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Flycatcher - Archived 5/98

Outlook

- Total sales around 270, plus 120 on license in India
- In use on about 100 Caesar AA tanks in the Netherlands
- Spares and repairs market for this product is still active
- Export of this product looks unlikely

Orientation

Description. Dual I/J/K-Band short-range radar forming part of an optical/radar air defense fire control system for tanks, guns and missiles.

Sponsor

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Ministry of Defense

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Contractors

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Craig Systems

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Licensee

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Status. Production and service.

Total Produced. A total of 100 Caesar AA tanks are in service with the Dutch armed forces. For a long time official Signaal figures concerning Flycatcher referred to total system sales being in the region of 450 units. Revised production figures are estimated around 270, with India probably accounting for a further 120.

Application. The Flycatcher radar is mounted as part of a transportable containerized system. It also forms the prime sensor for the 5PZF-C CA1 Caesar AA tank, a modified version of Gepard and based on Leopard 1 tank chassis. Flycatcher is for deployment with AA guns and missiles providing the acquisition and tracking element.

Price Range. Based on figures released following the recent Dutch Army order, Flycatcher would appear to cost about US\$4 million per unit.

Technical Data

Characteristics	Metric	US
System weight:	2750 kg	6050 lb
Antenna length:	1.5 m	5 ft
Range:	20 km	12.5 miles
Search radar frequency	I/J band	X-band
Tracking radar frequency	K band	K-band
Search antenna	Slotted waveguide type	
Polarization	Horizontal or circular	
Horizontal beamwidth	1.4 deg	
Vertical beamwidth	30 deg	
Rotational speed	60 rpm	
MTI improvement factor	30 dB	
Track antenna beamwidth	4.2 deg	
Transmitter power	160 W average	
Power consumption	200 V 380 Hz approx 2 kVA	

Design Features. CA1 Caesar SIRS The Caesar uses an integrated system whereby a single magnetron transmitter drives both the search and tracking radar. The dual band tracking radar operates in both the I/J and K bands, using a broad beamwidth compared with that of the search radar, and a very narrow beamwidth for tracking very low altitude targets. This concept allows for flexibility and reduced reaction time. Flycatcher features track-while-scan, allowing uninterrupted search to continue throughout the tracking exercise. High refresh rate is assured by the use of fast antenna rotation. The parabolic tracking radar antenna is situated center/ front turret while the slotted waveguide search radar is mounted rear/top turret. Following acquisition, tracking is continued automatically.

The Caesar is primarily configured for the medium/low/very low altitude air threat. Rapid automatic or manual switching facilities allow the Caesar to handle the multi-target threat. Caesar features a search-on-move facility, complementary to its primary mission which is to act in organic air support of armor/mechanized infantry. The Caesar is able to make calculations which are platform speed compensated while on the move. It has extensive protection against ECM, is able to cope with the presence of heavy environmental clutter, and is built to withstand heavy treatment. Integrated IFF is a feature of the CA1 Caesar SIRS, as is modularity for ease of maintenance.

Flycatcher The system employs the same transmitter/antenna arrangement as the Caesar, but a Surface Movement Radar (SMR) digital processor has been configured with the system. The computer generates track data in two dimensions on a total of four targets simultaneously, which is useful when Flycatcher is deployed with a weapon system/mix which is able to fire on more than one target at once. In addition to the four tracks generated by the Caesar antenna, the SMR computer can process and display data provided by remote sensors or other systems, giving it a considerable capability in overall command and control. The slotted wave guide antenna is deployed co-axially with the parabolic dish antenna in the Flycatcher system. TV tracking is an integral part of the Flycatcher system.

Operational Characteristics. The Flycatcher system is built into a standard military Craig container, with a detachable trailer bogey. The antennas are retractable to facilitate air transport either as a slung load or as fixed wing cargo. The operator's compartment and the electronics are protected by the controlled environment provided by the Craig shelter. A range of nuclear-hardened shelter is produced by Craig and may be offered with the Flycatcher system at some later date.

Variants/Upgrades

CA1 Caesar SIRS The CA1 Caesar SIRS is mounted on a Leopard 1 tank chassis armed with twin rapid-firing Oerlikon 35 mm AA cannon. This is the same weapon carried by the similar German Gepard AA tank, the difference being only that the Dutch version (designated

5PZF-C CA1 Caesar AA tank) is equipped with a Signaal radar.

Flycatcher Flycatcher was developed from the Caesar radar. It was configured as an air-transportable highly mobile solution to the Dutch Air Force's requirement for

fire control in the point and area defense role. Flycatcher is deployed with Bofors L70 40 mm AA guns in Dutch

Air Force service, under the designation VL4/44.

Program Review

Background. In 1969 the Dutch Government selected the German 5PZF-B Gepard AA tank with a Signaal-developed fire control radar. A preproduction batch of five tanks were designated 5PZF-C. In 1972 a production batch of 95 tanks were ordered, under the new designation CA1 Caesar AA tank. Deliveries commenced in 1977 and were completed by 1979. There have been no further orders for the CA1 Caesar AA tank. Caesar is expected to remain in Dutch Army service for the foreseeable future and Signaal continues to provide ongoing support for it.

Signaal repackaged the Caesar radars to act as part of a fire control system for guns and missiles, designating the subsequent optical/radar system Flycatcher. In 1981 Venezuela procured some 36 units of the Guardian twin 40 mm AA gun (Breda/HSA). The guns are operated by the Venezuelan Army's Ribas AAA group, and Flycatcher fire control systems are deployed on the ratio of one per two guns.

In August 1985 India ordered the Signaal Flycatcher, although only a limited number was built in the Netherlands. Extensive production of Flycatcher for the Indian Army is being undertaken by Bharat Electronics Limited (BEL). The Flycatcher was to be deployed with Bofors 40 mm L60 and L70 AA guns, 790 of which are currently on the inventory. Assuming that all these gun batteries have Flycatcher target acquisition radars, a total of approximately 120 radars were required. The L60 and L70 guns on the Indian inventory are obsolescent. India's existing inventory of low level air defense radars is uncertain and it is possible that major requirements have been satisfied by acquisitions of Soviet equipment. However, license-produced Flycatcher radars have been delivered at regular intervals.

The United States acquired one copy of the Flycatcher fire control system, which was delivered to the USAF in mid-1984. Trials are understood to have been conducted with the system in the Nevada desert. There have been no further developments.

The Flycatcher radar has been acquired for the Dutch 1st Army Corps, stationed in Germany. The news was announced in April 1984. Production, which commenced immediately, was to result in the first units being delivered in April 1989. Deliveries were to be completed within 36 months.

Flycatcher was ordered by Thailand in 1981. Some 12 systems are deployed on a basis of one radar supporting a battery of six gun mountings. In 1985 Thailand's Defense Ministry authorized the procurement of fourteen Chinese 37 mm AA guns with a subsequent further 30 Norinco 37 mm AA guns ordered a year later from the PRC. This was followed in July 1988 by a major order for 90 twin 37 mm guns to give a total of 132 guns in 22 batteries in service. To support these batteries a further 10 Flycatcher radars were required and sources indicate that these were ordered in 1988. Growing dissatisfaction with the quality of Chinese equipment and the level of technical support provided has led to these acquisitions being curtailed.

In 1989 there were reports that Malaysia had ordered Flycatcher fire control systems for 35 mm Oerlikon AA guns. This was completely erroneous, the order being, in fact, for the Contraves Skyguard system. Indonesia is rumored to have procured the Flycatcher radar system for deployment with 57 mm AA guns supplied by the Soviet Union in the 1960s.

In December 1991, Flycatcher was demonstrated to the Portuguese Army as a potential solution to their requirement for an AA fire control radar. Probably due to financial constraints, there has been no further development in this area.

The Flycatcher radars operated by the Dutch Air Force were updated by the addition improvements in ECCM hardware and a fully-independent K-band pulse Doppler tracking radar, a TV autotrack capability and a new multi-sensor data fusion track processor. In addition the track-while scan software was updated, increasing the number of channels from one to three and the clutter rejection system was enhanced. Software improvements included threat evaluation subsystems and improved track history data access. This package cost approximately US\$1 million per radar. The contract for this upgrade was placed in 1990, with the first upgraded radar being delivered in October 1993. The last of the 26 upgraded radars was delivered in 1995.

Since that time Flycatcher has continued to be actively promoted by Signaal and has been shortlisted for a number of requirements. At time of writing, none of these are reported to have resulted in firm orders but the Flycatcher system remains very much alive.

Funding

In 1969 the Dutch government placed contracts covering the development and production of a preproduction batch of five Signaal Integrated Radar Systems (SIRS) as the CA1 Gepard 35 mm AA Tank Radar. HSA developed a repackaged version of SIRS for the Dutch Air Force under contract to the Dutch Ministry of Defense. Flycatcher was supplied to the Dutch Army under a contract placed in early 1987. Thirty systems were to be procured, at a total price of US\$120 million.

Recent Contracts

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Signaal	27.0	Dec 1990 — Flycatcher upgrade for Dutch Army.

Timetable

	1968	Development of early AA tank radar began
	1969	Dutch ordered Caesar AA tank with HSA radar
	1971	Pre-production Caesar CA1 units delivered
	1972	Main production batch of 95 SIRS ordered
	1979	Main Caesar CA1 production order completed CA1 radar repackaged for Dutch AF as Flycatcher
	1981	Thai order for Flycatcher
	1985	Indian order including licensed production
	1987	Flycatcher ordered for Dutch Army
	1988	Thai Army ordered further Flycatcher radars
Mar	1989	Turkish joint venture established
Dec	1990	Flycatcher upgrade for Dutch Air Force
Oct	1993	First upgraded Flycatcher delivered
	1995	Deliveries of upgraded Flycatchers to complete

Worldwide Distribution

India (Unknown number, possibly 120, produced under license)
 Ireland (2)
 Netherlands Army (36)
 Netherlands Air Force (48)
 Thailand (22)
 Turkey (24)
 Venezuela (18)

Forecast Rationale

The Flycatcher radar is suffering from the dearth of sales for gun direction radars in general. In order to remain a player in this category, the technology must be kept current through upgrades. In spite of the fact that an upgrade has been designed and produced specifically for the Netherlands Air Force, the probability of this effort becoming an exportable product is fairly slim. Thomson-CSF, the parent company of Signaal, already markets similar products under its own name. Making an all-out

attempt to sell the Flycatcher as an export product would effectively cut into its own market share.

At present, the leader in the high-end gun direction radar market is the Contraves Skyguard system, while a number of powerful competitors to Flycatcher have appeared in the mid-price range. The Flycatcher has been proposed to a number of countries as a replacement for the elderly Contraves Superfledermaus system. Main rivals for this business are Contraves, with its Skyguard system, and the

Scandinavian manufacturer Ericsson with its Superfledermaus update packages.

One factor working against the potential exportability of Flycatcher is the proliferation of short-ranged, shoulder-fired anti-aircraft missiles. While the comparative effectiveness of these systems are disputable, the missiles are low-cost and require little training or operational support. These missiles are not vulnerable to traditional air defense suppression techniques. Consequently, they are becoming a cost-effective and viable alternative to radar-directed gun systems.

The forecast for this year predicts no production of the Flycatcher radar throughout the forecast period. This

conclusion is subject to change if, for instance, a substantial Flycatcher upgrade is announced. A "Super Flycatcher" may receive international acceptance; however, as mentioned before, the possibility of an upgrade for export remains remote.

Without a decent upgrade of the product, it is relatively safe to conclude that Flycatcher production has terminated and that all deliveries of the system have taken place. On the positive side, the existing user base will still require years of spares and support maintenance, meaning that there is still some activity within the program.

Ten-Year Outlook

No production is forecast.

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