

Saab Ericsson Space

- holds a key position with regards to space qualified electronic equipment

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in this article:
Saab Ericsson Space

While most of the products early on were mainly meant for publicly financed space research and development, Saab Ericsson Space today generally recognises that they are one of the most important suppliers for the commercial space industries. Various products have provided the company with increased possibilities in an extended market. However, it does not mean that the company is not affected by the general decline in the space-related market. After a nearly steady growth for many years, the company was forced to reduce the amount of personnel last year, a reduction that mainly targeted personnel in the electronic division of the company, though it spread throughout other divisions as well. "The reduction in the activity has mostly hit suppliers of satellites, and this goes for everybody, not only for our company", says Bengt Mörtberg, President of Saab Ericsson Space, "but we hope and believe in an increase in the coming years".



President of Saab Ericsson Space,
Bengt Mörtberg.



Saab Ericsson Space holds near the whole world marked for satellite adapters.

Saab Ericsson Space is one of Europe's largest independent space suppliers of products such as computer systems, antennas and microwave technology, as well as guidance and separation systems for launcher and satellites.

The headquarter and the largest production plant is situated in Gothenborg, and it has about 400 employers, in addition to most of the activities concentrated around microelectronic and digital equipment. In the Linköping plant 75 persons are engaged in the production of satellite adapters and equipment for sounding rockets. Saab Ericsson Space's activity in Austria is carried out through Austrian Aerospace GmbH and the division employs 120 persons. The production in Austria is in the most similar to the one in Gothenborg. In addition Saab Ericsson Space has a small marketing and support division in the USA, Saab Ericsson Space Inc.

The President of Space Ericsson Space for the last few years, Bengt Mörtberg, gave in an interview an outline of the activities at Saab Ericsson Space and his evaluation of the future, both in terms of his own company and for the space activity in general.

"With our company's headquarter here in Gothenburg", states Bengt Mörtberg, "the products is digital electronics, like the onboard computers for the Ariane launcher, and data handling system and onboard computers for satellites. The other main product types are microwave products and all types

Bengt Mörtberg is a civil engineer from Linköping Technical University. He worked at Saab Space the first ten years of his career, and participated in developing and building the Viking satellite and Tele-X, early in the 1980s before he left Sweden for a period of 11 years. In this time he worked within Inmarsat in London the first years and in the USA the last part of the stay abroad. Thus he gained international experience and good contacts within the American market and other international space-related industries. This is why Bengt Mörtberg in the middle of the 90s came back to Sweden as the leader for Saab Ericsson Space in Linköping, a post he had until he was chosen as head of the whole company of Saab Ericsson Space in 2000.

of antennas. Our customer list holds organisations such as ESA and Arianespace, in addition to most of the commercial satellite providers. After a continuously increased growth for many years, the division has demonstrated a decline this period. We are very dependent on the commercial market, but I am sure our products are of a such high quality that we will hold our market share, even in a time of decline”.

“We have a very robust division of Saab Ericsson Space in Linköping both within production and development of new and better products”, says Bengt Mörberg, “and we have great expectations of a steady activity here. The division has a very dominating position in the world market for satellite adapters and separation systems, in addition to long-term contracts delivering guidance systems for sounding rockets”.

Decline in the space industry

“For us, as a supplier for the satellite market, it is a difficult period right now. The satellite market has decreased the last years to a level of 20 –22 satellites a year as opposed to previously, namely 30-35 a year. That is a level we believe can be the next years’ level and we have adjusted our activity accordingly. That has resulted in the fact that about 15 % have had to leave the division in Gothenburg”.

“The reduction in the activity has hit mostly of suppliers of the satellites, but we believe the activity will increase again after a period of three to four years. One reason for the decreased market is the consolidation of the structure of satellite operators. Combination and purchasing of smaller operators has provided a more rational use of satellite capacity, thus created a lesser need for new capacity. One example is SES Global, owner of 29 private satellites and part owner in 13 others; they can use the capacity very rationally, and can postpone purchasing of new satellites. However, the fleet will need replacement and expansion in the future, and the technology market is not permanently done with”.

“The satellite operators are now in an ideal situation, the high capacity in production and launch of satellites gives them possibilities to purchase services at a very low price, but this situation must



be changed. The profitability must increase within all fields. The American companies can survive on the defence market, but for the European companies such possibilities are very small. Another problem is the fact that large development contracts for the defence provides our American competitors with possibilities to develop advanced products through these contracts, and later introduce these in the commercial market”.

“Over-capacity is, however, a more common problem for the space industry, aimed at both satellite and launcher suppliers. I expect that this in fact constitutes almost one hundred percent in today’s market. In the present situation some of the suppliers at all levels will die out, but I fear the reduction will not will be sufficient”, claims Bengt Mörberg.

“The same problem, over-capacity and economical loss is also found in the launcher market, even worse for the European market because the American operators can rely on a defence market in addition to the commercial market. For example, the economical problem for Arianespace hits companies such as Saab Ericsson Space in two ways, both as part owner and as supplier of equipment for the Ariane launcher. Arianespace has 50% of the commercial market, but the launcher capacity in the market is very large and the company does not make money. The introduction of the modern American launchers Atlas 5 and Delta 4 will cause further competition in the commercial market. As supplier of onboard computers for Ariane 5 our company is dependent on these launchers’ success in the market. For adapters and separation system we have such a large part of the world market, that we are only dependent on a sufficient numbers of launchers, he proclaims”.

“Our company is at the level next under the prime contractors and can be responsible for parts of the satellites’ system. We are an independent supplier of equipment, and that is our strength

High quality at personale and technical equipment is necessary for industrial companies as will be in the forefront.

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towards European and American industry. We have good relations to all of the satellite manufacturers and the equipment we produce we principally deliver to all of these. We have a clear strategy to stay independent from the large constructors, thus being able to produce a sufficient volume at the right level of cost".

"Very important for relatively small companies like Saab Ericsson Space is to operate in small niches and develop products with a high technological level, at the same time maintaining the right price. Our main objective is not to become a prime contractor for whole satellites, our idea is to develop and produce equipment, and possibly, be responsible for parts of a complete satellite. A high quality and small niches constitute our key to success, both for us in Sweden and for our company in Austria".

"If we are going to expand, we must take new market shares in the commercial market. Neither the Swedish, nor the ESA market will increase, not even the commercial market the first years. Being in the forefront technologically means that we can take new shares in our niches".

"For this reason, development contracts for ESA, like the ones to the Herchel Planck project is very important. The high demand of quality, weight and vitality is very valuable in order to develop products for the commercial market. We utilise projects like Herchel Planck to develop new generations of computer equipment, both for future scientific satellites, and for the commercial market. It is a steady generation exchange in the development process, and the computers for Herchel Planck is such an exchange, and therefore important to win for us".

The development of Europe's Galileo positioning system will be the largest space-related project in Europe this decade. How is the company's position in this project, we ask Bengt Mörberg.

"When it comes to Galileo we are in a good position to develop and deliver equipment for the

first experiment satellite and later as supplier for the operative system. However, I am sure that the competition for the different contracts will prove tough, and many large companies will put much effort into winning. The contracts will be huge, but the way I see it, we have a fair chance of winning some of these".

Saab Ericsson Space wishes to be in the technological forefront and spends large resources accordingly. What gives the largest technological advance, demand from customers, participating in developing projects or creative co-workers?

"Saab Ericsson has very creative co-workers, that is a well-known fact, but the developing process is a combination of general technology, demand from the users and at last, but most important for us, creative co-workers. This ensures us possibilities to develop the products the market requires, but of a better quality and at a better price than our competitors. In addition, we must keep a close eye on the future and evaluate the on-going trends, what our customer will need and what the market will need".

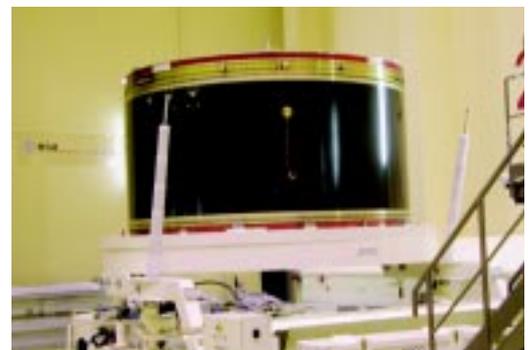
What then about the future for Saab Ericsson Space?

"Possibly we will be greater than now, not through our own expansion, but in co-operation with, or owner of allied industries. The market will not increase considerably, and the expansion must come in larger market shares. I also hope the company, even in the future, will be an independent company where we can be supplier for all prime contractors within the space segment. If we are going to become a part of one of the a large prime contractors, we will encounter problems supplying others. I believe that the future for Saab Ericsson Space lies in remaining a relatively small company, independent, but at a high technological level", Bengt Mörberg concludes. ■

What can Saab Ericsson offer?

Separation systems and structures.

The company is the world-leading supplier of separation and adapter systems for all major launchers and for carrying payloads of all sizes. The success rate is very good. The last twenty years the company's products have provided 300 satellite separations, all successfully carried out. The product is the adapter between the launcher and the satellite, together with the mechanism that separates the



The adapter between Ariane 5 and the Automated Transfer Vehicle here in a test hall at ESTEC. Photo: NSA

satellite from the launcher, bringing him away and in many cases set the satellite in a slow rotation. The separation is momentary using explosive bolts and a spring system that brings the satellite away to a predetermined orbit, an orbit where the satellite's own engine takes the satellite to the final orbit. The demand for the product is very high, they must hold the satellite steady in the launch sequence, insert the satellite in a correct orbit and rotation, and not leave lose parts in space.

Developing and producing these products are carried out at the Saab Ericsson's plant in Linköping. Saab Ericsson is almost the only supplier of such a system in the world, the separation system is to be found in all versions of Ariane, the Russian Proton, the American Atlas and Delta and the American-Ukraine Sea Launch launcher etc. The company can also develop and manufacture the satellite's main structures, or of parts of the structures. It is also worth to mention products such as Tele-X, parts of the Japanese test satellite ETS-8 and for the MTSAT-2.

Guidance and satellite systems.

Saab Ericsson is also a supplier of guidance systems for sounding rockets, with NASA and ESA as the end customers. For the NASA's sounding rocket research program the company has a multi-year contract, not only for the developing and manufacturing of the guidance system, but also in terms of analysing the control loop and set control parameters that warrant the best performance. For ESA's MAXUS micro gravity program Saab Ericsson supplies the thrust vector controlled Guidance system for Castor 4B Maxus sounding rocket. The guidance system is used for trajectory guidance, stabilisation and impact point control. They also perform the required control analyses for the Maxus missions. The large customer, however, is NASA, where the company supplies 10-20 systems a year, and that means the world for a company like Saab Ericsson Space."

In the field of satellite systems, Saab Ericsson Space provided the Altitude Control and Determination Computer (ACDC) for the Odin satellite. The supplies included both hardware and



DS19 with ground support equipment

software for its technically demanding application calculations. Odin is a Swedish national satellite project, and the satellite is still operative in the orbit after two years in space. Thermal analysis and design for space applications is also a strong specialist area, and the company is responsible for the thermal control of the Smart-1 spacecraft.

Electrical harness for satellites is also an important niche. Over the past ten years the company has designed and manufactured harness for several ESA's programmes. The Cluster satellites and the Sirius 2 programme should be mentioned in that connection. During the last period, electrical harness is manufactured for the Cupola program for the International Space Station.

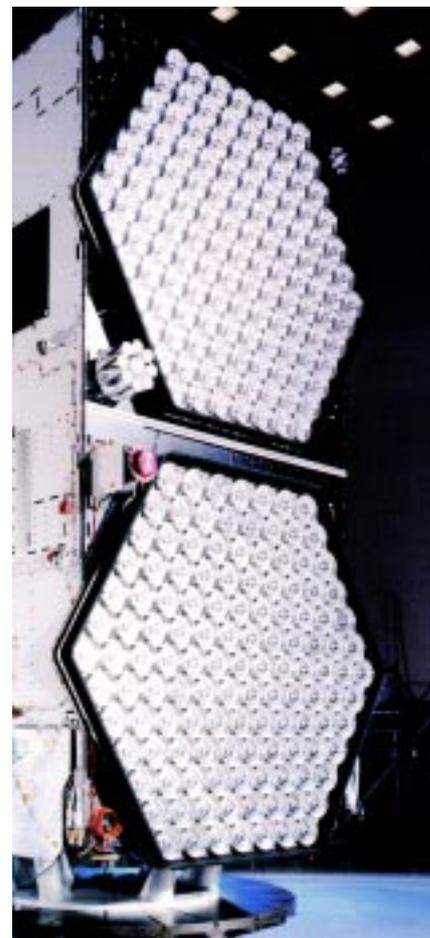
Antenna Systems

All satellites have at least one antenna onboard, but most of them have several types, dependent of the type of mission. Antenna types can be high-precision reflector antennas for TV and communications, arrays for mobile communications, omni-directional antennas for telemetry and command, and SAR antennas for remote sensing.

Antennas determine the degree of ground coverage, and the degree of interference with other communication links. For telemetry, tracking and command (TTC) they have to provide full, or almost full sphere coverage. For remote sensing they form the sensor head, defining the resolution of the instrument. Antennas are often large, since radiation pattern control requires a certain physical size, and this most often rules out redundant systems. That's why they have to be very reliable, stable, and at the same time lightweight. Mounted on the outside, antennas are also exposed to a very severe environment in terms of temperatures, radiation and atomic oxygen.

Consequently, the customers need high-level skills in thermal, mechanical and RF design combined with a thorough understanding of composite materials and their production processes, all brought together by professional craftsmanship in an integrated production system.

As the leading supplier both in Europe and USA, Saab Ericsson Space develops and manufactures all this above-mentioned types of antennas to a row of satellite operators. Telecommunication antennas are placed on the well known types of commercial communication satellites as TV-SAT 1&2, TDF 1&2, Thuraya, Italsat, ICO-Global, Eutelsat W4 etc. Reflector antennas for



Saab Ericsson Space supplies antenna elements and microwave equipment to the ICO satellite program at Hughes.

scientific and earth observations tasks are delivered to Odin, SOHO, Ulysses, Giotto, Rosetta, Cryosat etc. in addition telemetry antennas for the Ariane 5 launcher. Omnidirectional antennas for satellite TTC, data and Beacons are delivered to the SPOT Vegetation 1&2, GOES, the ICO-program, Metop, Artemis, SMART-1, ISEE-B and GEOS to mention some.

Onboard Computers

A satellite must function perfectly in a harsh environment, without possibilities of repairs, for several years. New commercial satellites have been designed for a nominal lifespan lasting 15 years, and the demand is even larger for scientific missions. It is clear that this creates greater demands to perfect execution of design and manufacturing than for computers designed for an office environment.

Satellites become more and more intelligent the more data handling and processing are being carried out onboard. That creates greater needs for high-tech computers with minimal weight and volume, demands that will combine cutting edge technology

with well tested, or preferably space proven technology.

There are not many producers of data systems that are qualified to deliver space applications, and one of the best is Saab Ericsson Space. The company has participated in developing and producing such equipment from the beginning of the European space era, and has steadily improved, both technologically, and in terms of production processes. Today, the company therefore supplies most of the European commercial and scientific satellites, in addition to handling the Ariane program and for the International Space Station.

With computers in well-known satellites such as Viking, Spot 1-5, SOHO, Meteosat, Eutelsat, Envisat etc., it is no wonder that computers from Saab Ericsson Space are being used in future projects like Rosetta, Mars Express, Herschel & Planck.

The company has participated in the Ariane program since 1973 and has supplied guidance and control computers for every generation of the launcher, including the latest Ariane 5's pairs of redundant computers. More than 100 computers have been made for the successful Ariane 4, and now it's hoped that Ariane 5 will prove to be as successful too.



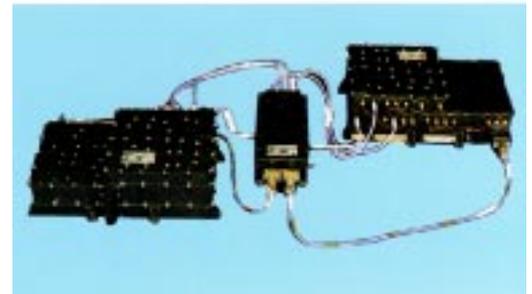
Onboard computer for Ariane 5.



A typical data handling unit

Microwave Electronics

For more than thirty years Saab Ericsson Space has supplied high quality microwave electronics for space applications. More than 300 units have been delivered for use on around fifty telecommunication and earth observation satellites and space probes. The main products are receivers and frequency converters. Saab Ericsson Space also designs and manufactures other high performance products such as RF-sensing systems, telemetry modulators and transmitters, and microwave electronics for spaceborne radars. The equipment is extremely responsive to incoming signals, delivering crystal clear results. Which is precisely what the company does for its customers as their highly experienced and reliable partner. This is to help international space companies boost their competitiveness.



Envisat/Asar RF Subsystem flight model

Successful development and production of microwave electronics is relying on high-level skills in both electrical and mechanical design. You also need advanced modelling and simulation capabilities as well as high-performance test facilities, and the experience to make good use of them. And, just as important, a high production quality. Saab Ericsson Space has all this, as our satisfied customers can testify. But most importantly we work in close partnership with our customers. Having a keen ear, coupled with our flexible and open-minded attitude, helps us to quickly produce the very best designs. Through concurrent engineering, something we practised long before the term was invented, our designs become finished products in the shortest possible time.

About 45 electrical and mechanical design engineers staff the department of Microwave Electronics at Saab Ericsson Space. Two thirds of them hold master or doctor's degrees.