

# ARCHIVED REPORT

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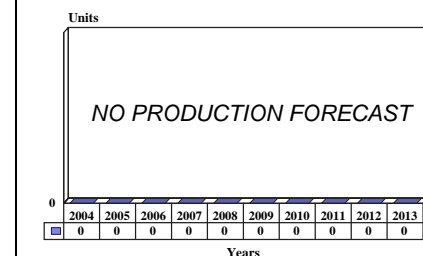
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## DELTA CS/ZODIAC/NAFIN - Archived 6/2005

### Outlook

- Operations and maintenance only
- No further procurement seen
- This report will be archived June 2005

10 Year Unit Production Forecast  
2004 - 2013



### Orientation

**Description.** The Deltamodulation Tactical Area Communications System (DELTA CS)/Zone Digital Automatic Encrypted (ZODIAC) is a fully automatic, digital encrypted communications system. It provides the Royal Netherlands Army with the Netherlands Armed Forces Integrated Network (NAFIN) communications system which is fully compatible with the other systems in use within NATO.

#### Sponsor

Thales Communications BV  
(formerly Thomson-CSF Signaal)  
(formerly Hollandse Signaalapparaten BV)

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Thales Nederland (formerly Signaal) was the responsible agency for DELTA CS; the Netherlands Ministry of Defense was the executive agency for the ZODIAC program and was responsible for adapting DELTA CS for the Royal Netherlands Army.

**Status.** In operational service.

**Total Produced.** Two: one system for the Netherlands and one for Germany.

**Application.** Encrypted digital communications systems.

**Price Range.** Estimated total cost was US\$644 million for the Netherlands portion of the ZODIAC system, including DELTA CS.

### Contractors

Thales Communications BV, <http://www.thales-communications.nl>, 1271 ZA Huizen, PO Box 88, Huizen, 1270 AB Netherlands, Tel: 31 35 5248248, Fax: 31 35 5248242, Email: [info.tc@nl.thalesgroup.com](mailto:info.tc@nl.thalesgroup.com), Lead Contractor (DELTA CS/ZODIAC)

Northern Telecom, Nortel Networks, <http://www.nortelnetworks.com>, Srijdsdreef 42-47, Hoofddorp, 2132 WT Netherlands, Tel: 31 31235673173, Fax: 31 31235611400, Lead Contractor (NAFIN)

## Technical Data

	<u>Metric</u>	<u>SAE</u>
<b>Characteristics</b>		
<b>MILTEX</b>		
Dimensions	52 x 31.5 x 50 cm	20.5 x 12.5 x 20 in
Weight	50 kg	110 lb
Capacity	24 groups of 16, 32, or 64 full-duplex channels per group; each group 256, 512, 1,024 or 2,048 kbps	
Interfaces	Eurocom/Stanag security bulk encryption	
Temp range	-32 to 55°C	
<b>DELTAMUX MTR-30</b>		
<b>Dimensions</b>		
Rack version	483 x 410 x 177 mm	19 x 16.2 x 7 in
Field version	503 x 454 x 200 mm	20 x 18 x 8 in
<b>Weight</b>		
Rack version	20 kg	44 lb
Field version	28 kg	61.6 lb
Temp range	-40 to +55°C	
<b>DWBST 55</b>		
Dimensions	255 x 295 x 175 mm	10.1 x 11.7 x 7.0 in
Weight	7 kg	15.4 lb
Operating rate	16 or 32 kbit/sec	
Temp range	-20 to +55°C	

**Design Features.** ZODIAC is the acronym of the Eurocom system for the Royal Netherlands Army. ZODIAC is built around the DELTACS family of digital switching elements. The heart of the system is MILTEX (Military Tactical Exchange), a powerful circuit switching unit jointly developed by (then) Signaal (now Thales Nederland) and GTE-CSD. This fully automated switch is capable of handling up to 3,000 traffic channels including voice, data, teletype, and facsimile. Point-to-point communications and conferencing services are also included. Continuous communications among subscribers are maintained automatically, even in rapidly changing tactical circumstances, due to a wide selection of user and system facilities. These include automatic switching and rerouting, automatic subscriber connection and integrated system control. ZODIAC is able to interface with private automatic branch exchanges, including both PABX and PTT systems. It can also be enhanced with a packet/message switching system, for which Signaal received a DELTACS development contract in 1986.

The DELTAMUX MTR-30 is a compact, time-division multiplexer/demultiplexer and constitutes an essential

part of a mobile voice/data network. It is designed specifically for military land-based communications networks and meets all relevant Eurocom standards. It has a maximum capacity of 15 analog or 31 digital channels, with the capability to stack up to four DELTAMUXES where more channels are required. Stacked modules can be cable-linked or multichannel linked. In the MTR-30, incoming subscriber signals are multiplexed into a time-division multiplex (TDM) signal. For analog signals, A-D conversion takes place using the Eurocom-recommended digitally controlled deltamodulation algorithm.

The MTR-30 has a modular design and can be supplied in either a rack-mounted or rugged-field version. The MTR-30 can be programmed by an operator via a keypad for speedy and simple installation of necessary configurations. Preprogramming configurations can further reduce set-up time. It features automatic maintenance of synchronization, an advantage that eliminates the need for a master node in the network. Built-in test equipment is provided and maintenance is performed using plug-in modules. Channel-line interfaces can be tested without interfering with other channels.

The DWBST 55 is a stand-alone tactical wideband secure voice terminal designed for the high-grade secure communication of speech and either digital or analog data. It enables a subscriber to set up an end-to-end automatic connection for secure communications on a digital basis with any other DWBST 55 subscriber or any other compatible apparatus in the system. The terminal can also be used as an automatic telephone set for plain-language communications.

For secure cryptographic traffic, the terminal can communicate on the basis of two key variables:

- Net key settings. Up to 18 sets of commonly held key settings can be loaded into each terminal for end-to-end or conferencing communications. Net key settings can be loaded into the memory either by a fill-gun or by remote keying from another station via the transmission line.
- Key Cube (KC) key settings. The terminal can store KC key settings for up to 2,000 subscribers in a DWBST network using the KC principle. These settings are selected automatically between the

calling subscribers (end-to-end only) without operator intervention. They are loaded with the aid of a special crypto key loader in a low-frequency rollover replacement schedule.

Both Net and KC key settings are protected by an emergency key stored in the terminal and by a personal module that provides additional physical security. Both must be present before the terminal can be loaded or a secure phone call made.

In the fifth and final phase of the program, ZODIAC was extended with a Single Channel Radio Access (SCRA) system, which was scheduled for full operational capability in 1995. At that time the companies of Siemens and Signaal were jointly contracted by the German and Dutch governments to execute the project definition phase of this program. The Dutch government regarded SCRA as a logical expansion of ZODIAC, while Germany integrated it with the AUTOKO-90 program.

## Variants/Upgrades

AUTOKO-90. German area communications systems that include the SCRA component developed as part of ZODIAC.

DELTACS. The Deltamodulation Tactical Area Communications System (DELTACS) is a fully automatic digital encrypted communications system designed to provide a fully compatible NATO communications system for the Royal Netherlands Army.

DELTAMUX MTR-30. The main multiplexing unit for the DELTACS/ZODIAC system.

DWBST 55. The Digital Wideband Secure Terminal 55 (DWBST 55) is a stand-alone tactical, wideband, secure voice terminal designed for high-grade secure communication of speech as either digital or analog data.

NAFIN. The Netherlands Armed Forces Integrated Network (NAFIN) replaced existing fixed military

communications systems and integrated the systems into a single network that serves over 200 sites.

MILTEX. MILTEX is the military tactical exchange center for message routing and transmission for the DELTACS/ZODIAC system.

SCRA. The Single Channel Radio Access (SCRA) system was another phase of the ZODIAC program. Little is known about SCRA except that was composed of technologically advanced radios that integrated into the ZODIAC Phase 5 Eurocom system.

TN-Radio (SDH Radio [NxSTM-1]). The Synchronous Digital Hierarchy radio (SDH Radio [NxSTM-1] or SDH) is a spectrum-efficient radio capable of long-haul capacity links of up to 22xSTM-1 with traffic availability typical of fiber-based networks.

ZODIAC. Overall Dutch tactical communications system program name that uses DELTACS technology as its foundation.

## Program Review

In the early 1970s, a number of NATO countries started to define integrated communications systems to be used in the tactical environment. Because it was recognized that standardization within NATO would greatly enhance the strength of the alliance, an ad-hoc body was established to determine the architecture and interoperability parameters for tactical digital networks. The group, called Eurocom, succeeded in defining system

parameters and took the lead in realizing additional NATO standards. The technical parameters for DELTACS were derived from the Eurocom studies. During the feasibility study phase, which lasted to 1985, industry compared the various solutions in the VHF combat net radio range (30 to 108 MHz) and UHF ranges (175 to 400 MHz). This study led to the conclusion that the UHF frequency showed the greatest

promise, and subsequent research efforts were focused in that area.

The DELTACS system, delivered to Allied Forces Central Europe (AFCENT) during 1987 and currently in full service, was successfully deployed during a number of NATO exercises. The project definition phase for the ZODIAC system was completed in mid-1989, and equipment for operational testing and field evaluation was delivered. This was followed by a demonstration of the merits of diverse receiving techniques and recommendations to Eurocom for the SCRA definitions. Signaal (now Thales Nederland) then received a contract for the delivery, installation, and integration of DELTACS equipment for Phases 3 and 4 of the Royal Netherlands Army ZODIAC program.

In September 1990, full go-ahead was given for Phase 5 development of ZODIAC, the SCRA, which formed a major component of the German Army's AUTOKO-90 area communications system.

The final deliveries of ZODIAC Phase 3 and Phase 4 equipment were made in August 1991. The switching equipment represented the conclusion of Phases 3 and 4 of the ZODIAC program, making the system operational with the Royal Netherlands Army and placing the entire project well into the final stages of completion. Final testing and operational certification of the system were completed in 1993; the full DELTACS/ZODIAC area communications system become operational with the Netherlands Army shortly thereafter. The first dedicated radios for the ZODIAC system were delivered in March 1994, and the final part of the program, Phase 5, was completed by early 1995.

Replacement of existing fixed military communications systems in the Netherlands started as part of Project NAFIN (Netherlands Armed Forces Integrated

Network). NAFIN connected approximately 150 locations throughout the Netherlands. NAFIN has been completed and operational since the end of 1998.

In mid-1995, the Netherlands Ministry of Defense (MoD) announced that it chose Northern Telecom (NorTel Networks) to provide NAFIN transmission and communications management equipment. In particular, NorTel was to develop military transmission equipment based on synchronous digital hierarchy (SDH), as well as a network management system. When awarded, the contract was in excess of US\$40 million. This was a significant loss for Siemens – of the three bids received by the program, its bid was recognized as the most expensive. The other losing bidder was Alcatel of France.

By 1997, NorTel had completed work on the SDH Radio (NxSTM-1). This system is a spectrum-efficient radio capable of long-haul capacity links of up to 22xSTM-1, and whose traffic availability is typical of fiber-based networks. Although not confirmed, the debut of this radio only one and one-half years after the contract award, as well as its base description, seems to indicate that it is part of the Netherlands Armed Forces Integrated Network.

The Royal Netherlands Army awarded a contract to Racal Acoustics in December 1999 (approximate value US\$5 million) to supply 24 of the latest generation field telephone systems (the Multitel 2) to interface with the FM 9000 tactical radio and the ZODIAC system. Multitel 2 deliveries began around July 2001 and were completed by the end of the year.

According to the last known publicized schedule, Germany's version of ZODIAC became fully operational by the end of 2002.

## Funding

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Funding was by the government of the Netherlands with NATO financial assistance. The program contract was valued at US\$200 million (NLG375 million), with total expenditures estimated to be US\$644 million. German SCRA expenditure was estimated to total over US\$1 billion.

## Recent Contracts

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No further contracts have been identified through public source open material.

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1970s	Initial Eurocom studies
	1985	Prototype ZODIAC system delivery
	1986	Field testing of DELTACS system
	1987	AFCENT system delivery
	1988	Third phase development contract award

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1989	DELTACS demonstration for Switzerland
Sep	1990	SCRA go-ahead
	1991	ZODIAC IOC
Aug		ZODIAC Phases 3 and 4 complete
	1993	ZODIAC complete
	1995	SCRA service entry date
	1995	Contract award to transform ZODIAC into NAFIN
	1997	SDH radio for NAFIN system debuts
	2002	Full Operational Capability for Germany; last known deliveries for ZODIAC equipment to German Army

## Worldwide Distribution

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Area communications systems using DELTACS/ZODIAC technology are used by the **Royal Netherlands Army**, the **German Army**, and **NATO AFCENT**.

## Forecast Rationale

The Deltamodulation Tactical Area Communications System (DELTACS)/Zone Digital Automatic Encrypted (ZODIAC) is a fully automatic, digital encrypted communications system. It provides the Royal Netherlands Army with the Netherlands Armed Forces Integrated Network (NAFIN) communications system, which is fully compatible with the other systems in use within NATO. Germany also uses the DELTACS/ZODIAC system.

The Netherlands, Germany, and NATO AFCENT appear to be the only confirmed users of DELTACS/ZODIAC. The Netherlands completed its installation in 1999, and Germany finished in 2002. Future sales are not anticipated at this time. Only operational and maintenance funding is liable to be allocated. This report will be archived in June 2005.

## Ten-Year Outlook

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System operational with production and procurement completed. The forecast chart has been omitted. This report will be archived in June 2005.

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