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Structure of the French Armament Industry
and the profiles of its main armament companies

Jean-Paul Hébert, Jacques Fontanel

Report Research
Dual-use company in Europe

Hébert, J-P., Fontanel, J. (1991),
Economic Impact of Dual-Use Industries in France.
[Research Report] Eurostrategies, Brussels. 1991.

Résumé : L'industrie d'armement en France a toujours été centralisée, avec des champions nationaux, relativement performants à l'exportation. Il n'y a normalement pas de compétition entre les secteurs publics et privés. La Délégation générale à l'Armement est le tuteur de l'industrie de défense. Il n'y a en général aucune discrimination pour les entreprises de capital français. Les grandes entreprises sont puissantes, mais avec la fin de la guerre froide qui s'annonce, il va leur falloir se renouveler, notamment par l'innovation, les achats du gouvernement et l'ouverture vers de nouvelles exportations d'armes. Le profil des sociétés n'est pas standard. Plusieurs entreprises dominent, notamment Thomson-CSF, Aérospatiale, Dassault Aviation, la DCN, GIAT, Matra, SNECMA, SNPE ou Sextant Avionique.

The arms industry in France has always been centralised, with national champions, relatively successful in exports. There is normally no competition between the public and private sectors. The DGA (Délégation générale à l'Armement) is the guardian of the defence industry. There is generally no discrimination for French-owned companies. The big companies are powerful, but with the end of the Cold War coming, they will have to renew themselves, notably through innovation, government purchases and the opening up of new arms exports. The profile of the companies is not standard. Several companies dominate, notably Thomson-CSF, Aérospatiale, Dassault Aviation, DCN, GIAT, Matra, SNECMA, SNPE or Sextant Avionique.

Industrie française de l'armement, industries d'armement, complexe militaro-industriel, Alliances, exportations
French arms industry, arms industries, military-industrial complex, alliances, exports

Résumé

As indicated in the general introduction, the present situation of the French defence industry results from a policy of national independence followed for some thirty years, and from the corresponding creation of the DGA (General Delegation for Armament) within the Ministry of Defence.

The DGA is much more than a procurement agency : in 1989, it employed 69,200 people, of which only 24,700 in government tasks, the other 54,300 having an industrial activity, mostly in arsenals for land-based equipment and in shipyards. The arsenals (GIAT) were converted into a state-owned company in July 1990, but the DGA still employs some 29,000 people in industrial tasks (essentially in the shipyards) out of the 260,000 working in the armament industry (see table 3.2).

Anyhow, its influence widely exceeds that of a manufacturer, because it remains the coordinator of the whole defence industry, as a follow-on to its original role when it was created in 1961 (as "DMA", i.e. Délégation Ministérielle pour l'Armement), which was to coordinate the buildup of the French strategic forces. In addition to its industrial activity, its main ongoing missions are :

- to participate in the definition and to procure the weapon systems required to equip the French armed forces,
- and to prepare for the future by adapting the defence industry to the foreseeable evolutions of the threat and by conducting the research and studies required for future armaments.

The backbone of the DGA staff is made up of the "Armament Corps", a corps of engineers and scientists with a military status. The fact that many of them leave the DGA and hold important positions in the defence industry reinforces the links between this industry and its "tutor" DGA.

Another important state agency acting in the defence industry (although not part of the Ministry of Defence) is the Atomic Energy Commission CEA (Commissariat à l'Energie Atomique), whose military activity alone employs 10,400 people out of the 20,000 working in the "public establishment", as opposed to the industrial holding (see the analysis of this sector).

Another public agency deserves mentioning : the aerospace research centre ONERA (Office National d'Etudes et de Recherches Aérospatiales), not so much because of its manpower (2,000), but because it is one of the instruments of another role of the DGA : being the tutor of the whole aerospace industry, as indicated earlier.

The present status of GIAT (i.e. a state-owned company) results from its former one where it belonged to the DGA. But many more companies are state-owned or at least state-controlled, so the general structure of the French defence industry is the co-existence of a so called "public" sector and of a smaller private-owned sector.

There is normally no competition between the private and the public sector, except for the Navy shipyards which had a monopoly on military shipbuilding until 1988. For each sector (aerospace, electronics, ammunitions...) the DGA, as "tutor" of the French industry :

- tries to rationalize the industrial structures,
- shares the budgets between the "leading" companies (except in the past where ~~one~~ companies were supported by the DGA for local political and industrial reasons),
- suppresses duplications (in spite of the Staff's wishes who would prefer more competitors).

For instance, the DGA would like to gather the missile activities of Aérospatiale and Matra even if they don't have the same products and the same status. In the case where two companies work in the same field, the DGA asks them to joint (the radar of the combat aircraft "Rafale" is manufactured by a public company, Thomson-CSF and a private company, Dassault Electronique; see the Breakdown of the Rafale programme).

No discrimination can be noted in the orders passed by the French government which might indicate a bias in favour of its own "property" as opposed to private owned firms. The guidance and inertial stabilization system of the French strategic missiles M 4 and S 4 is manufactured by a private company : SAGEM. When MATRA was nationalized (from 1981 to 1988), the numbers of contracts signed by the government did not increase. It is the technical position of the company that is the determining factor. This partial ownership is used by the government as a political means of controlling the entire arms industry, not as a means of imposing a preference. The only difference between private and public sector is the shareholder behaviour and capacity.

Ownership and alliances

More precisely, the French defence industry is covered by four different statuses :

- a) direct management by a state agency : shipyards (DCN), army arsenals (GIAT, before 1 July 1990) and the military division of the Atomic Energy Commission (CEA); this "status" represents about 25% of the 1989 total French defence turnover;
- b) companies 100% state-owned : Aérospatiale, SNECMA, SNPE and GIAT (since 1 July 1990); this "status" represents about 19% of the 1989 total French defence turnover;
- c) companies where the state owns more than 50% of the shares : Thomson-CSF (a 59% subsidiary of the 100% state-owned group Thomson S.A.), Dassault Aviation and RVI (Renault Véhicules Industriels, a subsidiary of Renault); this "status" represents about 40% of the 1989 total French defence turnover;
- d) private companies, e.g. Matra, Dassault Electronique, Sagem, Labinal; this "status" represents about 15% of the 1989 total French defence turnover.

Including the subsidiaries, the "public" sector in France (i.e. state-controlled) amounts to about 85% of the French arms industry. This very high share might account for the lack of big national financial holdings, as opposed to the German structure, for instance. Even more, whereas banks play a major role in the ownership of dual industries in Germany, some major dual companies in France possess their own banks (e.g. Altus-Finance for Thomson and Arjil for Matra-Hachette). This absence of holding companies accounts for the lack of a substantial amount of capital sharing between national companies, although a certain number of restructuring efforts, mergers and strategic alliances have occurred lately, as shown in table 4.1. However, three joint subsidiaries are worth noticing :

- Sextant-Avionique (Aérospatiale 50% / Thomson-CSF 50%)
- SAT (Sagem 57% / Matra 25% / miscellaneous 18%);
- and SEP (SNECMA 52%, Aérospatiale 14%, SNPE 8.5%, miscellaneous 25.5%).

The SNECMA group also owns 100% of other companies having a military activity: Messier-Bugatti, Hispano-Suiza and SOCHATA. The Dassault group represents a more complicated case, since its property is shared between the main private owner Serge Dassault and the state (with a few shares left to the employees), but the share of voting rights does not coincide with the share of capital.

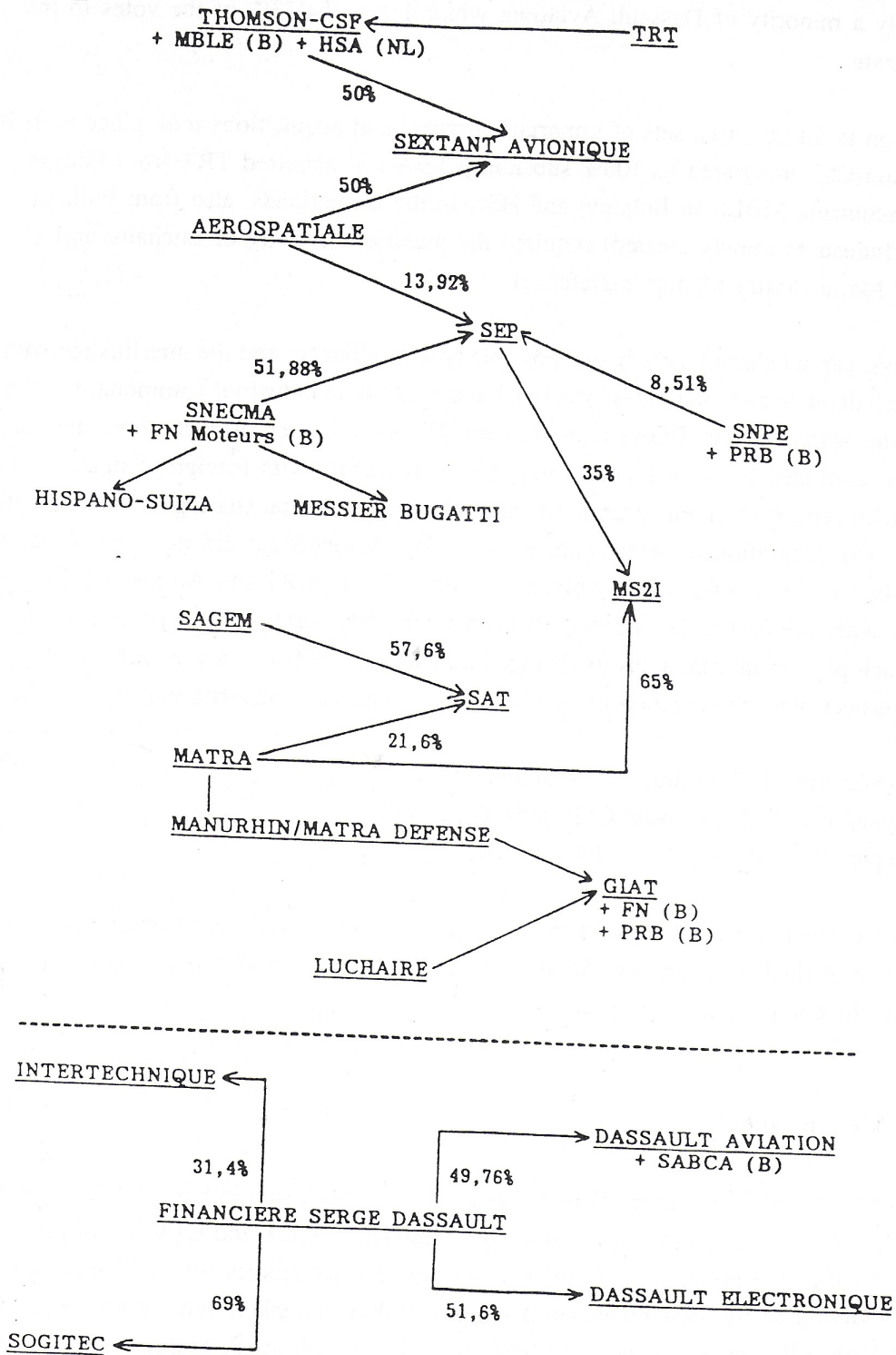


Table 4-1 - Joint subsidiaries and mergers in the French defence industry

Thus, the holding "Financière et Industrielle Serge Dassault" holds :

- the whole of Dassault Electronique,
- but only a minority of Dassault Aviation, which leaves 54.73% of the votes to the French state.

In addition to all this, two sets of important mergers and acquisitions took place in 1990:

- Thomson-CSF integrated its 100% subsidiary TBA and acquired TRT from Philips (after acquiring MBLE in Belgium and HSA in the Netherlands, also from Philips);
- GIAT Industries (newly created) acquired the munitions activity of Luchaire and that of Matra (Matra-Manurhin-Défense).

Nowadays, capital sharing is only one possible type of alliance, and the interlinkage within the French defence and dual industry is much more based on industrial commonality (partly due to the action of the DGA) than on capitals. As a matter of fact, there are many alliances concluded between French companies - frequently with foreign companies too - for the achievement of given programmes and without any capital sharing. It must be noted that the first generation of joint ventures involving Aérospatiale did not lead to capital sharing between the companies involved : Euromissile, EMDG and Airbus Industrie are "GIE's" under the French law (Groupements d'Intérêt Economique), a type of association where each participant maintains its financial autonomy. 1990 was a very innovative year in that respect, with the creation of three major international consortia with a real capital sharing :

- Matra-Marconi (51% Matra, 49% Marconi)
- Eurodynamics (50% Thomson-CSF, 50% BAe)
- Eurocopter (60% Aérospatiale, 40% DASA)

Table 4.2 presents a partial view of the alliances between French and foreign companies on defence or dual programmes. All the above data will be analyzed in more detail by means of the company monographs.

Size and duality

The largest 20 companies (in terms of defence turnover) are listed in table 4.3. The figures presented are budgetary ones for the state agencies (DCN, CEA and GIAT). For all other companies, they are given in or calculated from the annual reports for 1989. This source explains why the restructuring which took place in 1990 is not taken into account (e.g. TRT and Luchaire still appear as such, and Matra still holds its subsidiary Manurhin). The same remark applies to all subsequent tables.

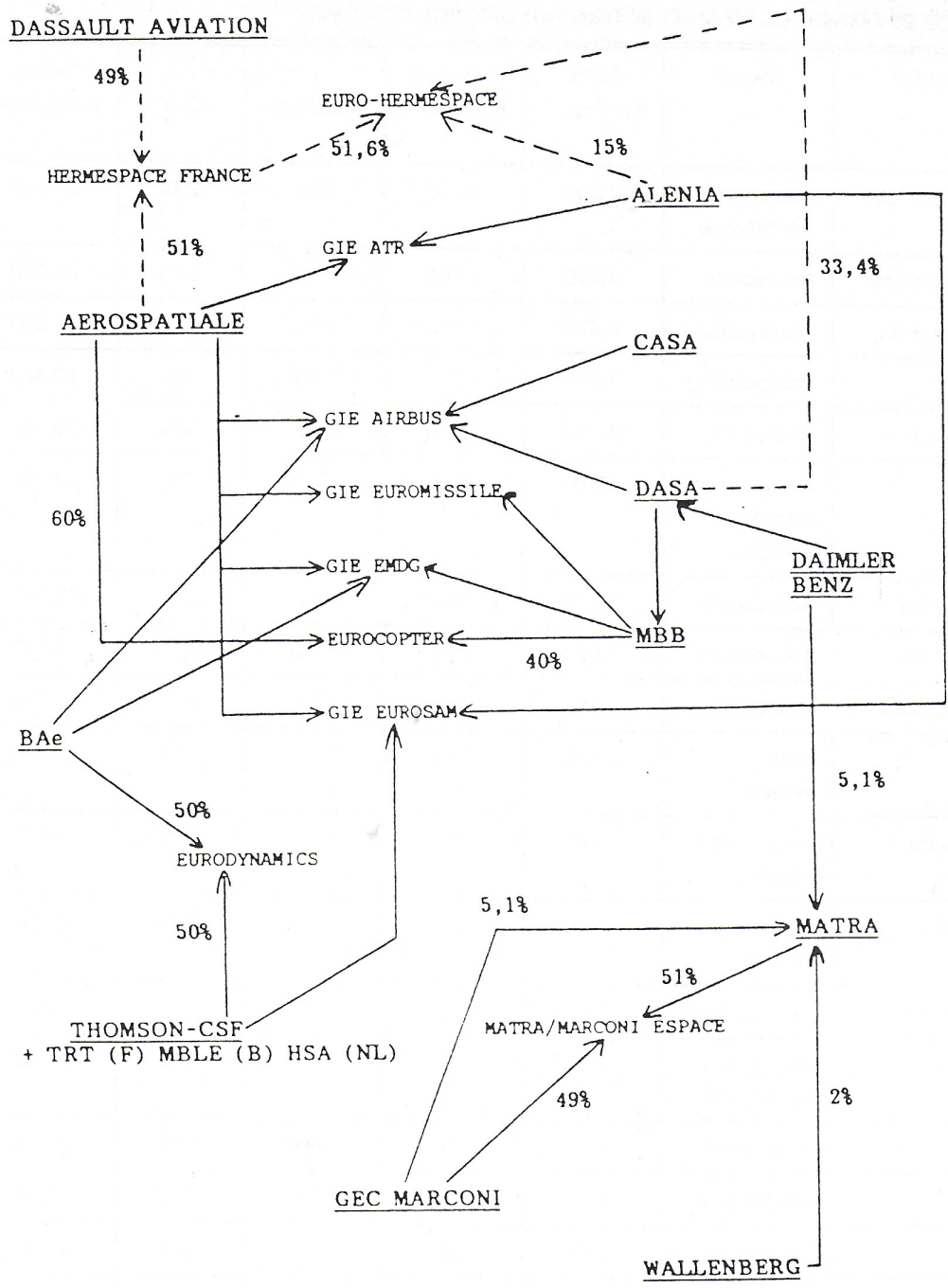


Table 4-2 - Main international consortia or "GIE's" in defence and aerospace activities

Source : CEPS

Country: France						
TOP 20 FRENCH COMPANIES IN TERMS OF DEFENCE TURNOVER						
Million ECU	Sector	Total turnover	Defence turnover	% Defence	% Civil	Total employees
1 Thomson CSF	Electronics Aerospace	4,800	3,760	78%	22%	37,800
2 Aérospatiale	Aerospace	4,510	1,985	44%	56%	33,220
3 Dassault Av	Aerospace	2,470	1,930	78%	22%	13,380
4 DCN	Shipbuilding	1,810	1,810	100%	0%	30,460
5 CEA Ind	Nuclear	3,560	1,420	40%	60%	20,000
6 GIAT	Ammo&arm smotor vehicles	970	970	100%	0%	14,300
7 Matra D.E.	Aerospace	1,200	780	65%	35%	9,330
8 SNECMA	Aerospace	1,920	770	40%	60%	13,730
9 Dassault EI	Electronics	590	450	77%	23%	4,110
10 RVI	Motor vehicles	4,885	365	7%	93%	32,500
11 Sextant	Aerospace Electronics	860	320	37%	63%	9,850
12 SNPE	Aerospace Ammo	530	260	49%	51%	6,700
13 SAGEM	Electronics	700	250	36%	64%	7,690
14 Labinal	Aerospace Electronics	970	250	25%	75%	16,320
15 TRT	Electronics	410	190	46%	54%	4,100
16 SEP	Aerospace	630	160	26%	74%	4,000
17 SAT	Electronics	410	130	31%	69%	4,670
18 Luchaire	Ammo	260	93	35%	65%	2,350
19 SFIM	Electronics	130	65	50%	50%	1,460
20 CSEE	Electronics Aerospace	180	54	30%	70%	2,160

TABLE 4.3 Sources: - for DCN, GIAT and CEA: budgetary figures
- for all other companies: annual reports

In order to clarify the analysis of duality, the term "company" systematically designates the smallest possible legal entity having a military activity, as opposed to the group or holding it may belong to. This is especially the case for :

- Thomson-CSF, CEA Industrie, Matra Défense-Espace, RVI (Renault Véhicules Industriels) and Sagem, which belong to bigger groups but which concentrate the whole military activity of these groups;
- Sextant and SEP, which are joint subsidiaries of other companies listed, as previously indicated.

The case of Dassault is particular, since the group consists of two entities (Aviation and Electronics) both having a military activity.

This choice of specialized companies instead of large groups explains the very high percentage of defence turnover of Thomson-CSF (78%) - third to DCN and GIAT (100% due to their present statute) - and that of Matra Défense Espace (65%). The military share for the corresponding groups are only about 40%, and as far as Renault is concerned, the 7% military share of RVI only represents only 1.6% for the whole Renault group.

Another approach to the study of the industrial structure is to take into consideration the defence turnovers of table 3.2 as percentages of the overall national defence turnover in 1989, i.e. 17,100 Million ECU (i.e. 5.4% of the GNP). This shows that :

- Thomson-CSF alone represents 25.7% of the total
- the first 05 companies represent jointly 67.5% of the total
- the first 10 companies represent jointly 86.7% of the total
- the first 20 companies represent jointly 96.4% of the total

The percentage left after the top 20 companies is very low (3.6%). Yet, many more companies work for defence, but their number is difficult to evaluate, because they can go down to extremely small ones (for specific orders) or even individuals (for research grants). Official statistics indicate that a total 4,800 companies work regularly for defence (excluding clothing, catering, etc.), and another 3,200 more sporadically.

In terms of employment, among the 400,000 people working directly or indirectly for defence, 30% work with major contractors, and - at the opposite end of the industrial space - 63% work in companies employing less than 2,500 people. Table 4.4 gives a more detailed breakdown. Important efforts have been made for two years to extend the background of the defence industry towards small- and medium-companies, by granting them research contracts.

Position within the national industry

Table 4.5 situates the main military or dual groups and companies within the French industrial community on the basis of their turnover in 1989. It shows that the first defence company Thomson-CSF comes only 38th in this list. Even the Thomson group as a whole comes only 14th.

BREAKDOWN OF WORKFORCE IN THE FRENCH DEFENCE INDUSTRY		
% of companies with defence contracts	number of employees	% of total defence employment
33%	less than 25	2%
25%	25 to 49	5%
15%	50 to 99	6%
12%	100 to 199	8%
9%	200 to 499	14%
3%	500 to 999	12%
2%	1000 to 2499	16%
1%	2500 and more	37%

TABLE 4.4

Source: French Ministry of Defence

Country: France		
DEFENCE INDUSTRY IN NATIONAL ECONOMY		
RANK	COMPANY	1989 TURNOVER
1	Renault	24.930
2	Peugeot S.A.	21.790
4	C.G.E.	20.500
14	Thomson S.A.	10.930
37	R.V.I.	4.880
38	Thomson CSF	4.800
42	Aérospatiale	4.510
59	CEA Industrie	3.560
67	Matra (group)	3.150
83	Dassault Av.	2.470
103	SNECMA	1.920
154	Matra Def. Esp.	1.200

TABLE 4.5

Sources:

- Guideline: listing made by 'les Echos' in November 1990
- Precise data: annual reports

This might appear as a consequence of a previous remark, according to which the ownership of many of the defence industries by the state excludes the existence of big holdings. But even if "the State" were considered the holding company of the whole nationalized defence industry (roughly 80% of the total, i.e. of the 17,100 Million ECU defence turnover for 1989), its defence turnover ($17,100 \times 80\% = 13,680$ Million ECU) would only place it in the 9th position.

This corrects, to some extent, the impression of paramount importance of the arms industry in the national industrial community, as it might result from former considerations.

This classification is established on the basis of turnovers. The position of dual companies within the whole industry is very different when the classification is made on the basis of

R&D turnovers, owing to the importance of R&D in military equipment and in such dual sectors as aerospace and electronics. Hence another list of so-called "most innovative" companies (table 4.6) which changes not only the general position of dual companies, but also their relative ranking :

- n° 1 = Aérospatiale
- n° 3 = Thomson (group)
- n° 6 = SNECMA (group)
- n° 10 = Matra (group)
- n° 12 = Dassault Electronique

It would be wrong to attribute this result exclusively to the military R&D funding, because some of these companies also receive a civil public funding, and they also contribute to their expenses by self-financing. Indeed, as indicated about procurement policy, the DGA tends more and more to request a contribution from the companies themselves in the R&D expenses.

Monopolies and leaderships

Putting aside the CEA (whose industrial position is very particular), some monopolistic situations can be identified within the French defence industry :

- DCN for military shipyards,
- Aérospatiale for strategic missiles and for helicopters,
- Dassault Aviation for combat aircraft,
- SNPE for propellants and explosives.

Other companies have dominant positions, but with competitors, as will be shown case by case in the sectorial analysis.

Companies can also be classified as prime contractors (for French defence programmes, or for the French share of international programmes) or subcontractors. Among the top ones :

- DCN, Aérospatiale and Dassault Aviation are almost systematically prime contractors ;
- SNECMA, SNPE and all subsequent companies are systematically subcontractors ;

FRENCH 'MOST INNOVATIVE' COMPANIES IN 1989				
Rank	Company	Turnover (Million ECU)(Total) R&D	Employees (total) R&D	European research projects
1	Aérospatiale	(4,512) 1,567	(32,222) 9,428	11
2	CGE	(20,501) 1,538	(210,300) 18,550	?
3	Thomson S.A.	(10,927) 1,197	(100,000) 9,900	123
4	Renault	(24,934) 798	(174,570) 8,000	40
5	SNECMA group	(3,064) 726	(25,550) 6,350	11
5	Peugeot	(21,792) 726	(159,100) -	14
10	Matra group	(3,148) 370	(21,240) -	11
12	Dassault El.	(590) 237	(4,110) 2,300	5

Table 4.6

Source : 'Le Monde', special issue, Nov. 1990

- Thomson-CSF, GIAT and Matra (and exceptionally Dassault Electronique) are in a position to be prime contractors, but may become subcontractors on a case-by-case basis.

For instance, Thomson-CSF is the prime contractor in the Crotale programme (while also acting as a subcontractor), and is a subcontractor to Dassault Aviation in the Rafale programme and to Matra in the MICA programme, which is itself a sub-programme of the Rafale programme.

In order to identify some of the main actors of the contracting chain, table 4.7 gives the typical example of the Rafale programme.

Breakdown of the Rafale programme

1 - Prime contractor and system integrator (35% of the value added) :

Dassault Aviation

2 - First-level contractors (contracts passed directly by the procurement agency DGA) :

- (for the airframe : Dassault Aviation)
- for the engine M 88 : SNECMA
- for the radar SPECTRA : GIE "RBE" formed by Thomson-CSF (66.7%) and Dassault Electronique (33.3%)
- for the air-to-air missile MICA : Matra

3 - Second-level contractors (contract passed by Dassault Aviation) :

- Aérospatiale : missiles other than air-to-air
- Air Equipment : fuel circuit
- Auxilec : electric circuit
- Bronzavia : hydraulic ancillaries
- Dassault Electronique : "black box"
- GIAT Industries : 30 mm gun
- ECE : electric supply
- ELECMA : computer for engine
- EROS : elements of the oxygen circuit
- Hispano-Suiza : connectors for the engine + ancillaries
- Intertechnique : equipments for the fuel circuit
- LMT Radio Professionnelle : IFF
- Messier Bugatti : landing gear
- Microturbo (Labinal) : auxiliary power unit
- SAGEM : gyrolaser inertial system
- SECAN : elements of conditioning
- SEMMB : ejection seat
- Sextant Avionique : displays, symbols generation, radio, sensors, vocal control, trajectory calculator
- Sully Produits Spéciaux : cockpit
- Technofan : conditioner
- TRT (now Thomson-CSF) : radio-altimeter
- Zenith Aviation : fuel circuit

4 - Third-level contractors : hundreds of smaller companies

Table 4.7 Source: Dassault Aviation

Company profiles

In order to gain a better understanding of the various types of companies existing in the defence industry and of their strategies, investigations were carried out at three different levels :

- For each of the top 40 companies (in terms of defence turnover), a standardized data checklist was established (using its annual report) and annexed to the present study.
- In addition to this, a more thorough investigation was made of the top 7 (excluding the CEA, whose status is very particular) thanks to interviews of high-ranking managers. The outcome of these interviews is analyzed in three different chapters of the present study : "company profiles", "company strategies" and "conversion".
- Three more companies were interviewed, in order to constitute a representative sampling when added to the top 7. Their "profiles" were analyzed with less quantitative details (since they are smaller), but the same care was given to them in the chapters "strategy" and "conversion".

In order to avoid duplications, the contents of these three chapters are defined as follows

- "Company profiles" (the present one) : general description, main productions (the financial data being in the annexed checklists, together with some organization charts);
- "Company strategies" : corporate strategies, national and international alliances ;
- "Conversion" : the particular strategy of civil/military duality and convertibility.

Some duplication remains, though, between this analysis by companies and the description of the defence-related industrial sectors.

The ten companies interviewed are (in the order of decreasing defence turnover) :

1. Thomson-CSF, the "dual" component of a world-leading group in electronics (and itself second in the world in defence electronics), a particularly interesting company for the present study since its gradual specialization in defence results from a deliberate strategy.
2. Aérospatiale, the leading French aerospace group (and also a major international partner which achieves 2/3 of its turnover in cooperative programmes) and a typical example of a dual industry (now more civil than military), hence a good basis for a study of the interactions between civil and military productions.
3. Dassault Aviation, the main French military aircraft designer and integrator, very dependent on military orders (national and export) in spite of its diversification efforts, hence a good basis for a study of vulnerability to defence budget cuts.
4. DCN, one of the directorates of the DGA ("Délégation Générale pour l'Armement") - i.e. not a "company" in a legal sense - the major French military shipbuilder and integrator of naval weapons and electronics in naval systems.
5. GIAT Industries, formerly part of another DGA directorate, but just converted into a civil company (although state-owned) and which endeavours to work on international programmes and to diversify its activity towards civil products.
6. Matra, a group with three different activities (defence and space - automobile and transports - communications and information-processing), a good basis for the understanding of a strategy of diversification.
7. SNECMA, the main turbine engine manufacturer, a very specialized company, but which works for the military and the defence world markets.
8. SNPE, a former military monopoly converted into a national society in 1971 as a consequence of the Rome Treaty, now covering the whole range of civil and military propellants and explosives, and extending its activity to advanced materials and chemistry.
9. Sextant-Avionique, a joint 50/50 subsidiary of Thomson-CSF and Aérospatiale, and a merger of small avionics companies (SFENA, Crouzet, EAS and Thomson AVG) into a major one in its field (5th in the world and 1st in Europe).

10. Bertin, the most important private and independent research company in Europe, specialized in high-tech studies and open to European contracts through the EACRO (European Association of Contact Research Organisations).

In addition to the features described above, the main reasons for selecting these companies are :

- their importance within the defence industry : 9 of these 10 companies are part of the top 12;
- their coverage of the defence industry by end uses :
 - . land-based equipment : Thomson-CSF, GIAT
 - . shipbuilding : DCN
 - . aerospace : Aérospatiale, Dassault Aviation, Matra, SNECMA
 - . electronics : Thomson-CSF (also involved in aerospace);
- their coverage of the defence industry by types of enterprises :
 - . systems integrators : Thomson-CSF, Aérospatiale, Matra
 - . subsystems : SNECMA, Sextant-Avionique, SNPE
 - . advanced technology (per se) : Bertin.

Thomson-CSF

Thomson-CSF is a 59.1% subsidiary (the remainder being on the stock exchange) of the state-owned Thomson group (nationalized in 1982), which is 16th in the world for electronics in general. In addition to Thomson-CSF, the Group (Thomson S.A.) consists of two fully-owned companies : Thomson Consumer Electronics, and Thomson Electroménager (for home appliances). It also includes its share of three joint subsidiaries :

- Sextant Avionique (50/50 Thomson-CSF/Aérospatiale) for avionics (i.e. airborne electronics);
- SGS Thomson (50/50 with Finmeccanica) for semiconductors;
- a bank Altus Finance (50/50 with Crédit Lyonnais).

Apart from Sextant Avionique, which was formed from its "General Avionics" division, Thomson-CSF concentrates the whole defence activity of this group, which makes it second in the world (behind General Motors) and first in Europe for defence electronics. Within the French defence community, it comes first in terms of defence turnover. In spite of this, it only comes 38th in the list of French companies, and even the Thomson group as a whole comes only 14th. Conversely, this group is the third most innovative.

In 1989, Thomson-CSF integrated Thomson's 100% subsidiary TBA (Thomson Brandt Armements), a rocket and mortar manufacturer, and a user of electronics for "smart" munitions. Within the field of electronics, it acquired the defence activity of TRT from Philips, in France. Outside France it also acquired HSA in the Netherlands and MBLE in Belgium (also from Philips), and Link Miles in the USA. Conversely, it had withdrawn from Thomson-Lucas in 1988.

Except for Lucas, none of these changes appears in the tables presented, which are established with data for 1989. Incidentally, the Thomson group went through such extensive restructuring in the last years (and this might continue) that comparisons from one year to another (especially financial comparisons, like those contained in the annexed checklists) are often meaningless. Indeed, the list of restructuring of the group and even of Thomson-CSF alone between 1982 and 1990 is rather impressive :

- cessions : the equivalent of 48,700 employees and a 3,800 Million ECU turnover for the whole group (34,330 employees and 2,500 Million ECU for Thomson-CSF alone);
- acquisitions : the equivalent of 54,900 employees and a 4,500 Million ECU turnover for the whole group (13,650 employees and 980 Million ECU for Thomson-CSF alone).

Since April 1990, Thomson-CSF is organized in two sectors :

- Electronics and Defence Systems, with six operating groups (aerospace, detection systems, communications and command systems, information technology, missile systems, and specific components);
- Professional Electronics.

In terms of productions, it is easier to categorize its military activity under two different aspects, although strongly overlapping : on the one hand weapon systems, on the other hand electronic systems and components.

In weapon systems, it most often acts as a prime contractor in French programmes or in the French share of international programmes. Its main productions are :

- mortars and their munitions, ground-to-air rockets, and "smart" munitions, all this corresponding to the activity of TBA;
- air-defence (including anti-missile) missile systems : Crotale and Shahine nationally, and other programmes in international cooperation (Crotale NG, Hawk HIP, SAMP and SAAM : see company strategy).

Matra

Matra (Mécanique Aviation Traction) is one of the two components of the Lagardère group (with Hachette). It is a privately-owned group formed in 1945 for defence purposes (air-to-air missiles). Over the years, it gradually diversified its activities, thus forming three civil oriented "branches" - Transports, Communications and Space - in addition to the defence branch. It was nationalized in 1982, then de-nationalized in 1987. In 1989, the group was n° 67 in France in terms of turnover, but it was the 10th best innovator.

In 1989, the structure of the group was as follows :

- Matra Défense Espace (38.2% of the total turnover of 3,150 Million ECU, in 1989), to be separated in 2 branches Defence and Space more recently ;
- Matra Automobile Transports (35.6%)
- Matra Télécommunications et Traitement de l'Information (26.2%)

The first of these former three branches (Defence & Space) concentrates nearly the whole defence activity of the group. Even so, defence orders represent only 65% of its turnover. This percentage should still decrease in 1990 due to :

- the cession of its munitions and small arms subsidiaries Manurhin and Matra-Manurhin Défense to FN (Belgium) and to GIAT Industries;
- the acquisition of three divisions of Fairchild, in September 1989, to form Fairchild Space and Defence Corporation.

These changes are not taken into account in the annexed checklists, established from the situation of 1989. The main defence production of Matra remains its original one, i.e. air-to-air missiles (Magic, Super 530, MICA and the future MICASRAAM). But it was extended to air-to-ground missiles (Martel, Apache) and special bombs (Durandal, optically-guided bombs), antiship missiles (Otomat), ground-to-air missiles (SATCP) and drones (Brevel), which make Matra a competitor to Aérospatiale.

Space production consists of satellites, which so far have been civil (SPOT, METEOSAT and HISPASAT), and military in the near future (Helios).

Aérospatiale

The Société Nationale Industrielle Aérospatiale, 100% state-owned, is the second French defence company, although only 44% of its turnover was military in 1989. It was created in 1970 as the ultimate step of a number of mergers which started in 1936 (first nationalization of 8 small aircraft companies) and went on over the years. Its most recent component is SEREB, a company especially created in 1959 for ballistic missiles, now also working in space programmes. Although Aérospatiale is the second defence company and the first in the aerospace sector, it comes very far down on the general list of French companies (approximately 42nd, depending on the definition of "company"), although it is the most innovative. The company consists of four divisions, all of them strongly involved in international cooperations (see "strategies") :

The aircraft division achieved 38.2% of the company turnover in 1989. It had manufactured the airlift Transall with MBB, but its present productions are only civil airliners : the European Airbus and the Franco-Italian ATR 42 and 72. Its subsidiary SOCATA manufactures small aircraft, also civil except for the Epsilon trainer.

The helicopter division achieved 21% of the company turnover in 1989, of which 87% exported. It manufactures the whole range of helicopters from 2.5 to 13 tons (Ecureuil, Gazelle, Dauphin, Super-Puma, Super-Frelon), all of them dual in their basic version, and actually sold on civil and military markets. It also develops the Franco-German military helicopter Tigre, and prepares for further European developments (for the time being, the NH 90).

The tactical missiles division achieved 17.7% of the company turnover in 1989. It is the most diversified one, since it covers the whole range of missiles :

- antitank : following the 1st generation (SS 11, SS12, ENTAC), it developed the 2nd one with MBB (Milan, HOT), and now develops the 3rd one with MBB and BAe; it also develops the Eryx very-short range missile, the only one purely national;
- antiship : following the Exocet family (co-produced with BAe), it develops the supersonic ANS with MBB;
- ground to air : following the Roland 1 and 2, it develops the Roland 3 (also with MBB) and studies a hypersonic version Roland Mach 5; it also participates in the SAMP and SAMM air defence systems by developing the basic version of the missile (ASTER), while Thomson-CSF and Selenia develop each one a radar for a specific version;
- air to ground : it develops the Apache missile (for the Rafale fighter) in cooperation with Matra.

The space and strategic systems division achieved 22.7% of the company turnover in 1989. Although initially military, it now works on two different markets :

- the military one, with all the strategic missiles for the French nuclear force;
- the civil one, with the Ariane family and the possible development of the future European space shuttle Hermès.

The company possesses some subsidiaries in France, one of them jointly with Thomson-CSF for avionics : Sextant Avionique, which is treated separately. It also possesses foreign subsidiaries and holdings, mainly for helicopters in the USA (AHC = Aérospatiale Helicopter Corporation) and in Brazil (Helibras). But the company is involved in many more international cooperations that do not appear in its financial structure, because most of them are carried out within GIE's (groupements d'intérêt économique), where each participant keeps its financial autonomy (see company strategy).

Except for strategic missiles, the whole of Aérospatiale's production is on a competitive world market where prices are established in US dollars, hence a very problematic profitability when the dollar is under-evaluated : a 0.1 drop of the dollar rate versus the ECU means a 150 Million ECU loss for the company in one year.

In spite of this, the sales in 1989 amounted to 4,510 Million ECU for the company alone (4,830 Million ECU consolidated), i.e. a 13% increase (in current French Francs) versus 1988. But the most important factor in 1989 is the increase of the orders in hand: these exceeded 9,000 Million ECU (twice the company's annual turnover), so the backlog now reaches 2.5 years of sales.

This increase is mostly due to the aircraft division (63% of the new orders), which means that the ratio of civil turnover of the company should keep growing in the future, as it has been growing for the last 3 years : 45% in 1987, 49% in 1988, 56% in 1989.

The export share remains stable around an average 60% (but it reaches 87% for helicopters). As indicated in the sectorial analysis, this value must be handled with care due to the existence of induced imports, but the export/import balance remains very favourable.

In 1989, the company turnover was 4,510 Million ECU, of which 1,985 Million ECU (i.e. 44%) for defence. The company spent 1,570 Million ECU on R&D and industrialization (included in this statistics), of which 360 Million ECU was self-financed. This accounts for its first rank in the list of French innovative companies in 1989 (while it came only second in 1988).

AEROSPATIALE (1989 main figures)

- Turnover: 4,510 Million ECU (civil 56% - military 44%)
- Legal status: public company (100% state owned)
- Employees: 33,222
- Main products: civil aircraft, helicopter, missile, space systems
- Orders in hand: 9,025 Million ECU
- Total exports: 2,689 Million ECU (59.6% of turnover)
- Net operating surplus: 87 Million ECU
- R&D expenditure: 1,537 Million ECU
- Long term borrowing: 445 Million ECU

Dassault Aviation

The initial company (AMD = Avions Marcel Dassault) was created by Marcel Dassault. It started manufacturing propellers, then gradually extended its activity to the whole field of aeronautics (and now space). In the meanwhile, it acquired the main other independent company Bréguet in 1971, thus becoming AMD/BA (Avions Marcel Dassault - Bréguet Aviation). In addition, Serge Dassault (Marcel's son) created another company, now Dassault Electronique.

Until the death of Marcel Dassault in 1986, the company was totally private. Owing to the inheritance fees and to various repayable loans, the French state then acquired some rights on the whole group, with different consequences according to the company considered :

- Serge Dassault's participation in both companies is grouped in a holding (Financière et Industrielle Serge Dassault) which holds the whole of Dassault Electronique, but only a minority of Dassault Aviation;
- The French state does not own the majority of the capital of Dassault Aviation, but its voting rights give it the majority for the decisions, as indicated below :

	Capital %	Votes %
- Holding	49.75%	41.52%
- French State	45.76%	54.73%
- Dassault Personnel	4.49%	3.75%
Total	100%	100%

In the 1950s, Marcel Dassault worked almost exclusively on combat aircraft. He went on with the Mirage family, which was the predecessor to the present programme Rafale (competitor to the European EFA). The present products of the company in this field are:

- the purely national fighters Mirage III, V, F1 and 2000 (with a nuclear version Mirage 2000 N);
- the fighter-bomber Jaguar developed with BAe,
- the trainer Alphajet developed with Dornier,
- and the maritime patrol aircraft Atlantic 2 developed with a European consortium SEBCAT.

The company also gradually entered the field of civil aircraft : very successfully in executive aviation (with the Falcon family) and less successfully - commercially speaking - in commercial liners (Mercure). It now enters the space field by participating in the European consortium Euro-Hermespace. In any case, the company remains essentially a design office and a systems integrator, whose value added to the whole system is approximately 35%. As an example, table 4.7 gives the breakdown of the Rafale programme.

The company turnover in 1989 was 2,470 Million ECU, of which 1,930 Million ECU (i.e. 78%) for defence and 300 Million ECU (i.e. 12%) for R&D. After the reduction of orders for Mirage 2000 fighters and for the retrofit of Mirage F 1 observation aircraft, and considering the general situation of military exports, the short-term company's future rests essentially with the two versions (Navy and Air Force) of the Rafale. Even in this programme, which is considered a priority, a reduction of production rates is already anticipated, although the R&D budget for the Air Force is substantially increased in 1991 (+ 23.55%)

DASSAULT AVIATION (1989 main figures)	
-Turnover:	2.470 Million ECU (civil 22% - military 78%)
-Legal status:	private company
-Employees:	13.385
-Main products:	private company (but the state owns more than 50% of the voting rights)
-Orders in hand:	2.357 Million ECU
-Total exports:	1.558 Million ECU
-Net operating surplus:	179 Million ECU
-R&D expenditure:	290 Million ECU
-Long term borrowing:	724 Million ECU

(further information in the DASSAULT AVIATION profile, see Annexes II.9)

DCN

DCN (Direction des Constructions Navales) is the generic name of a group of shipyards and associated facilities and offices, which form part of the Ministry of Defence, i.e. whose personnel has a military status or a civil servant status. The director - a high-ranking official of the Armament Corps (DGA) - has a dual subordination :

- to the director DGA for the R&D and building of naval systems,
- and to the Navy Chief of Staff for the repairs and maintenance, which also constitute an industrial type of work, but assigned to the navies themselves throughout the world.

Owing to this duality, it is wrong to assign the whole turnover and the whole manpower of the DCN to a fictitious industrial company : if a partition were to occur between government and industrial tasks (as it occurred with the Army arsenals GIAT), only part of the present DCN would become a company. The shipbuilding activity, in particular, only employs 8,200 people out of the total 30,460, and only represents 62% of its industrial turnover. Repairs and maintenance add another 6,200 people (all over the world, as far the Indian Ocean), i.e. 43% of the entire ship-related activity.

Leaving aside the role of the DCN as a state agency, its main productions are :

- a nuclear-powered aircraft carrier, now in the development phase;
- nuclear-powered submarines, both attack SSN's and ballistic missile launchers (SSBN's);
- anti-submarine and air-defence frigates;
- some weapon systems such as torpedoes;

But, more than a manufacturer, the DCN is a systems integrator which builds the hulls and a few weapons, and incorporates all other weapons (conventional or nuclear), and also the engines (diesel or nuclear). All ships are very complex and autonomous systems where all elements are interconnected, even the most unexpected ones (e.g. radar radiation can ignite electric fuses by inductive currents, and cause a major accident), which requires a specific approach to the problems.

In spite of its particular status, the DCN establishes yearly an analytical accounting report, which reveals its real costs. But as far as funding is concerned, this comes nearly exclusively from the French defence budget, because exports represent only 2.3% of its turnover. Indeed, being "the State", the DCN is not supposed to build ships designed especially for export needs, nor even to commercialize directly those built on French Navy standards : some consequences of this situation are analyzed within the shipbuilding sector. Nevertheless, it cooperated with Beliard in Belgium and Van der Griessen in the Netherlands for the construction of a series on non-metallic minehunters Eridan.

In 1989, the "turnover" of the "company" (with all the reservations due to its status) was 1,810 Million ECU, entirely military, of which 155 Million ECU (i.e. 8.6%) for R&D. In addition to developments, the DCN is very active in applied research, especially in underwater acoustics and detection, but it is difficult, in that field, to make a clear-cut separation between its government role and its industrial role.

DCN (1989 main figures)
-Turnover: 1,810 Million ECU
-Legal status: Naval dockyard (state agency)
-Employees: 30,460
-Main products: ship building
-Orders in hand:
-Total exports: 67 Million ECU
-Net operating surplus:
-R&D expenditure:
-Long term borrowing:

(further information in the DCN profile, see Annexes II.9)

GIAT

Until July 1990, GIAT (Groupement Industriel des Armements Terrestres) had the same status as the DCN (i.e. a military agency with military personnel and civil servants) and as what used to be the state monopoly on propellants and explosives, which became the state-owned company SNPE in 1971.

GIAT now follows the same evolution as SNPE, since it changed from military arsenals to a state-owned company "GIAT-Industries" on 1 July 1990.

Actually, this change had been prepared for a number of years thanks to an administrative partition of the directorate for land-based weapons (DAT, part of DGA) between government tasks and industrial ones. This, in particular, already provided GIAT with an analytical accounting system.

GIAT-Industries keeps all the assets of the former GIAT, but also its constraints, i.e. the civil-servant status of its personnel, which excludes laying off in a near future, and even closing facilities, although these are currently considered too numerous. Conversely, this change of status enabled GIAT-Industries to acquire the munitions activities of Luchaire and of Matra, and possibly the small arms activities of FN in Belgium.

Munitions only represent about one third of its activity. In addition, GIAT Industries manufactures all the types of land-based weapons, except for motors, trucks and light armoured vehicles. Its initial organization (subject to rapid evolution) was in three branches :

- Munitions and pyrotechnics (37% of turnover in 1989), now covering the whole range of calibres from 5.56 mm to 155 mm thanks to its acquisitions;
- Artillery and weapons (18% of turnover), also covering the whole range from the 5.56 mm FAMAS automatic rifle to self-propelled 155 mm artillery guns;
- Armoured vehicles and turrets (45% of the turnover), manufacturing medium and heavy tanks, in particular the main battletank Leclerc, which is entering the production phase.

GIAT-Industries is in a monopolistic situation in France in this third sector, but it has to face severe budget cuts : the number of Leclerc tanks to be ordered should be 800 instead of 1,400 initially forecast. Similar cuts occur in the other two sectors : 68 artillery guns, 34,000 FAMAS (which means the end of the production) and all 12.7 mm munitions, all this adding up to 350,000 hours of work (while GIAT employees are already too numerous as stated above). Hence a low turnover and a negative profitability, which will compel the state (as legally forecast) to pay a 140 Million ECU allocation at the end of 1990.

In spite of its particular status, the DCN establishes yearly an analytical accounting report, which reveals its real costs. But as far as funding is concerned, this comes nearly exclusively from the French defence budget, because exports represent only 2.3% of its turnover. Indeed, being "the State", the DCN is not supposed to build ships designed especially for export needs, nor even to commercialize directly those built on French Navy standards : some consequences of this situation are analyzed within the shipbuilding sector. Nevertheless, it cooperated with Beliard in Belgium and Van der Griessen in the Netherlands for the construction of a series on non-metallic minehunters Eridan.

In 1989, the "turnover" of the "company" (with all the reservations due to its status) was 1,810 Million ECU, entirely military, of which 155 Million ECU (i.e. 8.6%) for R&D. In addition to developments, the DCN is very active in applied research, especially in underwater acoustics and detection, but it is difficult, in that field, to make a clear-cut separation between its government role and its industrial role.

DCN (1989 main figures)
-Turnover: 1,810 Million ECU
-Legal status: Naval dockyard (state agency)
-Employees: 30,460
-Main products: ship building
-Orders in hand:
-Total exports: 67 Million ECU
-Net operating surplus:
-R&D expenditure:
-Long term borrowing:

(further information in the DCN profile, see Annexes II.9)

GIAT

Until July 1990, GIAT (Groupement Industriel des Armements Terrestres) had the same status as the DCN (i.e. a military agency with military personnel and civil servants) and as what used to be the state monopoly on propellants and explosives, which became the state-owned company SNPE in 1971.

GIAT now follows the same evolution as SNPE, since it changed from military arsenals to a state-owned company "GIAT-Industries" on 1 July 1990.

Treating GIAT as a company, even in 1989, shows a turnover of 970 Million ECU, entirely military, of which 140 Million ECU (i.e. 14.5%) for R&D. This is a very high percentage in land-based equipment, which results essentially from the development of the battletank Leclerc, now entering the production phase. As a matter of fact, the R&D share of the Army equipment budget has been reduced by 22% in the 1991 budget.

GIAT (1989 main figures)

- Turnover: 910 Million ECU (100% military)
- Legal status: army arsenal (state agency until 01.07.91)
- Employees: 14,000
- Main products: Land based weapon systems
- Orders in hand: 800 Million ECU
- Total exports: 91 Million ECU (10% of turnover)
- Net operating surplus:
- R&D expenditure: 142 Million ECU
- Long term borrowing:

(further information in the GIAT profile, see Annexes II.9)

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