terms of destination of sales.



Source: IK: UT, PL. RA.

The proportion of working hours devoted to the various types of production is shown in diagram 8.[7] According to this, from April

[7] The percentage distribution of workers in various sectors of the whole of the engineering industry is based on figures for the distribution in larger and smaller companies respectively, with a dividing line of 100 workers. It has been possible to make the assessment because of the fact that either the number of working hours or the number of workers has been known for the two groups. In some cases – 1941, October 1942 and August 1945 – such figures have not been available and the distribution has had to be gauged approximately on the basis of known figures. Since the relationship was very stable – whether one uses working hours or the number of workers in the calculation, the larger works account for about 83 per cent of the capacity during the period – the approximations do not result in any great uncertainty.

IK's employment researches do not descend as far in order of size as do the Official Statistics, but only list companies with 20 – in 1945 25 – workers. This means that the number of works in IK's researches is small in comparison with the latter: at most about 15 per cent. As far as the number of workers is concerned, for the same reason IK's researches cover a larger proportion of the material on which the Official Statistics are based. As is shown in the table below the level of coverage increased from about

1940 until September 1944 at least 24 per cent of the labour force would be engaged in military production, and during the peak period in 1942–1943 around 30 per cent. Here a high and remarkably even load becomes apparent.

If it is assumed that productivity in the working hours set aside for military purposes was the same as for the other hours – and there is no reason to assume otherwise – it becomes possible to "translate" the percentage proportion of working hours into production values and compare the result with the sum calculated on the basis of the money granted. The result of such a "translation" is 3,862 million kronor, i.e. a higher sum than that which was calculated on the basis of the grants.[8] According to IK's records the average load of military orders

two-thirds to more than three quarters up to 1942 and remained as high throughout the period.

	April 1940	Aug. 1941	April 1942	Oct. 1943	Sept. 1944
1. Number of workers according to IK	95,000	108,000	130,213	143,626	142,588
2. Number of workers according to SOS	156,626	159,464	169,561	177,255	180,031
3. 1 as a percentage of 2	61	68	77	81	79

IK UT H 28/40, UT H 29/40, PL H 2c/42, PL H 3/42, PL H 17/44, PL H 25a/44, PL H 2c/45; Handelskommissionens arkiv III AA prot. 18/12 1946 bil. RA.

[8] The estimates have been compiled in the following way:

	Engineering industry's production in millions of kronor (SOS)	Proportion of working hours devoted to military production (IK) %	Production for military purposes in millions of kronor
1939 1/9–30/12	700	7	49
1940	3,138	25	534
1941	2,379	27	642
1942	2,756	30	827
1943	3,085	30	926
1944	3 298	25	824
1945 1/1–30/6 approx.	300	20	60
Total approx.	14,656		3,862

Note: A labour dispute completely paralysed the engineering industry from the beginning of February 1945.

is 26 per cent which is three per cent higher than the proportion calculated above. The difference in the results is probably due mainly to the fact that IK's census did not include the whole engineering industry but only applied to companies with more than 20–25 workers. Because of this a large number of small companies with a total of around a quarter of the engineering workers employed in the country disappeared. Since the smaller companies, generally speaking, had a smaller share of military orders (see p. 149) one can assume that IK's estimate of the share of military equipment production is somewhat too high if the whole sector of the industry is taken into account.[9] An approximate but more realistic estimate of direct military orders' shares of the total production value of the Swedish engineering industry during the period of the war appears on the next page in the form of diagram 9 together with the collocation of figures below it.[10]

How then was the military production fitted into the overall development of that sector of industry? During the period in question the engineering industry's international approach and its great importance for the armed forces made it dependent to a high degree on political and military developments beyond the borders of Sweden. Political developments abroad had already had an effect from 1938 onwards. The general decline in business which could be seen in the international economy was counteracted in the case of the engineering works by the tendency to rearm in Europe. In addition there was in Sweden a continuing high rate of investment both in industry and in

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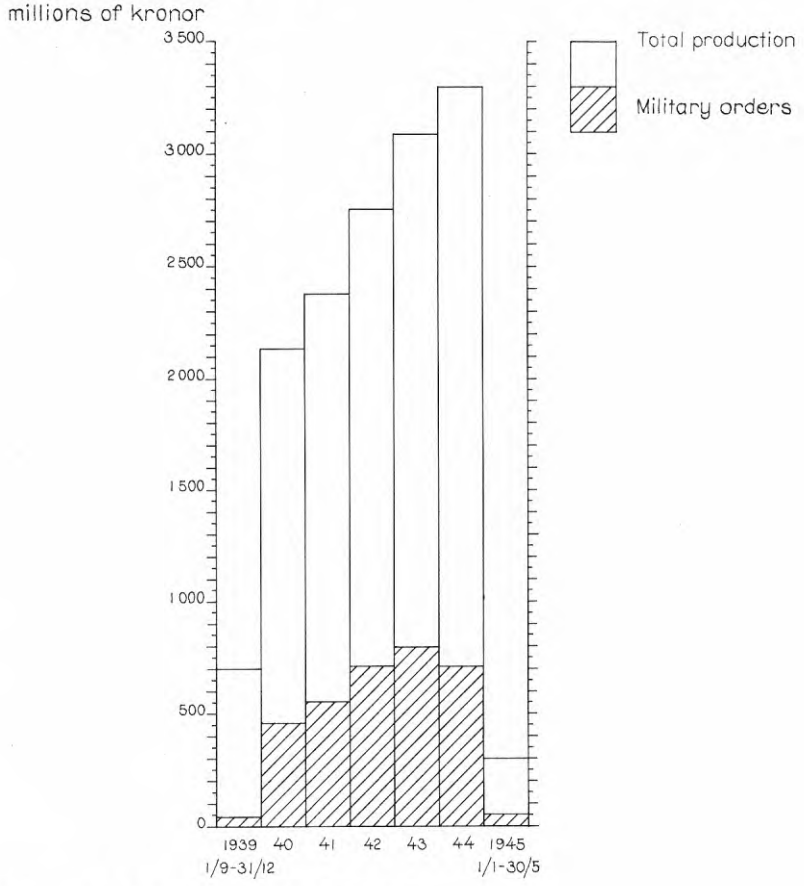
[9] Before the five-year plan for 1942–1947 an estimate was compiled within IK of the burden in terms of value which the military orders would impose on the engineering industry during 1941. The information was supplied by the administrations and SAN and included all workshops. The result was 650 million kronor, distributed as follows: the army; 300, the navy: 75, the air force: 75, joint ammunition: 200. IK KR h 2/42. RA. When 10 per cent is deducted for Government production this figure becomes 585 million kronor, which on the whole is in the same proportion to the estimate of 642 million kronor according to IK's percentage rate for 1941 as 3,300 is to 3,862.

Thus this spot check confirms the estimate based on the equipment grants and indicates a military share of 23 per cent for the period as a whole.

[10] The production values have been obtained by a proportional reduction of the yearly production values obtained from IK's percentage rates by $\frac{3{,}862-3{,}300}{3{,}862} = 0.14$

Cf. note 8 above.

Diagram 9. The production of the engineering industry 1/9 1939–30/5 1945 and the proportion of military orders.



Source: SOS Industri, IK: UT, PL. RA.

building operations.[11] From the beginning the year 1939 was characterized by the threat of war. The increase in the demand for armaments was most apparent as regards weapons and ships.

[11] The account of the economic development of the engineering industry is based on Meddelanden från konjunkturinstitutet A:2, pp. 44–47; A:3, p. 44; A:4 pp. 4–6, 14–15; A:5, pp. 12–13; A:6, p. 15; A:7, pp. 19, 34–35; A:8, pp. 12–14; A:9, pp. 9–14; A:11, pp. 5, 74–76; A:12, pp. 76–76.

	Production of the engineering industry in millions of kronor (SOS)	Military orders in millions of kronor	Percentage proportion of military orders
1939 (1/9–)	700	42	6
1940	2,138	459	22
1941	2,379	552	23
1942	2,756	711	26
1943	3,085	796	26
1944	3,298	709	22
1945 (–30/5)	300	52	17
The whole period	14,656	3,321	23

When the war broke out in September 1939 the engineering industry in Sweden came under the influence of two main forces which would be decisive for the development of the sector for several years to come: on the one hand the direct consequences of a blockade and a war which affected the prospects of exports and the possibilities of being supported by production resources, and on the other hand the demands for a rearmament of the Swedish armed forces. However, the direct consequences of the new situation took some time to occur. Exports declined somewhat during the autumn of 1939, but the decline was compensated for by the increase in Government orders for military equipment. The unprecedentedly large building programme for 1939 still acted as a major stimulus for demand.

It is possible to say with a certain justification that the Swedish economy during the first months of the war was still a peace economy. As the autumn and winter wore on ever greater demands were made for production results. Exports were stepped up, especially after the outbreak of the Finnish Winter War. The increased demands from several quarters resulted in an increase in the production of the engineering industry to absolute maximum figures and in the capacity of machinery and manpower being used to the utmost.

The situation was to alter in several respects during the course of 1940. The Finnish War came to an end, domestic building operations were on the decline, and Sweden's trading connections to the west were cut off by the German occupation of Denmark and Norway

in April. The importance of external developments is reflected in the export figures from the first months of 1940.[12]

The value of the exports in 1940 as a percentage of 1936–1938.

Machinery, means of transport, instruments et cetera	
January	217
February	125
March	115
April	82
May	62

The exports which took place after April 1940 went almost exclusively southwards. In spite of the fact that Government orders for military equipment now began to mount up, the engineering industry experienced a slowing down in demand in the summer of 1940. This was to a certain extent connected with the fact that orders for military equipment were short-term and related to lighter equipment such as ammunition. The acute demands were met with comparative rapidity, and new orders were not placed at a corresponding rate. The situation stabilized in the autumn of 1940 and there was once more an increase in production. This is connected to some extent with the fact that the production of certain items which was stimulated by the war situation gathered momentum. For example producer-gas units were manufactured at a remarkably rapid rate from the month of September onwards. One tenth of the working hours of the engineering industry were used for the production and adaptation of these. The electrification of the rural areas and the production of carbide lamps were other fields in which operations were stepped up for reasons of preparedness.

In the meantime longer term rearmament was planned. The production of aircraft, tanks and vehicles amongst other things began to be organized. As far as making room in the engineering industry for the extensive production of military equipment was concerned, the situation in 1941 was quite different from the situation in the first year of the war. During the winter of 1939/40 in particular Govern-

[12] Meddelanden från konjunkturinstitutet A:6, p. 59.

ment orders had come into conflict with the companies' other undertakings, but developments during 1940 resulted in the emergence of a reserve capacity which the engineering works were glad to use up in producing goods for domestic military requirements. The increase in the total production from 1941 was not generally speaking limited by any capacity ceiling but rather by the supply of raw materials and fuel and also – from the spring of 1942 – a certain shortage of labour.[13] The Government's allocation according to priorities – with military requirements well in mind – determined the size of the production in the strictly controlled economy which had developed by this time.

From the autumn of 1941 onwards the development had entered a phase of stability. Up to and including the year 1943 the relations between production for a civilian domestic market, an export market and Government orders for military equipment were comparatively stable (see diagram 8). The Government orders now related above all to heavier equipment and claimed about a quarter of the capacity of the engineering works. The export production which had accounted for at least one-third of the total before the war now comprised about one-eighth. The World War also determined the concentration of the rest of the production to a not insignificant extent; this applied for example to investments in machinery and buildings for the production of military equipment or replacement production of various kinds.

This "wartime boom period" resulted in an increase in the volume of production of the engineering industry during the period 1941–1943. From the spring of 1944 conditions had reverted to those of the pre-war period inasmuch as the demand once more determined the size of the production. The military orders declined as the equipment confirmed in the rearmament plan was completed and the emergency demands abated. At the same time developments on the battlefields,

[13] During the years 1941–1943 the employment level was around 90 per cent of the capacity for the larger works and between 75 and 80 per cent for the smaller. Thus certain parts of the production capacity – those which could not be devoted to military purposes – were not used at all. Often the companies in question were simply not given the allocation of raw materials and power. In 1944 too the larger companies' use of their capacity declined towards 80 per cent. By this point in time the total demand had been reduced. IK PL h 2c/42, 17/44, 25 a/44, PM angående sysselsättning 12/6 1946. RA.

primarily within "Festung Europa", disturbed the export situation. On the domestic market developments were uncertain in the face of what the peace which was now in sight would bring about. A certain increase in the building of houses was the only upswing factor. Not until there was the threat of a conflict on the labour market did a recovery in production occur in the autumn of 1944.

The total strike within the engineering industry during the months February–July 1945 makes it more difficult to interpret developments during the final stages of the war. The factors which created the demand situation in 1944 were still in fact operative in 1945: declining military orders, export problems, a cautious domestic market. During the strike production requirements were dammed up and manifested themselves in high production figures for the second half of the year 1945 and the beginning of the year 1946. The continuing development during the latter year in fact showed that the post-war picture had not yet become clear and that the expansion of the post-war period with its large increase in exports had not yet begun in earnest.

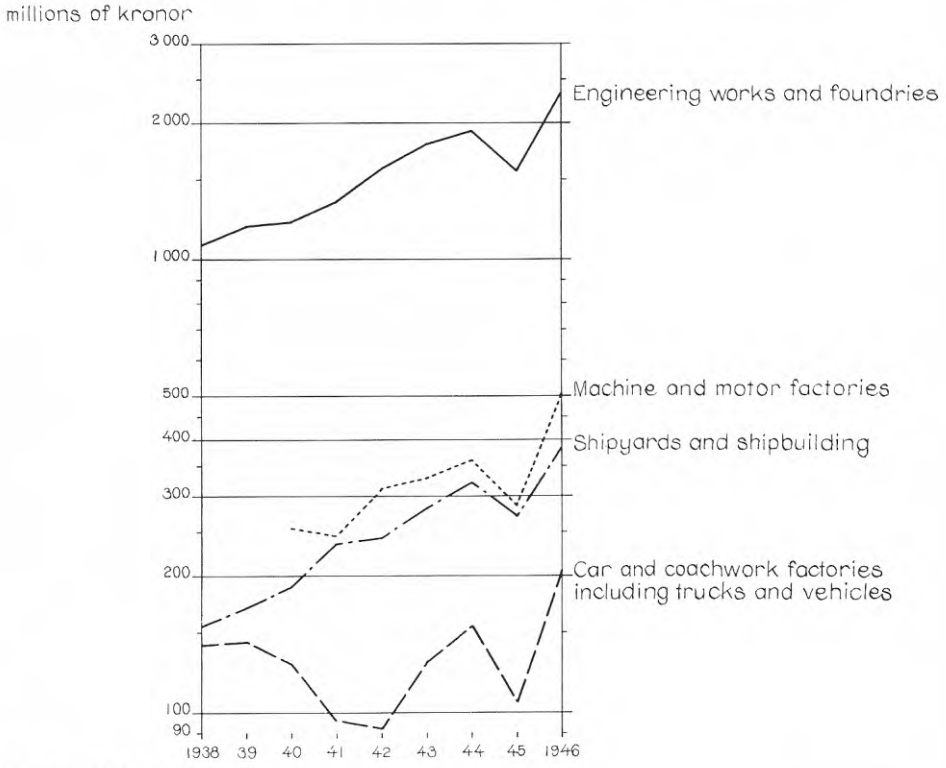
Summarising the development for the whole engineering industry, it can be established that during the period of the war Government

Table 12. *Work on military orders within parts of the engineering industry. As a percentage of the total work.*

	Sept. 1940	April 1942	Oct. 1943	Sept. 1944
Machine industry, heavy	37	49	48	30
Machine industry, light	35	31	27	26
Car and engine factories	23	74	71	70
Shipyards	21	19	13	7
Elec. machines and appl.	34	18	21	17
Accumulators and cables	–	–	26	15
Foundries	24	20	16	11
Sheet-metal industry, heavy	29	25	19	16
Sheet-metal industry, light	34	34	35	32
Tool, nut and bolt industry	18	30	24	21
Instrument factories	40	39	39	46
Accessory factories	4	52	32	26
Metal goods factories	39	53	38	29

Source: IK UT H 28; PL H 1/42, 2c/42, 25a/44. RA.

Diagram 10. The development of the production of certain branches of the engineering industry.



Source: SOS Industri.
Note: Logarithmic scale.

orders did not merely replace the vanished exports but also allowed that sector of industry to expand. Thanks to its strategic importance the engineering industry was favoured by being given the production resources which it needed for its expansion. Problems of adjustment only arose in 1940 and 1944, but they were not very profound and they entailed no serious consequences for the industry as a whole.

The picture of the quantitative role of the military orders for the engineering industry will be amplified somewhat in two respects: the distribution between the parts of this sector of industry and the distribution between companies of various sizes.

A comparison between different parts of the engineering industry shows that the military orders were unevenly distributed.

During the summer and autumn of 1940 the machine industry – which was the dominant one and employed about one-third of the workers from the engineering works – experienced a certain general decline and the military orders were very unevenly distributed. Because the rearmament was stepped up, from the autumn of 1941 and for about two years thereafter the heavy machine industry's share of the orders for military equipment increased by getting on for half, while there was a slow decline in the figures for the light machine industry. During this period this part of the engineering industry worked close to the limit of its capacity.

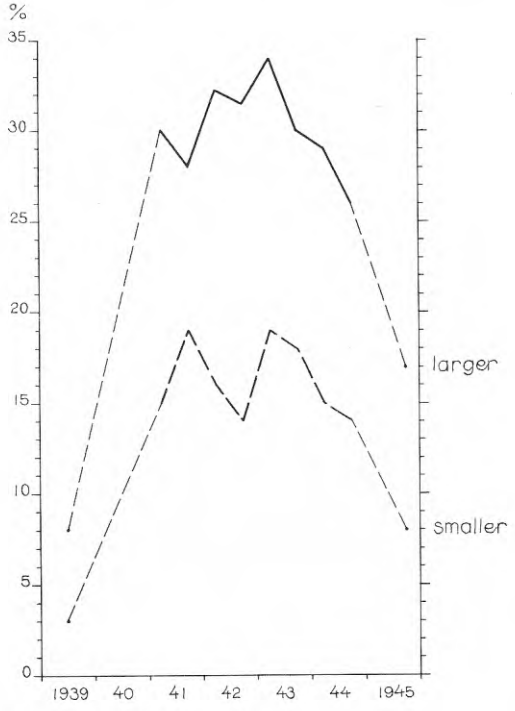
The car and motor industry's development resembled that of the heavy machine industry but was even more dramatic. This branch of the industry which employed about 5 per cent of the workers in the engineering industry as a whole was hard hit at the outbreak of the war. The civilian market practically disappeared and it was not possible to change over rapidly to other production. The manufacturing of producer-gas units provided short-lived relief. However, when the picture of the equipment requirements of the Swedish armed forces had become clear and the adjustment had taken place within the companies it was precisely the car and motor industry which concentrated most heavily on the production of military equipment. As a result of this the total production was also increased. Towards the end of 1944 two-thirds of the capacity was still used for military orders. These were mainly responsible for the increase in production which took place within the car and motor industry after 1941 (see diagram 10).

There was no similar development within the shipbuilding industry. The work in hand on military orders was comparatively small and already showed a tendency to decline from 1942 onwards. New civil shipbuilding and repair work provided the main employment for the expanding shipbuilding industry (see diagram 10).

Of the other branches of the engineering industry the electrical and the sheet-metal industries were the largest. Both were characterized by the fact that they reached their maximum shares of military equipment production early on, and these did not in fact exceed the share of the engineering industry as a whole to any appreciable degree.

During the whole period under investigation engineering works with more than 100 workers had a greater share of military orders than companies with between 20 (1945 25) and 100 workers. As is shown in diagram 11 the percentage figures for works with more than 100 workers from January 1941 to March 1944 range from 28 to 34 while the figures for the latter companies range from 15 to 19. The difference is accentuated somewhat during the period under investigation; the smaller workshops reach their maximum percentage figure, 19 per cent, in August 1941 and only attain it again in March 1943, while the larger engineering works increase their percentages to new maximum figures in April 1942 and March 1943.

Diagram 11. The share of military orders at the larger and smaller engineering works respectively.



Source: IK: UT, PL. RA.

Diagram 12. The accumulated share of the total working hours spent on military production within the engineering industry. The ten biggest manufacturers.

Source: IK: UT, PL. RA.

An indication of a shift towards the larger engineering works is also given by the fact that in September 1940 the larger works (95) accounted for just over half of the military production and in April 1942 the larger works (224) accounted for over 90 per cent of that production.[14]

For some points in time it is possible to study the work of the engineering companies in detail. Thus diagram 12 shows how large a share of the total production of military equipment was accounted for by the ten leading companies in September 1940 and April 1942. From this it is possible to distinguish a clear tendency towards increased concentration: ten works account for getting on for twice as large a share in 1942 as in 1940. Clear evidence of continuing concentration after the conclusion of peace is to be found in the fact that in October 1946 three companies accounted for half of the produc-

[14] IK UT h 28; PL h 2 c/42. RA.

tion of military equipment.[15] In 1940 three companies accounted for 16 per cent, and in 1942 for 22 per cent.

The explanation for the apparent concentration is mainly to be found in the change in character of the acquisition of military equipment: at the beginning of the war it was a question of looking after all the available capacity in order to make grenades and manufacture light equipment of all kinds. Gradually the emphasis shifted to heavier objects such as tanks and aircraft, and there was a concentration around certain larger companies. Diagram 12 certainly gives an exaggerated picture of the absolute level of concentration, since a large number of sub-contractors were attached to the bigger companies, but the trend towards concentration is nevertheless unmistakable.

The companies which crystallized into the large suppliers of equipment to the armed forces in the middle of the period under investigation differed greatly from each other. Bofors continued to play its central role as a specialized military equipment company both before and after the war. Husqvarna Vapenfabrik was the largest of the other weapon manufacturers, but only just over one-third of it was concentrated on military production. SAAB developed into a large new company for the production of military equipment and in 1943 surpassed Bofors in the number of working hours devoted to defence supplies. A number of companies were attached to SAAB which were to an equally great extent engendered by the rearmament, above all Svenska Flygmotor. In the long term the establishment of this group which concentrated on aircraft manufacturing was the most important result of the rearmament of the Second World War as far as industry was concerned. In consequence the Swedish war industry had expanded greatly by the time the war was over.

Another important group of suppliers were the car and motor manufacturers, with Scania Vabis and Volvo as the most important companies. This sector of industry concentrated to a very great extent on the production of military equipment in the years 1941–1944 but in this case the phenomenon was more ephemeral; in an abnormal situation – after certain problems of adjustment – the Government

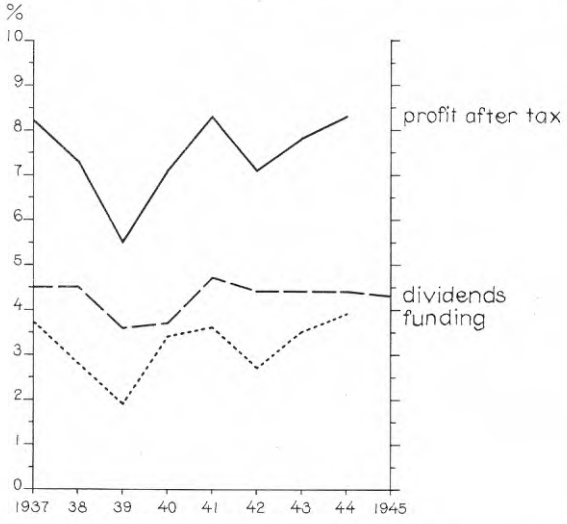
[15] IK UT h 28; PL h 1/42; PM 12/6 1946; Handelskommissionen III AA. Prot. 18/12 1946. bil. RA.

orders replaced the vanished civil market. Thanks to their production structure the car industry and the motor industry were never to become as dependent on Government orders as the manufacturing group connected with aircraft production.

A further important group of workshops were the shipyards, amongst which Eriksberg and Kockum were the armed forces' largest suppliers. Neither these companies nor – even less – that sector of industry as a whole concentrated to an extreme degree on Government production. During the whole of the period under investigation there was a strong civil demand for repairs and the building of new ships both within Sweden and abroad. Extensive work was carried out, not least on behalf of the Germans. In the long term the shipbuilding industry was not affected by the period of rearmament as far as its approach to production was concerned.

In concluding the discussion of the quantitative importance of the military orders it should be observed that the engineering industry was far more dependent in practice on Government orders than is shown

Diagram 13. Profits, dividends and funding in relation to companies' own capital.



Source: Vinster, utdelningar, produktion och investeringar inom industrien 1937–1947, p. 48.

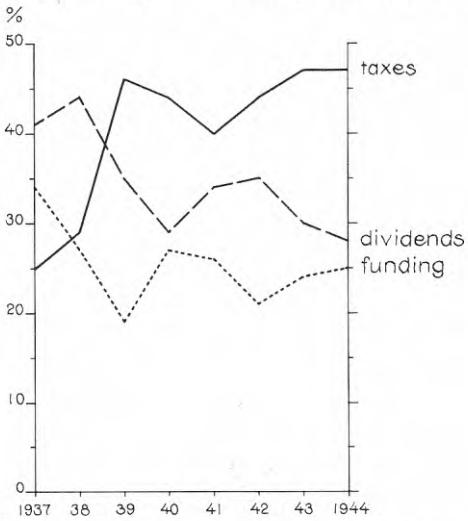
by the figures produced here. In many cases production for the armed forces demanded major readjustments with new investments in the form of buildings, machinery and tools which made demands on the resources of the domestic engineering industry. If the scope of the question is widened to include the inquiry as to how much of the engineering industry's production was connected with the country's general emergency situation which resulted from the war, further important factors emerge. The most important of these was probably connected with the actual or apprehended shortage of imported fuels: it fell to the engineering industry to acquire the materials for a stepping-up of electrification, and also to produce all the carbide lamps, bicycles, producer-gas units and the numerous installations which were required when wood was to replace coal for heating and industrial power. If in addition the picture is taken to include the altered conditions of competition both within and outside Sweden resulting from the western blockade, hardly any company escaped the influence of the exceptional conditions during the period in question.

B. Trading results

The first part of this chapter has concentrated on outside conditions for the development of the engineering industry, in which production for military purposes played an essential role. The question which the text which follows will attempt to answer is whether the expansion of the engineering industry in volume of production was parallelled by an increase in financial results or whether the difficulties as far as production resources were concerned or the extra taxes necessitated by the war imposed such a strain on the companies that business profitability deteriorated.

The most readily available gauge of the profitability of a sector of industry is the yield received from capital invested in the companies. The dividend paid to the shareholders then becomes the yardstick to be used. However, company managements might for various reasons take differing views as to how much of the profit ought to be paid out as dividends. In general terms it can be said that the trend of the development during the 1930s was towards the payment out of an ever decreasing share of the profit, while an increasing share was

Diagram 14. The allocation of profits before tax.



Source: Vinster, utdelningar, produktion och investeringar inom industrien 1937–1947, p. 48.

retained within the company, e.g. in the form of funds of various kinds.[16] In this case it would appear necessary, when estimating the development of profitability, also to take into consideration that part of the profit which is retained within the company.

Certain basic material for a discussion of the relations between own capital and profit, dividend and funding is given in diagram 13. It is based on a representative sample of 39 of the larger companies within the metal industry.[17]

[16] Index. Svenska Handelsbankens tidskrift juni 1942, p. 15.

[17] The diagram is based on information provided by Industriens utredningsinstitut: Vinster, utdelningar, produktion och investeringar inom industrien 1937–1947, p. 48. The survey comprised 39 companies within the metal industry whose own capital was as follows (in millions of kronor):

1937	1938	1939	1940	1941	1942	1943	1944	1945
356	366	370	379	399	418	439	443	470

The reorganization of the tax collecting system in 1945 makes it very difficult to estimate the tax for that year.

As a result of the outbreak of the war in 1939 the profit fell, but there was a speedy recovery and a certain nominal increase took place during the period up to 1944. Thus in relation to the companies' increasing own capital the profit amounted to about 7–8 per cent. After a lower level of dividends was paid temporarily in 1939 and 1940, this allowed for a remarkably stable dividend policy with the 4.5 per cent of the pre-war years as a target. Nor did the development preclude a funding on the same level as before the war.[18]

There is a natural explanation for the stability of dividends from 1942 onwards: an Act of 5 February 1943 imposed a limitation on dividends with effect from the dividend for 1942. The companies were not allowed to increase the dividend in relation to their own capital above the level for the period 1938–1940.[19]

One question which is of particular interest during the years under consideration is the effect of taxes on the profitability of the companies. During the war years an increased burden of taxation was

[18] Supplementary information can be obtained from Svenska Handelsbankens tidskrift Index (juni 1943, p. 13, juni 1944, p. 17, maj 1945, p. 17), which carried out a survey of 24–26 companies on the same basis. The following table shows the results:

	Own capital in millions of kronor	Net profit %	Dividend %	Funding %	Note
1939	–	10.5	6.5	4.0	26 companies
1940	–	8.4	6.3	2.1	26 companies
1941	695.4	9.26	6.49	3.0	24 companies
1942	745.9	8.85	6.10	3.1	25 companies
1943	759.7	8.82	6.23	3.0	25 companies
1944	760.7	8.12	6.22	2.4	26 companies

Note: For 1939 and 1940 there are no absolute figures available. The percentage figures are rough estimates from a diagram in the Index.

One defect in the information is the inclusion of Grängesbergsbolaget which explains the poorer result for 1944 (in that year the company's profit fell by 20 million kronor as a result of developments in the war in Europe).

Otherwise the survey confirms the conclusions drawn in the text: stable dividends and funding after a certain weakness at the outbreak of the war.

[19] Cf. Affärsvärlden 8/4 1943. SFS 1943.

imposed on industry. The Government tax was the heavy item; during the years 1939–1944 it accounted for more than 70 per cent of the total tax collected while the municipal tax amounted to 25–30 per cent and a percentage went towards the special war profits tax.[20] The increase in the burden of taxation is clearly shown in diagram 14 which is based on the same sample of companies as diagram 13. It is a remarkable fact that in spite of the sharp increase in the provisions for taxes the engineering works were able to maintain dividends and funding on a fairly stable level in comparison with the pre-war period. The explanation obviously lies in the fact that profits were higher. In relation to the companies' own capital they developed as follows:[21]

	1937	1938	1939	1940	1941	1942	1943	1944
%	11	10	10	13	14	13	15	16

However, to arrive at a true estimate of the possibilities of profitable business for the engineering works it is not enough to take into consideration the book profit and allowances for tax payments. To these should be added write-offs, on machinery and stock for example, and surplus dispositions of other kinds such as transfers to pension funds, et cetera. With the inclusion of "invisible" profit dispositions of this kind it would be possible to calculate a "gross profit" which would reflect more adequately the economic situation of that sector of industry.

[20] Vinster, utdelningar, produktion och investeringar inom industrien 1937–1947. IUI 1947, p. 48.

[21] In absolute figures the profit (in millions of kronor) was:

1937	1938	1939	1940	1941	1942	1943	1944
39	38	38	49	55	54	64	69

The companies' own capital is shown in note 17 above.

A priori one might expect that the engineering works – to the extent which the profit development allowed – made substantial provisions of the kinds mentioned above during the period 1939–1945. First of all the companies had been faced with an increased tax demand which was connected with the war situation and could therefore be regarded as temporary. Thus there were grounds, at least for the time being, for retaining untaxed profits within the companies. Certainly an inner consolidation of this kind also seemed desirable in the light of experiences from the First World War. Then the profits, in many cases splendid, of the war years had been eaten up rapidly by war profits taxation and a post-war depression. As regards the engineering industry part of the investments during the war years were directly concentrated on the production of military equipment. It would be natural if there was a desire to write off such investments more rapidly than usual since they in fact ran the risk of becoming more or less worthless when the war came to an end. The war also brought with it other investments, in shelters for example, for which special write-offs could be justified.

Finally, the period after 1938 was very liberal as far as allowing the writing down of the value of different items was concerned. The legislation of 1928 provided that "income from trading should be calculated on a bookkeeping basis". The bookkeeping of stocks was to correspond with "good business practice" which was soon to mean that on the whole they could be written down to an unlimited extent. Thereafter a change in the law gave the right from 1938 onwards to write off machinery and inventories just as freely. A further step in the development took place when the Supreme Administrative Court in a judgment about an income tax assessment for the year 1943 held that goods contracted for should be placed in the same category as goods delivered as far as write-offs were concerned. Thus this made it possible for a company to order raw materials and even before they had arrived – which could take a long time because of the widespread shortage of goods during the war years – use them for write-offs. During the last year of the war the view was widely held that because of this the development had gone too far and that the free write-offs should be limited. It had been the intention of the legislature that the power to write-off should act as a buffer against fluctuations in the economic situation and not that it should be used for tax eva-

sion, which, in the opinion of many people, was what was now happening.[22]

In the very nature of things it is difficult to establish the existence of and quantify "invisible" funding. However, some contemporary investigations can indicate the main features of the development.

In 1944 the National Price Control Board compiled an estimate of the "gross profits", i.e. taking invisible provisions into consideration, of 261 companies representing all sectors of industry. This estimate can appropriately be placed side by side with calculations of profits compiled by the Industrial Institute for Economic and Social Research and relating to 133 companies.[23]

No far-reaching conclusions can be drawn from the comparison between the lines in diagram 15 since the samples of companies are different. But it should be borne in mind that both samples have started with the larger companies and worked downwards, and that the 133 companies in the smaller sample should therefore be taken to be included in and constitute the bulk of the larger sample. The profit capacity and the tendency towards "invisible" fundings have proved to be greater amongst the larger companies.[24] Using the same sample of companies to calculate the gross profit as for the calculation of the profit before tax there is a sound basis for the assumption that the tendency towards an increase in the gross profit had been reinforced. In its present form the diagram shows that potential tendencies towards hidden profit dispositions during the pre-war years which

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[22] Annell, G., PM rörande nedskrivning av varulager i beskattningshänseende; Kungl. Maj:ts prop. nr 377 1945. Reply to the submission of the account by, inter alia, the County Administrations, the Audit Court and the Government taxation comittee of 1944. Observations about the trend towards ever increasing write-offs and appropriations before the final calculation of the profit are to be found in a large number of balance-sheet commentaries in Affärsvärlden. See for example 15/5 1941, pp. 400–401, 26/3 1942, p. 230, 2/7 1942, p. 253, 9/9 1943, p. 666, 1/6 1944, p. 458;

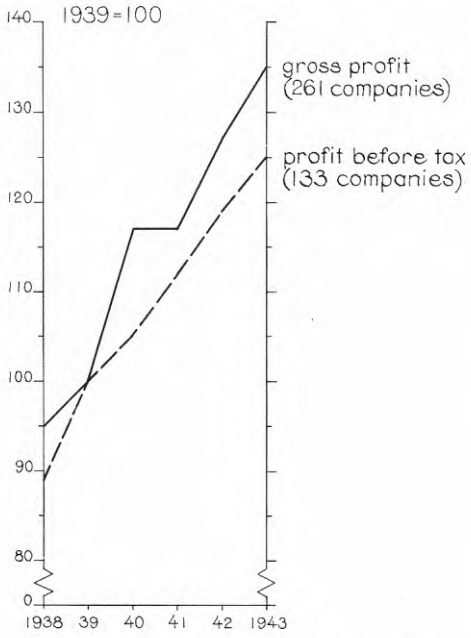
Västhagen, N., De fria avskrivningarna, passim;

The final accounts of the larger limited companies for 1940 with special reference to the disposition of the profits (in: Meddelanden från konjunkturinstitutet ser. A: 8 bil. 1); Meddelanden från konjunkturinstitutet A: 11, pp. 72–74.

[23] Vinster, utdelningar vid större industriföretag 1934–1943 IUI 1944, p. 11.

[24] See for example Government taxation committee of 1944: 1. Betänkande med förslag till förfarande vid avveckling av krigskonjunkturbeskattningen (SOU 1944:62), pp. 48, 51.

Diagram 15. Gross profits and profits before tax of the larger industrial companies.



Source: Vinster och utdelningar vid större industriföretag, p. 11.

were favourable as regards the economic situation were accentuated during the war. In 1945 certain investigations were carried out into the writing-down of stocks and goods contracted for, in connection with a proposal for a change in the law designed to curtail the right to free write-offs. The books for the year 1943 showed that the practice varied in this connection, but that there were often very large writing-downs. In one case six companies whose stocks consisted mainly of iron and steel products had written them down by between 55 and 87 per cent. Expressed in "pre-war prices" the stocks, worth 186 million kronor, had been written down by 129 million kronor, which meant that about 300 million kronor, according to the current value of money, was available as a reserve. In addition goods contracted for had been written down by 25 million kronor.[25]

[25] Annell, passim.

In 1944 the general taxation committee for that year published a report which contained certain criticisms of the relationship between stock values shown and stock values at pre-war prices. In this connection it was emphasised that the larger companies above all, especially those within the iron and metal industry, had built up large hidden stock reserves. In 1942 the stocks within this sector of industry, – which were particularly large in engineering works and shipyards – were valued at 618 million kronor in pre-war prices, and were shown at 438 million kronor. With a price increase estimated at 50 per cent this meant that the stocks were written down to less than half of their market value and that as a result a reserve of at least 450 million kronor had been created. The major part of the writing-down had taken place in relation to goods contracted for.[26]

Write-offs and other dispositions designed to retain profits within companies apparently took place on a large scale. These invisible fundings reinforce the picture already obtained of a positive development of profitability in the engineering industry during the period 1940–1944.

The war years also saw vigorous investment activity within the engineering works. A comparison between the situation at the end of the war and the situation at the beginning of the war shows that the production capacity increased by about 25 per cent. This meant that the country's capacity to be self-sufficient had increased by 50–60 million kronor, or 15–20 per cent of the imports of engineering products of the pre-war period. Within certain groups of goods in particular, such as machine tools, electrical appliances, tractors and other agricultural machinery, instruments and office machines there was a considerable increase in production resources.

The reasons for the extensive investments were to be found in the demand for military production and also for ersatz production when the imports were disrupted. During the first year of the war there were high figures for investments above all in machinery, but after that there was something of a slowing-down. By virtue of the fact that the more long-term production of military equipment and the ersatz

[26] The survey includes companies with a sales production value equivalent to about half of what is listed in the official statistics. 1944 års allmänna skattekommitte. 1. (SOU 1944:62), pp. 48–52.

production began to speed up from the second half of 1941 onwards the investments increased again, more rapidly now, with a greater proportion of buildings and other more permanent objects. The increase in the investment figures continued in the years 1942 and 1943 which show the highest figures for the period (see diagram 16).[28]

Although the particular needs of the war years lay behind some of the capital investments the development did not mean that this part of industry was ill prepared for the coming of peace. The bulk of the investments consisted of buildings, machinery and appliances which could also be used after adjustment for the civil market.[29] The stepped-up production of the years 1939–1943 had involved no wear and tear as far as capital was concerned. Instead, industry had

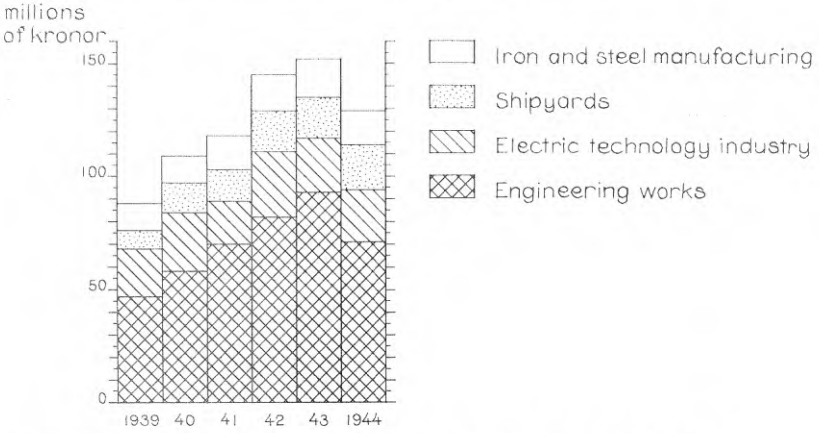
[28] Utredning angående ekonomisk efterkrigsplanering. 1. (SOU 1944:7), pp. 81, 107–108.

The four sectors of industry accounted for 95 and 93 per cent of the engineering industry's total investments in 1942 and 1943 respectively.

[29] In 1943 the percentage distribution of investments was as shown in the following table (according to Utredningar angående ekonomisk efterkrigsplanering 1. (SOU 1944:7), pp. 81, 107–108):

	Industrial buildings	Other production establish-ments	Machinery, appliances	Housing	Shelters	Total investment %	Total investment in millions of kronor
Engineering industry total including	38	8	45	5	3	99	164
Iron and steel manufacturing	34	4	48	12	1	99	13
Engineering works	38	8	48	3	4	101	93
Shipyards	47	15	32	3	4	101	18
Electro-technological industry	35	5	46	11	3	100	24

Diagram 16. Yearly investments within the engineering industry.



Source: Utredningar angående ekonomisk efterkrigsplanering 1, pp. 107–108.

strengthened its position through new investments.[30] It is part of the picture that the extensive investments had been carried out in the main with the companies' own capital. The companies only had to issue new shares to an insignificant extent and were seldom restricted to borrowing from banks or through bond issues.[31] The engineering industry emerged from the war years well equipped for a peace-orientated production.

C. The price-fixing of military orders

An assessment of the role of the Government orders in the engineering industry's production volume was made in the first part of this chapter. On the other hand the question of the profitability of these

[30] Meddelanden från Konjunkturinstitutet A:11, pp. 82–84; A:12, pp. 34–39, 58–59; Dahmén, E., Den industriella investeringsverksamhetens utveckling (in: Meddelanden från Konjunkturinstitutet B:3, pp. 120–130).

[31] During the period 1939–1944 heavy industry including engineering works financed about 70 per cent of their investments through write-offs and profit reservations. Dahmén, E., Finansieringen av industrins investeringar 1939–1944 (in: Inkomster och investeringar inom industrien 1939–1944. IUI 1945); see also Meddelanden från Konjunkturinstitutet A:11, p. 65.

very orders – as distinct from other orders – and thus their importance for the profit development of that sector of industry has not been discussed. Even with access to complete internal accounting material it would be very difficult to answer this question in respect of an engineering works which was engaged at the same time in production for the military and the civil market. Such an aim would be inconsistent with the object of this account, which is to keep the whole of the Swedish engineering industry in focus. To the extent to which it is possible to draw conclusions about the value of the production of military equipment for the industry they must be indirect and based on more general considerations.

The most important factor for estimating the value of the military orders is the price-fixing of military equipment. When a Swedish war administration began to take shape at the end of 1939, the question naturally arose as to the establishment of some form of organization for the review of the prices of supplies to the armed forces. It was difficult to conceive of a free price-fixing for several reasons. A sharp increase in prices would obviously occur since the military customers would be forced to place orders in competition with domestic civilian production and export demands. In the Swedish engineering industry the pressure of demand was very strong during the autumn and winter of 1939–1940. During previous years it had been possible to make military purchases under different conditions in which the companies' need for supplementary production in recessions and off-season was often exploited.[32] The acquisition of military equipment which took place under the auspices of certain provisions of the law, such as the general law of dispositions or the law of requisitioning, would in addition, according to the provisions of the law, be priced either by the National Valuation Board or through step by step negotiations between the parties. The latter applied to the so-called "war supply contracts" which the military administrations had made

[32] The head of PR 22/2–21/10 1940, R. Rausing, in an article entitled Några synpunkter vid prissättning av krigsleveranser (Ekonomisk Tidskrift 1941), pp. 18–28, described his experience of the problems of price-fixing. Summaries of PR's operations have been compiled by the Board: Prisbyråns verksamhet och resultat (author not disclosed), PM 4/9 1941 (H. Throne-Holst, head of PR from 22/10 1940 to 30/9 1942) and PM oktober 1945 (E. Larsson, head of PR from 1/10 1942 to 15/10 1945). IK PR BII:1 (öppna arkivet). RA.

Ruben Rausing worked out the basic features of the price policy as head of the Price Board of the National Industry Commission in 1940 and as a member of the Commission in 1941–1943 (Pressens Bild).

with certain companies and which imposed on the companies the obligation to supply specified products when called upon to do so.[33] On 17 January 1940 the Price Board of the National Industry Commission (PR) was set up to assist with this price-fixing.

To a limited extent the Board's tasks were to be the very ones mentioned above. The system of war supply contracts was abandoned soon after the outbreak of war and instead the purchasing armed

[33] The Government's acquisition of military equipment was partly controlled by the Requisition Act of 31 March 1938 (SFS 1938/87) paragraph 11 of which provided that compensation was to be paid on the basis of a valuation made by a National Valuation Board consisting of five people, of which the chairman and two members were appointed by the King in Council, and two members were chosen by the chairman from candidates proposed by the Board of Commerce and the National Board of Agriculture. Paragraph 31 of the Requisition Act (SFS 1938/304) imposed a duty to supply the necessary documents and information.

According to the Disposition Act of 22 June 1939 (SFS 1939/293) which was brought into force by ordinance on 6 September 1939 (SFS 1939/624), reasonable compensation was to be paid after investigation by the National Valuation Board. This Act was to be applied to a very small extent (only against Bofors in the autumn of 1939).

The regulations for war resulting from war supply contracts were set out in a proclamation by the King in Council of 2 December 1938 "med vissa bestämmelser om krigsleveranser m.m." (SFS 663/1938). A separate Act of 14 October 1939 (SFS 726/1939) imposed an obligation to give information about the cost of such war supplies.

forces administration signed supply contracts in which the prices had been fixed or in which a so-called price clause was included which provided that the price in the contract was a maximum price and that the actual price would be fixed through negotiations after a report from PR. In the event of a disagreement the question would be referred to an arbitrating body with a representative of each of the parties and a third from the Board of Commerce.[34] With the new forms of contract PR's tasks were on the whole the same as before but there was a difference, viz. that there was no longer any foundation in the form of legal provisions for PR's power to examine the accounts of the companies and the basis of their calculations, and this was to bring about certain difficulties.[35]

PR's main task was to work out principles for price-fixing and to get them accepted by the representatives of industry. No guidelines existed for this work. At a conference on 16 April 1940 certain "principles of price-fixing" were presented, which had been worked out within PR. These provided amongst other things that compensation for the replacement value of raw materials and other costs of materials was allowed to be included in the cost estimate. Furthermore compensation for all variable costs was allowed to be included, as was compensation for the fixed costs directly attributable to the production in question. No consideration was given to the imbalance which resulted when a part of the workshop could not be used because another part was being used for industrial production for the war. Write-offs were calculated on the basis of a reasonable replacement value and "in accordance with the normal practice" of the industry and the establishments in question in each case. The depreciation figures were lower for old establishments but investments which had been made exclusively for the production of military equipment were allowed to be written off completely within the delivery period. Interest and profit were both to be allowed in sums corresponding to a reasonable return of interest on all working capital in the parts of the companies affected by the deliveries. Sales and administration costs

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[34] War supply contracts during the war years were mainly signed by SAN-KKV but purchases also took place outside these. PM beträffande krigsleveranskontrakt. IK KR 30/42. RA.

[35] PM 25/4 1947. IK PR B II:1 (öppna arkivet). RA.

were allowed to be included in the cost estimate to the extent to which they were attributable to the Government orders. Certain other items were not allowed to be included, such as the writing down of unsaleable stock, interest on accounts receivable, collection expenses and bad debts. Special interest was paid in cases where companies went over from working in one shift to working in several shifts, when in fact certain kinds of costs, such as interest, write-offs and other fixed costs, could not be presumed to increase proportionately with the production. It was suggested that the procedure should be for companies to prepare estimates of costs in accordance with the guidelines above. Where appropriate a "normal estimate" and a "multiple shift estimate" should both be prepared. These should be certified and signed by a person responsible within the company. PR reserved the right to examine the basis on which a company calculated its costs, through an authorized auditor or its own staff.[36]

As will be seen the principles of price-fixing were expressed in very general terms and included – for obvious reasons – many vague phrases. It was for example difficult to calculate the replacement value of raw materials, not least because many raw materials were impossible to obtain on account of the blockade. As a rule estimates in such cases had to be based on prices of 1939. It was also difficult to be specific about conditions for writing-off and profit margins, having regard to the great variety of conditions prevailing within industry. Thus much was left open for individual negotiation.

However, the representatives of industry were not prepared to subscribe unconditionally to the principles formulated by PR. There was an apparent irritation at PR's entry into the arena. The procedure for the calculation of prices was considered unnecessary as far as supplies which could be regarded as normal for the industry were concerned even though the Government was the customer. Only with regard to purely military equipment was it possible to consider such a procedure justified. Furthermore it was maintained that the profit

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[36] Grunder för prissättningen av industriens krigsleveranser
Bil. 1. PM angående beräkning av tillverkningskostnader för krigsleveranser vid övergång från enskifts- till flerskiftsarbete.
Bil. 2. PM angående beräkning av försäljnings- och administrationskostnader vid krigsleveranser.
IK PR B II:I (öppna arkivet). RA.

estimates should be made more flexible according to circumstances than had been suggested by PR. However, the two most important areas of dispute were the question of compensation for an imbalance and the difficulty that the price was not always fixed before production began, which industry found unsatisfactory. PR's motive for not agreeing that the cost of idle parts of a factory should not be a burden on the production in other parts was that this would weaken the incentive to work off imbalances and that the Government orders would de facto acquire the character of a subsidy. The difficulties in determining the precise reason why a department stood idle were apparently great; export difficulties and the shortage of materials might also be behind it. As regards the start of the production PR referred to the fact that the rearmament was taking place in great haste and that it was not always possible to delay the start until the price had been agreed on. It was also frequently a case of producing articles without previous experience which made it very difficult to work out realistic prices. PR declared that it had the greatest interest itself in prices being fixed as soon as possible; it was totally opposed to production on a running account.[37]

The fiercest resistance came from the Swedish Association of Engine Makers which, after a long-drawn-out dispute, only agreed orally towards the end of 1941 to recommend negotiation with PR to its members.[38] The Federation of Swedish Industry's publication "Standard Principles for the Calculation of Prime Costs" appears to have been of great importance for the many cost estimates during the war years.[39] It was a practical handbook for a company's calculation of production values; it was reprinted in 1940 and numerous references to it are to be found in discussions of prices. A modus vivendi was fairly soon achieved between the parties. It seems that in general there was fairly smooth cooperation and no-one chose to press any question of price-fixing as far as resort to the arbitration procedure.

How then was PR's work carried out in practice? The customers

[37] PM 4/9 1941. (H. Throne-Holst) IK PR B II:1 (öppna arkivet). RA; Rausing, passim.

[38] Brevväxling mellan PR och Sveriges Maskinindustriförening 17/4 1940–16/9 1941. IK PR B II:1 (öppna arkivet). RA.

[39] Enhetliga principer för självkostnadsberäkningar jämte normer rörande enhetlig terminologi vid industriell självkostnadsberäkning.

KATD, KMF, KFF and SAN-KKV, made agreements with manufacturers, and in principle PR was to assist in this as price examiner. This was not always the case. Bearing in mind the thousands of agreements which were made, this was an impossibility for purely practical reasons. Therefore as a rule only the more extensive contracts were submitted for examination. The lower limit for the contract price varied between 10,000 and 50,000 kronor for the various administrations. In the main SAN-KKV handled its purchasing without the assistance of PR. Only in exceptional cases, and then only where there was no competition between the manufacturers, was PR brought in.[40]

As far as possible the customers tried to create competition between the manufacturers through a procedure of tenders. In consequence PR's staff examined the quotations on the basis of the provisions in the purchasing legislation as to the number and selection of suppliers, et cetera. In certain cases the prices quoted were examined but normally an estimate was accepted and delivery agreements were made.

However, on many occasions the situation was such that the tendering procedure could not be operated. For example, a cartel or monopoly situation on the manufacturing side was not unusual. In such cases agreements were made with a price clause. PR then examined the prices on the basis of the preliminary calculations and negotiated direct with the supplier over the price, and the purchasing administrations were then given the result. As regards companies which received repeated orders or perhaps orders which were very similar in character, such as L. M. Ericsson, ASEA and SKF, separate general agreements, extending over several years, were reached as to the basis for price calculations. The main examples of special agreements with companies in a monopoly situation are the orders of aircraft from SAAB, of engines from NOHAB's Flygmotor-SFA, and of heavier weapons from Bofors. Long-term agreements often contained provisions for adjustments in relation to changes in costs, such as alterations in the price of raw materials or changes in wages as a result of collective wage agreements (cf. p. 123).

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[40] During 1940 one of SAN's tasks was to assist the administrations in their purchases but this task was completely transferred to PR.

In the case of large deliveries where there were substantial short deliveries the staff of PR also had the task of acting as price examiners in relation to the latter.[41]

During the period 1940–1945 PR functioned as a price supervisor in relation to the engineering industry's supplies to the Government. Thus even after the introduction of the price freeze in 1942 the National Price Control Board delegated the power to allow the controlled prices to be exceeded.[42]

It is extremely difficult to assess the economic effect of PR's operations. In its reports the Board indicates several cases in which it proved possible to achieve reductions in preliminary prices or in renewed supply contracts. As regards the original situation such a development is natural; there were no standard norms for price-fixing, the customers had large economic resources and competed amongst themselves for attention from an industry which was working at full steam. It was reasonable that the prices should tend to be high. During the first hectic months of the war there was great uncertainty as to how the labour and raw material situation would develop, and the companies therefore probably allowed for a considerable margin of risk compensation in their calculations. When the orders were placed gradually and on a small scale the first estimates were made on the basis of a small volume and prices became very favourable when the volume increased sharply.[43] PR's cost hunters, who first began in earnest when the economic trend had slowed down in the summer of 1940, found rich and easily captured prey to begin with.[44] The continuing operation probably also had a good effect in that

[41] PM beträffande kontroll av prissättning av leveranser till försvaret 16/11 1943; PM beträffande prisbyråns verksamhet. Oktober 1945 (E. Larsson). IK PR B II:1 (öppna arkivet). RA. There appears to have been no standard practice as to when the administrations were to use PR. In many cases this simply did not happen. It may be inferred that the collaboration between the military bodies and the "controlling" civil authorities did not always take place without friction. K. Appelquist, for example, also gives evidence of this (orally); he was employed within SAN-KKV.

[42] Cirkulärskrivelse från PKN 5/9 1943. IK PR B II:1 (öppna arkivet). RA.

[43] PM från sammanträde rörande orientering över prisbyråns arbetsprogram lördagen den 9 mars 1940 kl. 12 f.m. IK KR:B1 (PM 1940). RA.

[44] The first thorough survey of the cost of engineering works products was carried out in the summer of 1940 in connection with the price-fixing at Motala verkstad. Prisbyråns verksamhet och resultat, p. 7. IK PR B II:1 (öppna arkivet). RA.

norms for price fixing were now available and companies paid attention to the existence of PR in their cost calculations. In fact the Board was conscious of its in many respects weak position in negotiations with the companies. The basis for price-fixing maintained by PR did not derive from any legislative provisions and the companies had to be persuaded to accept it voluntarily. Nor did PR have any legislative backing for being able to study the basis for the companies' price estimates when the war supply contracts had been abandoned, which had already occurred at the beginning of 1940. When, as happened on occasions, an industry refused to hand over its documents PR could only make an appeal to it to do so. The surviving papers of the Board testify fairly often to the difficulty it experienced in getting hold of basic documents for price discussions. In the "testament" which PR drew up just before its abolition it says that it would be desirable in future for legal provisions to be enacted which would give the authorities support against the companies if a similar situation was to recur.[45]

In many cases the manufacturers' position in negotiations was favourable because of the fact that time was short. If the customers had indeed received grants for the military equipment in question they exerted strong pressure for speed in the procedure of preparing the contract. If the industry then firmly contended that the price should be fixed before production began it was difficult for PR to delay the whole matter with extensive and protracted price negotiations. PR maintained, for example, that the cost of building the large cruisers could perhaps have been kept down if it had had the alternative of not having the ships built or of postponing their construction for a considerable period of time, which in practice was out of the question once the grant had actually been made.[46]

Finally it may be said that PR had great problems in finding staff sufficiently well qualified to cope with the purely bookkeeping side of examining the cost estimates and also knowledgeable enough to reach decisions on technical questions relating to the consumption of labour and materials and many other matters. In the main the management of the Board chose staff who had links with industry and avoided

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[45] PM angående prisbyrån 25/4 1947. IK PR B II:1 (ööpna arkivet). RA.

[46] PM oktober 1945, p. 5. IK PR B II:1 (öppna arkivet). RA.

established civil servants, and it considered that this had contributed to the fact that the clashes with industry were not more serious than might otherwise have been the case.[47]

It has already been observed that it is difficult to make any assessment, based on incontrovertible fact, of the profitability of the production of military equipment as compared with other production or which can be regarded as fair. However, many factors tend to indicate that the engineering industry did not at least have lower profit margins on its production of military equipment than on its other production, and that the former was therefore at least as important for the result as it was in terms of pure volume.

[47] PM oktober 1945, pp. 4–6. IK PR B II:1 (öppna arkivet). RA.

V

THE GOVERNMENT, TRADE AND INDUSTRY

During the period 1939–1945 the Government was interventionist to a high degree, exercising strict control over the private sector of industry and commerce.[1] In contrast to what had happened when the First World War broke out, an extensive war administration was swiftly set up. In principle the whole of the build-up took place during the autumn of 1939. The preparations which had been made through the National Board of Economic Defence had been geared above all to measures to be taken in the event of the country being drawn into war, but they were still of great value on account of the fact that important fields of the economy were mapped out.[2] The central war bodies were attached to different departments but important questions – of foodstuffs, fuel, raw materials, industry, trade and price control – were to be dealt with by a newly created department: the Ministry of Supply. The local war administration was developed along completely different lines from that of the previous war. Wartime provisional government on a county level and local government on a municipal level effectively covered the whole country. Thanks to the so-called Municipal Emergency Powers Act the local authorities could be instructed to take control as the central bodies considered necessary. Yet another feature of the war administration of the Second World War was the consultative councils which added very weighty support to the management of the central bodies.

The industry commission was responsible for control in the industrial field save in relation to foodstuffs and fodder. The principal

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[1] Björnberg, A., Andra världskriget svenska krisförvaltning, passim (1946); Odhe, T., Folkförsörjningen under krisen, pp. 48–112.

[2] Månsson, p. 223, Gjöres, p. 67.

tasks were the planning and coordination of production in accordance with the requirements of the armed forces and other important sectors and the distribution within industry of raw materials and other means of production. Thanks to extensive legislation IK had at its disposal the power to take controlling measures: the law of disposition, import and export restrictions, the price control law, et cetera (see p. 164). With its extensive organization it was also possible to put its intentions into effect to a high degree.

The short-term effect of the extensive control as far as industry was concerned was a severe restriction on its freedom to acquire the means of production by itself and to choose the orientation of production and sales. The actual consequences of this varied sharply from company to company. The engineering industry as a whole was not hampered in its development, either with regard to production or economic results, a fact which is obviously connected with its role in relation to rearmament and ersatz production (see chapter IV). Within the sectors in which the Government acted as a big customer it also saw to it that there were products to be sold.

Thus the influence of the state on industry during the war years was very great indeed, mainly on account of the influence of the emergency bodies on the country's economy in various respects, but also by virtue of the fact that the Government authorities acted to an unusually high degree as buyers on the private market.[3] If one considers what actually took place and disregards the purely formal relationship between the state and industry and commerce, it will in fact appear more important to point out the converse: during the years in question the influence of industry and commerce on the Government was unusually great.

In their instructions the emergency bodies – with their extraordinary powers of control over the economy – had been told to cooperate closely with the organizations of industry and commerce. They were even willing to assist in the organization of private trade associations which would arrange for the actual implementation of the measures of control. Older trade associations often acquired a

[3] In "Styre i kristid. Studier i krisförvalningens organisation och struktur" (stencil 1971) L. Friberg has discussed certain general features of the wartime administration, mainly based on studies of the control of agricultural products, energy and transport.

position of almost corporate character, such as Jernkontoret (the Ironmasters' Association) which was an officially sanctioned part of the emergency administration under the control of IK. In other cases the bodies had a general semi-official position, i.e. they carried out official administrative functions without having clear official authority. The Swedish Association for the Importation of Iron Products was a body of this kind: a newly created framework organization which comprised eight old and four newly established import associations.[4]

In this way a large part of the work of practical control was given to trade and industry's own bodies. The emergency bodies themselves also used labour obtained from the private sector. This applied to a high degree to IK with its great need for knowledge of the industrial field. It has already been described (p. 170) how the price-fixing of supplies to the military administrations could only be done in the main by personnel from trade and industry. Only in this sector were there available the qualified personnel who were required. It was not possible to extract from the apparatus of the Civil Service all the staff needed by the emergency bodies. When the wartime administration was at its largest, in the autumn of 1943, about 9 per cent of its personnel had previously been engaged in local or Government administration while almost two-thirds had been obtained from what may be called the private sector in its widest sense. The remainder consisted mainly of women without previous experience. The central wartime bodies with about 2,000 employees had recruited about 14 per cent of their personnel from the Civil Service while about two-thirds came from the private sector, above all from industry and commerce.[5]

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[4] Friberg, pp. 244–247.

Björnberg (1946), passim.

[5] Krisorganens personal. A statistical survey carried out by the Government labour market commission (in: Utredningar angående ekonomisk efterkrigsplanering VI. SOU 1944:36), pp. 31–33.

People who "in the event of the winding-up of the wartime body in question were able to return to another post or other work or did not intend to try and find new employment" were not included in the survey. A total of 4,449 out of 5,037 office staff were included in the survey. 1,703 of the 2,031 people in the central bodies were included (pp. 10–11). Cf. Friberg, pp. 170 f.

The governing bodies were also completely dominated by the representatives of private industry and commerce. Thus IK was run by a leading group of heads of companies, the departments were normally headed by managers or senior personnel from industrial trade associations and companies, and other senior staff came from private industry. Finally, the council of IK was dominated by people with practical experience of various trades. The council was not to become of any great significance as an institution but its members – temporarily and individually – often helped out when special questions arose which required investigation.[6]

The close collaboration between private industry and commerce and the Government authorities during the war years can obviously be interpreted as a natural result of outward circumstances: the pressures of the war and the blockade drove all parties together and compelled collaboration regardless of differences in basic social attitudes. It is all the more important to point out that clear precedents for this existed in the Government's former attitude towards collaboration with private industry and trade. The policy of the Social Democrats during the 1930s included several features of organized collaboration with different groups. The earliest related to agricultural organizations. These developed – partly with the help of the Government – at the beginning of the decade and they gained a position which in certain respects resembled that of the trade unions. The collaboration with the agricultural organizations was connected with the political cooperation between the Social Democrats and the Agrarian Party during the 1930s. After the congress of 1932 the reform policy seemed to have triumphed amongst the Social Democrats and a pragmatic view of the relations with industry and commerce was dominant. This became clearly apparent after 1936 when the Government was more firmly in the saddle. In the year 1938 a dialogue began between the Finance Minister Ernst Wigforss and representatives of private industry and commerce. It was the Finance Minister who opened the door and suggested that they ought to cooperate instead of fighting each other. Before the outbreak of war interrupted the exchange of views, in which the leading industrialists participated, it had led to

[6] Huss, E., Statens industrikommission (in: Statsvetenskaplig tidskrift 1942, pp. 400–411). Cf. pp. 58–68.

concrete negotiations for joint stocktakings in several sectors of industry. The Government authorities had shown their willingness to support industry in 1938 by setting up trade equalization accounts, by changing over from a progressive to a proportional company tax and by raising the maximum figure for export credit guarantees from 35 to 60 million kronor in 1939.[7] The improvements in the depreciation conditions of limited companies described above (p. 157) also formed part of the picture. The strong support given by the Government to a domestic aircraft industry is a concrete example of a Social Democratic desire to strengthen Swedish industry in the face of the difficulties which were expected.[8]

Signs of a recession began to manifest themselves in the U.S.A. towards the end of 1937. The Government's economic policy from 1938 onwards probably ought to be regarded primarily as an attempt to guard against an international depression of the sort that had hit the world eight years earlier. There was no lack of signs that an armaments boom would be able to counteract the depressive tendencies but they could hardly have offered any secure basis for long-term planning. In addition the fact that a possible war might mean stagnation within the Swedish economy had to be taken into consideration. When the war came the climate was well-prepared for increased cooperation between Government and trade and industry. The hatchet had been buried and was not to be dug up again until after the war.[9]

Contemporary observers were agreed on the fact that the forms of collaboration during the war years were a new feature of modern Swedish administration. Both parties were aware of the necessity for

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[7] Montgomery, A., Svensk ekonomisk historia 1919–1939, p. 335. Söderpalm, S. A., Arbetare och bönder. Krisuppgörelsen och socialdemokraternas väg till makten, passim. Lewin, L., Planhushållningsdebatten, pp. 112–175. In an essay (Industrin och samlingsregeringen. Scandia 1973:1, pp. 99–113) S. A. Söderpalm has pointed out how industry tried, independently of party political attachments, to acquire influence over the Government during the 1930s and when the coalition Government was set up in 1939.

[8] Norberg, p. 124 et passim.

[9] Wigforss, E., Minnen III, pp. 110–118; in his account Lewin places heavy brackets round the war years. When one looks at the development of the politics rather than of the debate the war years seem less isolated from the periods before and after them (pp. 175, 263).

this collaboration but viewed in retrospect it seems to have taken place largely on trade and industry's terms, above all as a result of the personal "infiltration" into the war administration. When the pressure eased and there was no immediate threat of war or recessions, it turned out that each side had reached different conclusions from the events of the years 1939–1945.[10]

The development, especially as regards the organization of the acquisition of military equipment, has already been described (pp. 58–68). The claims of the representatives of trade and industry to be allowed to play a more active part in planning had been given expression earlier, but they grew stronger with the acceleration of the rearmament. From the spring of 1939 up to 1943 the influence of industry and commerce increased gradually but continuously. In March 1939 representatives of industry voiced criticism of the way in which the acquisition of military equipment was organized. They wanted better coordination and they wanted the National Commission of Economic Defence (RKE) to be given greater resources and power. The decentralized system which gave great independence to the military authorities should be reconsidered. Up to the outbreak of war the representatives of industry acquired an increasing influence over planning and acquisition, above all through an industrial committee which was set up within RKE in May. Because of the fact that the Government after the outbreak of war did not choose to adopt the proposal for a wartime organization which had been worked out within RKE, industry and commerce were to be completely dominant.[11] RKE's industry department became a war industry department within the newly established IK. The head of RKE's industry department, Colonel S. Thorén, was replaced by R. Blomqvist, a director. In the spring of 1940 special bodies were hived off to deal with important acquisition questions: the acquisition of ammunition and production at the Government's own factories and other establishments. SAN and FVN were set up on the initiative of IK; they exercised a dominant civil influence and were to be in

[10] Huss (1942), passim; Heckscher, G., Staten och organisationerna, pp. 231–262.
Cf. the views expressed in:
Domö, F., Svenskt näringliv under krig och kriser.
Björnberg, A., Svensk krishushållning. Lewin, pp. 263–347.

[11] Månsson, pp. 38–48; 168–183; 194–197.

the front line of the struggle for power between the new wartime administration and the military establishment. The establishment of KKV and FFV in July 1943 represents the natural peak of the expansion of the power of the industrial experts.

The development was connected with the technological and industrial character of modern warfare. Industry was placed at the centre of this warfare and its problems had to be solved by its own men since the representatives of military administrations lacked the required experience and knowledge. Just before the establishment of KKV the representatives of industry drew parallels with the purely military organization: industry was the fourth branch of the services – in the long run the decisive branch in a war. Its management must possess a staff which had the strength and knowledge to carry on the work of the administration in peace as well as in wartime. Not only the planning of industrial investment but also the entire acquisition of equipment should be brought together under the staff of KKV. In contrast to the National Commission for Economic Defence the Board would in consequence be able to hold its own against industry and other parties. The chief of staff – the Director General – should of course be recruited from the ranks of the industrialists. No-one in industry laid a claim to take command of units of troops and likewise the military representatives should not make claims to govern industry.[12]

In the field of acquisition of military equipment two influences combined to make private dominance very great indeed. At bottom there was the long-term trend towards greater cooperation between Government and industry and commerce, which had a political background but which was strengthened throughout the whole of the national economy by the war. In addition there was a military tendency, which was both technological and tactical, towards industrial warfare and closer contact between the branches of the services which made it natural for there to be a centralized organization for the acquisition of equipment, dominated by industry.

The same tendency can be found in other countries during the Second World War. In the U.S.A., for example, there had been since the First World War a tradition of central cooperation between

[12] Gummeson, P. E., Krigsmaterielverket och industrien, pp. 334–340.

trade and industry and the military administration. During the period between the wars this collaboration was the subject of criticism; it was said that the interest of private profit ought to be detached from the acquisition of military equipment. Such proposals were rejected and when the U.S.A. entered the Second World War the acquisition was dealt with by the Office of Production Management which was dominated by a large number of representatives of trade and industry (886 in January 1942). These administrators were lent by their companies, but they retained their company salaries and were therefore not civil servants. The system was motivated by the fact that it was impossible to ask them to accept a lower salary and an interruption in their careers in transferring temporarily to the Government service. The Office of Production Management came in for strong criticism. In the eyes of many people undue favour was given to the large companies, and this was thought to be connected with the system of borrowing employees. Conflicts with the military authorities were also common and the organization was regarded as being generally ineffective.

In January 1942 the acquisition organization was changed. A War Production Board was set up with increased powers. A "strong" representative of the economic life of the country, D. Nelson, was appointed to head the Board. However, he did not consider that he had enough time to change the basic features of the existing organization. It was a question of winning the war and this was made possible by maintaining good contacts with industry: the "borrowed" employees were allowed to remain. It would be too risky to replace them with bureaucrats who had no experience of work in industry. Nor could they afford a conflict with the military: they were allowed to retain their right to sign all contracts with the manufacturers. The war industry achieved outstanding production results but because of the organization it also made large profits during the Second World War as it had done during the First.[13]

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[12] Gummeson, P. E., Krigsmaterialverket och industrien, pp. 334–340.

[13] The information about the U.S.A. has been obtained from:

The Military-Industrial Complex (ed. Pursell, C. W. Jr.), particularly the following contributions:

Koistinen, P. A. C. The industrial-military complex in historical perspective. The

The experiences of the First World War obviously also played an important role when Germany rearmed again under Nazi leadership.[14] In order to coordinate the orders of war equipment placed by the military authorities and supervise production, during the 1930s an organization headed by General G. Thomas was set up under Oberkommando der Wehrmacht, Wehrwirtschafts- und Rüstungsamt (Wi Rü Amt). Because of an imprecise demarcation of powers and overlapping jurisdictions Wi Rü Amt fought with other bodies for the planning of the economy. The main competitor for power was Vierjahresplan, an organization headed by H. Goering, and also the Reichswirtschaftsministerium under W. Funk, which was generally speaking outmanoeuvered on military questions.[15]

In the winter of 1939–1940 difficulties had already arisen in relation to the supply of military equipment, especially ammunition. Wi Rü Amt did not manage to carry out its duties satisfactorily and it was

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Interwar Years.

Baruch, B., American industry in the War;

Report on Government Manufacture of Munitions. (Nye Committee);

Investigation of the National Defence Program (Truman Committee);

Catton, B., War lords of Washington;

Economic concentration and World War II (Smaller War Plants Corporation).

[14] The German war planning organisation immediately before the First World War was based on the assumption that the war would be a short one. When instead the situation on the Western Front developed into long-drawn-out trench warfare which made enormous demands for a continuous flow of military supplies the country was compelled, reluctantly and only after a military leadership crisis, to make a total readjustment to a war economy. On 1 November 1916 a special new body was set up, Kriegsamt, which – under the war ministry but with wide powers of its own – would handle questions relating to recruitment for military service and the labour force supply within industry (compulsory work was introduced for men between 17 and 60 years of age); raw materials, weapons and ammunition. In spite of the fact that this body was under the control of a civil authority it had strong connections with the top military leaders (especially General Ludendorff) who together with the leading industrialists had worked out the fundamental guidelines for the total war effort. During the first year the head was General W. Groener, who had two section heads under him, one civil and one military. The Waffen- und Munitions–Beschaffungsamt was under the control of the latter.

Armeson, R. B., Total Warface and Compulsory Labor. A Study of the Military-Industrial Complex in Germany during World War I, passim. Groener-Geyer, D., General Groener. Soldat und Staatsmann, pp. 47–63.

[15] Janssen, pp. 17–18.

subjected to criticism and strong pressure both from the various branches of the services and from the political leaders.[16] In February 1940 Hitler introduced a civilian onto the scene through Vierjahresplan: F. Todt, who had previously been responsible for the building of the Autobahn and the Western Wall, and who had also been Reichsminister für Bewaffnung und Munition since March 1940. The new minister was first in charge of the planning of the ammunition production and later of the army's other supplies of equipment. In fact the navy and air force still held on to the orders and Todt never managed to centralize the whole of the military equipment side under himself, let alone the country's whole supply policy.[17]

When Todt died in February 1942 the conflicts between the military and the civilian administration had intensified; at the same time the setbacks on the eastern front had brought the question of equipment to a head. Todt had worked for a transfer of further functions from Wi Rü Amt.[18] A viable coordination of the resources of the war industry was first achieved by A. Speer who was appointed to succeed Todt soon after the latter's death. Speer outmanoeuvered G. Thomas and the bulk of Wi Rü Amt was rearranged to form Rüstungsamt within Speer's ministry. A small and unimportant part remained behind within OKW. In practice Vierjahresplan and H. Goering and Reichswirtschaftsministerium were also made subordinate. In 1943 Speer's title was changed to Reichsminister für Rüstung und Kriegsproduktion.[19]

A. Speer's ideas about organization, the basic features of which had already been worked out by F. Todt, clashed with earlier ideas, inter alia in relation to the arrangement of the manufacturing companies in functional units, "shoots" for the main production (tanks, ammunition and so forth), surrounded by "circles" of sub-contractors. Industry itself controlled these units, being able to act with a fair degree of independence within the framework of the planning as a

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[16] Carroll, passim.

[17] Carroll, pp. 230–231; Janssen, pp. 20–22.

[18] "... Ende des Jahres 1941 erkannte Todt selbst, dass die von ihm versuchte Steigerung der Rüstung auf breiter Front unter militarischen Regie ein Fehlschlag war." Kehrl, H., Kriegswirtschaft und Rüstungsindustri, pp. 276–277.

[19] Carroll, pp. 238–250; Wagenführ, R., Die deutsche Industrie im Kriege 1939–1945, pp. 39–40.

whole. During the years 1942–1944 a remarkable increase in the production of military equipment was achieved through this organization.[20]

The Second World War was not followed internationally by a period of arms reduction as the First World War had been. Even after the war administrations had been abolished the close contact between industrial and military management was maintained in the countries in which no military defeat had sapped both military power and industry. The more complex the weapon systems became, the more intensive and durable must the contacts be. In this way a "military-industrial complex" was established. There has been discussion, especially in the U.S.A., of the effects which such a "complex" can have on the development of society in general, having regard to the fact that it is dependent for its existence on large orders of military equipment which in turn are most easily prompted by an atmosphere in which war and conflict threaten.

In spite of all the differences there are clear parallels between developments in Sweden during the Second World War and developments in the U.S.A. and Germany. A high quality and versatile engineering industry was mobilized, and representatives of industry and commerce gained great influence in a centralized acquisition organization. After considerable difficulties and delays the bottlenecks were widened, and towards the end of the war Sweden's industry was able to support modern forces. In the short term this meant large Government orders for the engineering industry and an economic consolidation. In the longer term it probably constituted a spring-board for the development of that industry during the post-war period.

By the end of the war Sweden had an advanced military industry which worked closely with the armed forces and in many cases included the country's leading engineering companies. This military/industrial complex acquired its basic features during a period of intensive rearmament. In a final chapter the fortunes of the military equipment industry will be traced up to the beginning of the 1970s. As with the war years, the starting point of the discussion must be Sweden's foreign political situation.

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[20] Wagenführ, pp. 40–42 et passim.

VI

THE THIRTY YEARS SINCE THE WAR

A. Foreign policy and defence policy

The flexible policy of neutrality which the Swedish Government pursued with undeniable success during the Second World War had become firmly rooted in Swedish public opinion by the end of the war. It was obviously the aim of foreign policy in the post-war period to try and keep out of possible conflicts in Europe. "Freedom from alliances in peacetime with a view to neutrality in wartime" became a generally accepted doctrine.[1] However, Sweden's membership of the United Nations was plainly a complication since a policy of sanctions within the framework of the new world organisation would be able to force Sweden away from the path of strict neutrality. The Swedes were prepared to take this risk; it was considered more important to be able to work actively within the United Nations towards the solution of conflicts.

However, the bloc formation in European politics, which manifested itself as early as 1947, forced the countries of Northern Europe to show their hand. Sweden then made proposals for a Nordic defence alliance between Denmark, Norway and Sweden. These proposals were based on the theory that the three countries would form a non-aligned bloc between the two formations in the east and west, so as to remain outside a possible military conflict. This presupposed a common attitude to foreign policy and a coordination of military resources. The Swedes counted on the other two countries to rearm up to the level of the Swedish forces. This could be done swiftly, e.g. by purchasing equipment from the U.S.A. On the other

[1] Several documents illustrating the Government's basic attitudes are collected in Andrén, N.-Landqvist, A., Svensk utrikespolitik efter 1945 (Stockholm 1965), pp. 91–140.

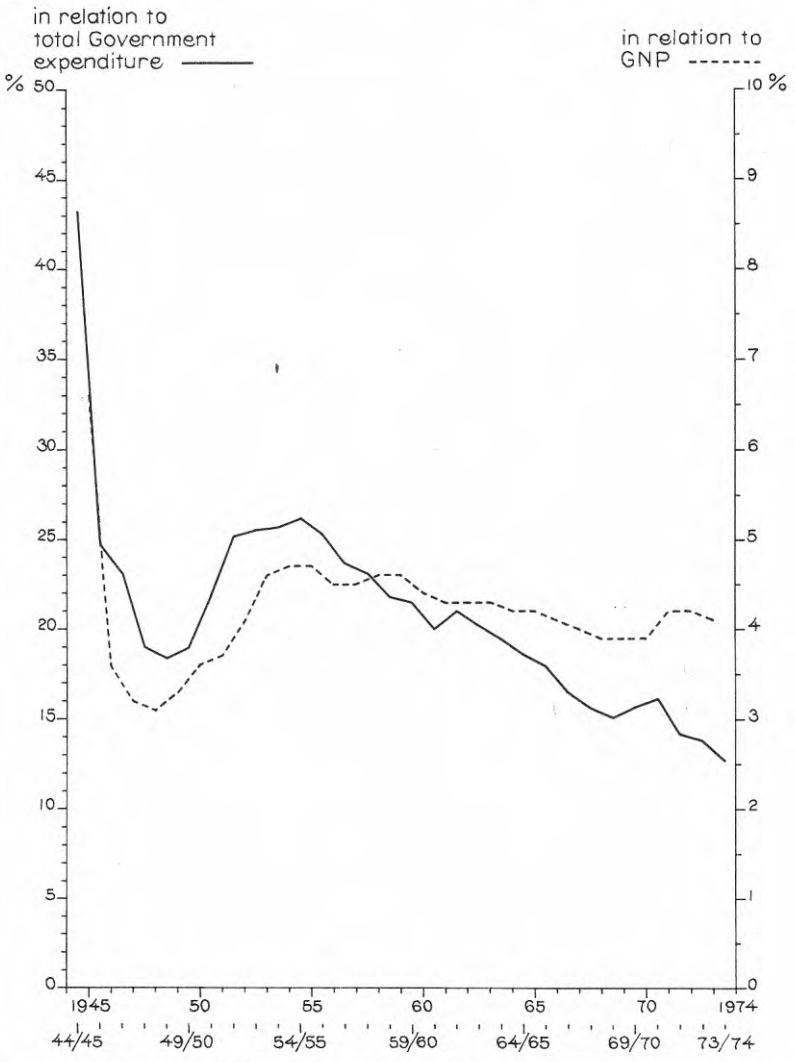
hand the Swedes thought that the acceptance of gifts from the U.S.A. would create an attachment to one of the parties to the cold war, which would run counter to the fundamental principle of the plan. Denmark supported Sweden's proposals, but in Norway opinion was divided. Powerful forces in Norway had drawn different conclusions from the Second World War as regards defence policy to those which had been reached in Denmark and Sweden. It was said that the main threat to world peace came from the Soviet Union. The best way of preventing another war was to make the western alliance a powerful deterrent. The surest defence against Norway being drawn into another war was a guarantee of support from the west in the event of an attack from the east. Participation with Sweden in a neutral alliance would have the effect of severing the close contacts with the west which had been formed during the war without replacing them with anything of equal value.

The idea of a Nordic defence alliance was opposed by the western powers, and with particular vigour by the U.S.A. which threatened to refuse even to sell weapons to a neutral Nordic alliance. After intensive negotiations in 1948, it became clear in January 1949 that Norway had chosen to go westwards to the North Atlantic Treaty which was concluded in April 1949. With that the whole idea of a Nordic defence alliance collapsed.[2]

Sweden's position as an isolated and non-aligned country of Northern Europe was already established in 1949. This foreign policy position has continued throughout the whole of the period since the war. In spite of the fact that Sweden has joined cooperative organisations of a "western" character, such as the Council of Europe, she has constantly shunned military or political alliances with other countries. As a result Sweden's defence policy position was established for a long time to come. Without political guarantees of security from any source and without the support of any treaty for her non-alignment Sweden considered it necessary to have a powerful defence in order to demonstrate her determination to safeguard her territory. In comparative terms Sweden was one of the world's best armed countries in the middle of the 1940s. Naturally

[2] On foreign policy see Andrén-Landqvist, passim; Erlander, T., 1949–1954 (Nacka 1974).

Diagram 17. Defence costs 1945–1973 in relation to total Government expenditure and GNP.



Source: SOS Statistical abstract, Historical statistics.

the funds allocated to the armed forces were reduced when peace was concluded in Europe, but the reduction was reversed when the Korean war broke out and there was great tension in the Baltic area at the beginning of the 1950s. Sweden's relations with the Soviet Union were strained at this point in time and several dramatic incidents occurred, including the shooting down of Swedish aircraft. As is shown in diagram 17, the tension in foreign politics led to an increase in defence allocations, not merely in absolute terms but also in relation to total Government expenditure and to the country's GNP. Since the second half of the 1950s there has been relatively speaking a gradual decline in defence costs as the political situation in Europe has become increasingly stable.

The basic strategic concept in Swedish defence has been the ability to confront an invading enemy beyond or on the country's borders with technologically advanced equipment. As a result great emphasis has been placed on the role of the air force. Roughly half of all new acquisitions have been of air force equipment.[3] As far as the acquisition of this equipment was concerned, the foreign political situation placed the Government in a position closely resembling that which had obtained during the Second World War: it was a question of supplying the armed forces with equipment which was as sophisticated technologically as any which a potential foe might possess, but without thereby becoming dependent on supplies of equipment from abroad. The Swedish military/industrial complex which had grown up during the war years therefore continued to order, develop and produce military equipment. Imports of military equipment were to become the exception during the post-war period. About 10 per cent of the purchases of equipment were made abroad, while the balance came from Swedish industry.

The ambitious aims of Sweden's defence resulted in the fact that in general terms she shouldered the same burdens as one of the great powers as far as research and technological development of munitions were concerned. As was the case in the U.S.A., England and France, grants for military research increased during the 1950s

[3] This relates to the beginning of the 1970s. Försvarsindustriella problem. Rapport till försvarsutredningen 1975-11-13 (stencil).

and accounted for about half of all Government research grants at the beginning of the 1960s. The grants have gradually been reduced since the middle of the present decade.[4] About 70 per cent of the grants for military research have been paid to Swedish industry for orders of military equipment. As a result about one-third of Swedish private industry's total research contribution has been financed out of Government funds. In assessing the importance of Sweden's defence policy for Swedish industry this fact should be borne in mind as being perhaps the most significant. As we shall see in due course, the proportion of pure production devoted to defence orders was far more modest. Certain technologically advanced branches of the engineering industry in particular, such as the electro-technology industry, have been favoured with large research grants which have in the main gone very largely to the leading heavy defence industries.

As well as in industry basic military research has also been carried on above all at the Swedish National Defence Research Institute (Försvarets Forskningsanstalt, FOA) which was directly under Government auspices. Towards the end of the 1950s comparatively advanced development work for the production of a Swedish atom bomb was also carried out within FOA. Having regard to the country's strategic planning it was a completely logical step for Sweden to have an atomic weapon. Arguments in favour of such a development were advanced by representatives of the armed forces and certain other groups, but there was also strong political opposition to this within the country. The party in power appointed a committee which shelved the question in a vague compromise report in 1959. In practice it proved politically impossible to produce a Swedish atom bomb. This policy was affirmed in 1970 when Sweden ratified the limitation of arms agreement. Instead the emphasis in military atomic research has been placed on "advanced defence research" which does not involve the introduction of the nuclear weapon into the Swedish defence system.[5]

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[4] The section on research is based, except where otherwise stated, on Annerstedt, J., Makten över forskningen. Om statlig forskningsorganisation och forskningsplanering i dagens Sverige (Lund 1972), pp. 28–34.

[5] Andrén-Landqvist, pp. 78, 80; Annerstedt, pp. 71–72, 155.

B. The production of military equipment

As far as foreign policy and defence policy are concerned, there has been no fundamental change in Sweden's position during the post-war period. This is probably the main reason for the fact that the structure of the Swedish munitions industry appears to have changed so little during the period in question. If one looks ahead thirty years from the period of the Second World War a familiar picture emerges. On the whole the same privately-owned Swedish engineering works are producing the bulk of the defence equipment. However, before considering this defence industry in greater detail we shall look at the development of the acquisition organisation and Government production of military equipment.

In 1943 the organization of the purchasing of military equipment by the armed forces had to a certain extent been assimilated by the Swedish War Supplies Board (see pp. 64). This body was dissolved in 1954 and the responsibility for acquisitions was again vested in the various branches of the armed forces. The pendulum swung back towards centralization in 1968 when the Military Administration of the Armed Forces (Försvarets Materielverk, FMV) was set up and was made responsible for all major acquisitions. FMV was given departments – army, air force, naval and quartermaster equipment divisions – which were to take charge of practically all the purchases of equipment for the Swedish armed forces. Through this organisation renewed attempts were made to resolve the old conflict between the rational argument that all acquisitions should be the province of a single body and the demand that those who were to use the equipment should also decide what it should look like.

During the post-war period the Government's own production of military equipment has been maintained within the narrow framework which was established during the rearmament of the Second World War. When the National Defence Factories were set up in 1943 they included factories for the production of ammunition, torpedoes and small arms (p. 66). There were also laundries and repair works. The pure service operations have been extended, and in addition development work is being carried on in conjunction with private Swedish companies. In 1970 the National Defence Factories changed their name to the Swedish National Industries Corporation (Förenade

Table 13. *FFV's departments engaged in the production of new mechanical military equipment. Number of employees as at 1/1 1974.*

Ammunition and gunpowder	1,066
Small arms	416
Torpedoes	340
Total	1,822

Source: SOU 1974:38 s. 37.

fabriksverken, (FFV)).[6] There has only been one change in the production of new mechanical military equipment, viz. the sale by the privately owned Husqvarna Vapenfabriks AB of its small arms division to FFV in 1970. However, FFV continued to operate within its traditional spheres. By the beginning of the 1970s the factories' invoicing of new production had increased to about 200 million kronor a year.

New production of the naval dockyards is also included in the Government's share of the production of military equipment. After the war the yard in Karlskrona also continued to supply small vessels as well as carrying out repairs and maintenance.[7]

In the budget year 1973–74 FMV made purchases costing a total of 272 million kronor from FFV and the naval shipyard in Karlskrona, which constituted 9 per cent of all purchases.[8] This was similar to the position during the Second World War when about 10 per cent of the purchases of military equipment were from state-owned manufacturers (p. 136). Thus during the post-war period too the private engineering industry in Sweden has accounted for the bulk of the equipment supplied to the armed forces. Familiar names from the war years featured amongst the biggest suppliers at the beginning of the 1970s: SAAB, now merged with the car manufacturers Scania Vabis

[6] FFV. Förenade fabriksverken (SOU 1974:38), pp. 40–50.

[7] Förutsättningarna för civil varvsdrift vid Karlskrona örlogsvarv (SOU 1959:11), passim.

[8] Försvarsindustriella problem, p. 18.

Table 14. *Payments made by the Military Administration of the Armed Forces to the biggest private suppliers of military equipment in 1973/74. In millions of kronor.*

Company	Invoicing				Most important military products
	army	navy	air force	total	
Saab-Scania	114	4	795	913	Aircraft, data equipment, instrument landing systems, missiles, trucks, tractors
Volvo	79	0	229	308	Trucks, cars, tractors, aircraft engines, missiles and tanks
Bofors	140	62	19	221	Guns, fire control systems for guns, ammunition, missiles, anti-submarine weapons
L M Ericsson (inc. SRA)	23	7	176	206	Telephone, radio and radar equipment
Total	356	73	1,219	1,648	

Source: Försvarsindustriella problem, p. 18.

to form SAAB-Scania, Volvo (above all as the owner of Flygmotor), Bofors and L M Ericsson with its special military division and its subsidiary Svenska Radioaktiebolaget (SRA).

In 1973/74 the four suppliers shown in table 14 accounted for about 55 per cent of all purchases of equipment by the armed forces. The high degree of concentration is also evident from the fact that during the same period 15 companies supplied 74 per cent of the military equipment (cf. p. 150). The degree of concentration was particularly high in the aircraft equipment sector where 74 per cent of the payments made by FMV went to the suppliers listed in table 14, including sub-contractors. This is partly due to the fact that one product, aircraft, was heavily dominant and to the extensive use of subcontracting. However, the concentration is also a reflection of the fact that purchasing policy had continued in accordance with the guidelines of the war years. Long-term contracts have been signed with the same companies which have in practice retained the monopoly position which they gained during the war.

In terms of volume, however, the role played by orders placed by the armed forces with the Swedish engineering industry has declined

since the war.[9] In 1973/74 about 22,000 employees were engaged in the production of military equipment, which was less than half the number so engaged thirty years earlier. At the same time this sector of industry had grown. Thus of the engineering industry's total production just over 5 per cent was sold to the armed forces at the beginning of the 1970s, which should be compared with about 25 per cent during the war years. Of course individual manufacturers may present a different picture. Certain companies have continued to concentrate on defence production and have become more or less dependent on Government orders.

Table 15. *The concentration of the most important private companies on defence equipment. The proportion of sales to FMV in 1973/74. In percentages.*

SAAB-Scania	15
Volvo	3
L M Ericsson	3
SRA	37
Bofors	17

Source: Försvarsindustriella problem, p. 21.

SAAB attempted in various ways to free itself from dependence on orders from the armed forces when the war ended. Production of a motor car was started and a civil passenger aircraft was developed. However, the rearmament at the beginning of the 1950s utilised the entire capacity for the manufacturing of aircraft and on the whole the civil aircraft sector has remained unimportant. Since the merger with the car company Scania Vabis the aircraft division has become smaller but as a result it is dependent on defence orders. For the even larger Volvo group of companies military equipment plays a minor role in quantitative terms. However, Volvo Flygmotor concentrates exclusively on the production of military equipment. Likewise the military division of the L M Ericsson Group of companies is built around defence orders. During the 1960s a diversification away from

[9] Försvarsindustriella problem, p. 35.

military production also took place at Bofors. At the beginning of the 1970s about 60 per cent of the production was sold to civilian customers. At the same time almost half of the military production was exported, which was nevertheless a far smaller proportion than during the period between the wars.

In many cases the large suppliers of military equipment have formed joint, formally independent specialized companies, built up round qualified military production and service. They are comparatively small but they do work of great technological sophistication, which is characteristic of the modern production of military equipment.[10]

The leading manufacturers of military equipment have carried out extensive research, they have employed large staffs of technicians and over the decades they have accumulated considerable experience of production. As a result they have become a necessary condition of Swedish defence policy and an integral part of it. In flexible cooperation between representatives of the armed forces, Government and industry guidelines for the acquisition of equipment have developed in accordance with the pattern which was formed at the beginning of the 1940s.

C. The end of an era?

The circumstances prevailing at the time of the Second World War forced on the establishment of an advanced Swedish military equipment industry. This was connected with a security policy and a defence policy the basic features of which have not undergone any significant changes during the first three decades of the post-war period. It is nevertheless possible to detect signs of gradual change towards the end of the era of self-sufficiency in technologically advanced military equipment. It is difficult to find proof of a direct connection between this state of affairs and any change in strategy or any new military and political situation. The reason is rather to be sought in the increased tension between technological development and limited economic resources.

As a result of international rearmament and the development

[10] Försvarsindustriella problem, pp. 16–49.

of weapon technology the cost of modern military equipment has risen enormously. For example, the unit prices of aircraft have increased almost two hundredfold in terms of fixed prices.[11] All countries with the ambition of developing modern weapons have been hit by these increases. The great powers and countries within the Warsaw or Nato pacts have to some extent been able to meet the increase in prices through rationalizations. The number of manufacturers has been reduced and there has been a concentration on a small number of types of equipment. For example, very few countries have constructed their own aircraft. Smaller countries have imported equipment from the great powers whose weapon manufacturers have received orders for longer production series. It has been more difficult to take these steps in the Swedish military equipment industry. The concentration of production has as a rule been at its maximum and the series have tended rather to become shorter. As a result of the small market there has been an unusually steep rise in the costs of research, development and production. Possibilities of exporting have been limited. In the 1960s between a quarter and one-third of Sweden's production of military equipment was exported. The exports have mainly involved traditional equipment of a defensive nature, while there has been a very limited market for more advanced equipment such as air and missile systems. It is thought that high prices have been partly to blame for this situation, but Sweden's position between the great power blocs has also weakened her negotiating position in many cases. The exporting of military equipment has also been hedged around with strict legal limitations. Amongst other considerations no exports have been allowed to countries engaged in acute internal or foreign conflicts or in which there appears to be a risk of war or unrest. These comparatively stringent regulations have made it more difficult for Sweden to export military equipment extensively to other parts of the world where there has been a great demand and other exporters of weapons have done business.[12] Thus it has been impossible for the country's military equipment industry to increase production series and reduce unit costs by exporting.

With diminishing grants and with the availability of foreign equip-

[11] This relates to the U.S.A. Försvarsindustriella problem, pp. 10–11.

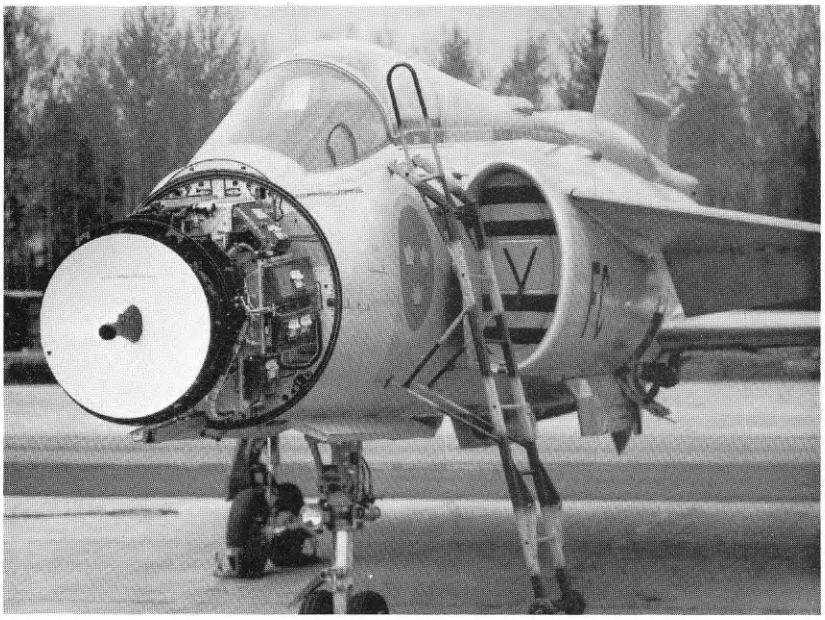
[12] Svensk krigsmaterielexport (SOU 1970:63), passim.

ment which is cheaper or better or both, it might appear more and more tempting to import equipment for Sweden's defence or to allow Sweden's military equipment industry to cooperate with those abroad. But to do this would be to infringe a fundamental principle – that of self-sufficiency – and perhaps jeopardise confidence in neutrality. Another not very attractive alternative would be to reduce the demand for quality, i.e. to abandon the ambition to supply the Swedish armed forces with equipment as sophisticated in weapon technology as that possessed by the foremost great powers. There seem to be signs of growing difficulties here, most readily apparent within the aircraft industry.

During the post-war period the Swedish aircraft industry has developed a series of advanced aircraft, called Tunnan, Lansen and Draken. Plans for the most recent, called Viggen, began to be made at the end of the 1950s, and it was possible to supply them to the units ten years later. However, the Viggen project became so large and complex that Swedish industry found it difficult to carry it out. American expertise had already been called in at the planning stage of the project. As in the past, foreign designs and help from foreign companies were used in the engine production: in this case Pratt & Whitney Aircraft in the U.S.A. In addition American companies supplied large parts of the Viggen's electronic system, the central data amongst other things coming from Honeywell. Throughout the whole of the post-war period there has to some extent been direct importation of equipment for Sweden's defence. In addition there have been purchases made abroad by Swedish suppliers. Around 1970, however, as much as about one-third of all the equipment acquired was imported. In the aircraft and missile sector the import requirements have been even greater, a fact which was heavily underlined by the Viggen project which has in fact been the heart of Sweden's whole defence system for a long period.[13]

At the same time the cost of the project has threatened to exceed the limits set by the defence grants. A heated debate has flared up about the wisdom of spending the bulk of the grants on a single defence system. Criticism has also been made of the military/industrial bodies which have in practice taken the key decisions to back

[13] Försvarsindustriella problem, pp. 52–57.



The Viggen aeroplane was equpped with radar produced by L. M. Ericsson (L. M. Ericsson).

the Viggen. The broad measure of agreement about the form which Sweden's defence should take has diminished, and voices have been raised in favour of a sturdy, cheaper defence in depth as an alternative to the expensive, advanced "shell defence" of the country's borders.

In the middle of the 1970s most of the signs seem to indicate that the Swedish aircraft industry will not design any successor to the Viggen. Instead it is being advocated within the air force that foreign types of aircraft should be manufactured under licence.[14] This would constitute a return to the position before the Second World War.

During the Second World War there occurred a transformation in the Swedish defence industry and the forms of cooperation with the armed forces as a result of a bounding increase in the ambition to be prepared for defence and in the will to keep up with the techno-

[14] Dödsstöten för nytt flyg från SAAB. Dagens Nyheter 9/3 1976.

logical development of weapons. The foreign political situation and the existence of an industrial defence establishment have contributed to the fact that the structure of the war years has been maintained remarkably unchanged right up to the 1970s. It is not only the Viggen debate which indicates that this period of great unity about an ambitious and costly defence policy is coming to an end and that the foundations of an advanced and independent defence industry have been shaken as a result. It was only within a few years of the end of the First World War that the arms supplied to Sweden's forces were sharply curtailed – the defence budgets of the 1920s were very small indeed and they did not allow for any large orders of equipment. The development since the Second World War has been different. Not until thirty years after the end of the war has the foreign political situation become such that it is possible to discern the close of an era which opened with the rearmament at the end of the 1930s.

Appendix 1. The defence cost of acquiring mechanical military equipment

However difficult it may be to define the engineering industry precisely, it is just as difficult to provide an exact definition of "mechanical military equipment". Nevertheless, both terms correspond to a practical reality. They are based on what the official industrial statistics call the metal industry. Military equipment produced by that type of industry is called mechanical military equipment. In the armed forces equipment belonging to this group in practice is kept separate in different services – even if under different names – from equipment such as quartermaster's equipment, medical equipment, et cetera.

Demarcations are discussed in Government Bill no. 1 of 1941. In it there appear by way of introduction in connection with the budget proposals for the Ministry of Defence the results of the inquiry into the Ministry's statement, reports on matters submitted to it for consideration and the opinion expressed by the Minister.[1] The national defence committee of 1941 includes in its estimates of costs a naturally demarcated cost group called "Engineering Products", consisting of armoured cars, tanks and the like, ships, aircraft, other motor vehicles, weapons, ammunition, other engineering products, repairs and maintenance.[2]

In the estimates which were compiled within IK in connection with the national defence committee of 1941, the equipment mentioned above was placed under the heading "Compilation of the annual costs

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[1] Riksdagstrycket 1941 C1.

[2] Betänkande med förslag till plan för organisationsarbetet inom försvarsväsendet. (SOU 1942:1), p. 29.

of the types of equipment for the manufacturing of which the engineering industry will be responsible''.[3]

It is probable that the group ''mechanical military equipment'' can be demarcated. The question then arises as to whether the sources allow differentiation in the grants.

The granting of funds to the defence during the period 3/9 1939–1/7 1944 was effected by Parliament allocating sums for respective budget years which were intended to cover expenditure which would also be normal in peace time according to the defence organization. Over and above this funds were made available for special emergency budgets which had to be used as interim budgets on account of the increased state of preparedness. This expenditure was adjusted afterwards through supplementary budgets, normally one at the end of December and one at the end of the budget year. The interim budget accounts were rendered in accordance with a wartime accounting system with special war headings which were statistical sub-headings in the interim budget grants. From April 1940 there was a complete change-over to war heading accountancy. To begin with the war headings did not completely correspond to the lay-out of the Government's current budget. However, with the introduction of the new lay-out for the Government's current budget from the budget year 1941/1942 onwards the two accounting systems corresponded. The war heading account was supplemented by a special account connected with the grant groups of the national budget. Only current expenditure on preparedness, which did not include equipment, was shown under war headings. From 1 July 1944 there was a change-over to more peacelike conditions for the granting of funds for defence.

At the General Accounting Office compilations have been made of the total expenditure on defence throughout the whole period of the war, distributed according to the national budget's grant groups for the budget year 1941/42. Only for the budget year 1939/40 is there a large equipment item which is common to all the branches of the services.[4]

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[3] IK KR B:2 10/42. RA.

[4] See Riksdagens revisorers berättelse 1945 I, pp. 71–77: Förskottsstats- och krigstitelredovisningen under den förstärkta försvarsberedskapen; II, pp. 84–100: Riksräkenskapsverkets yttrande i anledning av riksdagens revisorers uttalande: Riksdagstrycket 1946: C17.

A compilation of the costs of such equipment from these grant groups as is manufactured by the engineering industry includes the following items:

for the army: "ordnance equipment", i.e. weapons and ammunition, signal and technical engineering equipment, motor vehicles and trailers, grants for industrial preparedness for war, experiments with certain ordnance equipment and non-recurring grants for the acquisition of ordnance equipment.

for the navy: "floating equipment, artillery equipment, et cetera", i.e. shipbuilding for the navy and the coast artillery and maintainance of ships, the acquisition and maintenance of motor vehicles, the acquisition of artillery and other technical equipment, experiments with certain equipment and grants to industry's war organization.

for the air force: "flying equipment et cetera", i.e. the acquisition and maintenance of aircraft, weapons and ammunition, motor vehicles and motor boats, fire-fighting equipment, equipment for the upkeep of airfields and subsidies to industry's war organization.

The cost of these types of equipment is shown in table 16.

Table 16. *Collocation of grants made for certain types of defence equipment 1939/40–1944/45. In millions of kronor.*

	Army	Navy	Air Force	Joint	Total
1939/40	235.6	105.7	117.3	220.2	678.8
40/41	450.9	201.5	209.8	12.6	874.8
41/42	412.7	155.1	129.6	4.9	702.3
42/43	451.8	212.1	140.8	42.6	847.3
43/44	389.3	179.2	179.2	0.8	748.5
44/45	326.2	114.2	172.9	0.2	613.5
Total	2,266.5	967.8	949.6	281.3	4,465.2

Source: Riksräkenskapsverkets årsbok 1948, pp. 78–84.

After the end of the war an inquiry was carried out on the instructions of the Ministry of Defence into grants which had been made for the acquisition of equipment for the armed forces for the period 1 September 1939–30 June 1945. Collections were made of grants in

interim budgets for non-recurring expenditure as well as in national budgets and supplementary budgets. In these a more precise breakdown of equipment was made. To demarcate a group of mechanical military equipment for the present account the following groups of equipment have been selected: ammunition, artillery equipment, fire protection equipment, salvage and diving equipment, coding equipment, ships and boats, aircraft equipment, beacons, mine equipment, motor vehicles, reserve power units, fences and barbed wire, telephone and other signalling equipment, torpedoes and ordnance equipment. Table 17 is a collocation based on these groups.

The total figure in table 17 is 266 million kronor lower than the corresponding figure in table 16. Several factors interact to bring about this difference. During the budget years 1943/44 and 1944/45 47 million kronor was allocated for the reacquisition of certain equipment which had been handed over to the Danish and Norwegian police organizations. Since these allocations should have been covered by funds accruing from sales they have not been included in table 17. In addition, a number of irrelevant items have been excluded from table 17 which had been included in the collocations of the General Accounting Office as a result of the general wording of the Government grants. These include for example experiments with ordnance equipment, maintenance of equipment and subsidies to industry's war organization. On the other hand the figures given in table 17 are somewhat low since funds from interim budgets for current expenditure (as opposed to non-recurring expenditure) have not been included. As was mentioned above, these were shown only under war headings and without special votes of supplies. These costs also included purchases of equipment, even if this was not usual, but because of the set pattern of accounting principles it is very difficult to determine the extent of these. The material compiled by the Ministry of Defence has been used for the present account since it is more specific. In fact the figures are probably on the low side.

One weakness which affects both sources is the fact that they are based on grants which were sanctioned and not on grants which were used. Thus to obtain an accurate figure the debit position in respect of the various grants at the beginning and the end of the period would have to be established. It has not been thought worthwhile to do the

Table 17. *Collocation of grants made for certain types of defence equipment 1/9 1939–30/6 1945. In millions of kronor.*

	1939/40	40/41	41/42	42/3	43/44	44/45	Total
Ammunition	88.9	202.6	221.8	49.6	194.3	45.1	802.4
including: the army	20.0	111.2	96.9	14.3	139.9	24.2	406.5
the navy	10.8	11.5	32.5	8.3	6.6	–	69.8
the air force	15.6	33.0	24.4	15.0	15.0	15.0	118.0
joint	0.4	15.4	57.4	1.4	30.8	2.8	108.2
mines	32.6	31.1	8.3	5.3	0.2	0.7	78.2
torpedoes	9.5	0.4	2.3	5.3	1.8	2.4	21.7
Weapons	422.3	331.1	554.4	156.7	309.3	182.6	1,956.5
including: the army	344.6	241.7	536.3	140.1	295.9	161.9	1,720.5
the navy	77.7	89.4	18.2	16.6	13.4	20.7	236.1
Ships and boats	164.2	117.4	75.9	55.0	38.9	37.0	488.4
Aircraft equipment	184.9	165.8	141.5	124.1	117.3	142.6	876.2
Other equipment	13.4	5.3	11.2	9.1	33.6	2.6	75.2
Total	873.7	822.3	1,004.8	394.6	693.3	410.0	4,198.6

Source: Förteckningar och sammanställningar över under tiden den 1 september 1939–30 juni 1945 beviljade anslag för materielanskaffning m.m. för krigsmakten. Ber.v. Huvudredogörelse: bihang 8. Vol. A:5 MHA.

enormous amount of work which would be necessary to achieve precision on this point when the actual system of the allocation of funds involves fairly wide margins of uncertainty. This account is based on the fact that the total funds available but not used were just as great at the beginning of the period as at the end of it, and thus involves the assumption that the grants made during the period in question correspond to the purchases of equipment made.

Appendix 2. Production agreements relating to iron and metal made by IK 1940–1945.

Type of product	Type of agreement[1]	Year when agreement made	Contracting company
Pig iron	g	1944	10 iron foundries
Iron pipes; standard pipes	g	1943	AB Åkers styckebruk
	g	1944	Gjuteri AB Normalrör
	g	1944	AB Eksjö Mek. verkstad
forged pressure pipes	g	1944	9 workshop companies
	g	1944	Husqvarna Vapenfabriks AB
Nickel	g	1943, 1944	Bolidens Gruv AB
Tungsten (ore)	g	1942, 1943	
	g	1944, 1945	AB Yxsjö Gruvor
Molybdenum (ore)	g	1942	Säters molybdenbolag
	g	1942	Källfallsgruvans molybdenbolag
	g	1942	Uddgruvans molybdenbolag
Copper ore	s	1941, 1943 1945	Bolidens Gruv AB (agreement for contract work on certain mining deposits owned by the Crown)
Copper	g	1940, 1943	Bolidens Gruv AB
	g	1941	Riddarhytte AB
	g	1944	AB Ferrolegeringar
	g	1944, 1945	AB Svenska Metallverken
Zinc	g	1944	Trollhättans Elektrothermiska AB
	g	1944	AB Glückmans Metallaffär
	g	1944	Stora Kopparbergs Bergslags AB
Zinc and lead	g	1941	AB Zinkgruvor
Lead	g	1941, 1943 1945	Bolidens Gruv AB
	g	1942	Avesta Jernverks AB
	g	1942	AB Zinkgruvor
Lead and silver	g	1943	Svenska Ackumulator AB Jungner
Aluminium	s	1941	AB Svenska Aluminiumkompaniet

[1] *Note:* g = guarantee contracts (sales and price guarantee)
s = subsidy agreements

Source: Kristidspolitik och kristidshushållning i Sverige under och efter andra världskriget (SOU 1952:49) pp. 456–458.

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