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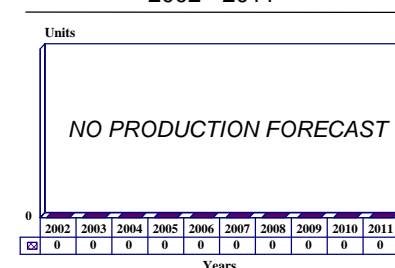
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TRS 2215/2230/22XX 3D Radars - Archived 05/2003

Outlook

- Last system to Turkey believed to have been delivered in 2000
- No activity detected since 1995
- Barring any further activity, this report will be archived in the near future

10 Year Unit Production Forecast
2002 - 2011



Orientation

Description. 3D E/F-band phased-array radar tasked with long-range air surveillance. The 2215/2230 is available as either a fixed or mobile system, and the 22XX is a fully relocatable unit.

Sponsor

Delegation Generale de l'Armement (DGA)
10/14 Rue St. Dominique
F-75997 Paris Armees
France

Contractors

Thales (formerly Thomson-CSF)
Division Systemes Defense & Controle (SDC)
40, Rue Grange Dame Rose
F-92363 Meudon le Foret
France
Tel: +33 1 46302380
Web site: www.thalesgroup.com

Licensee

Known licensees and joint ventures have included:

Bharat Electronics Ltd (BEL)

Trade Center
29/4 Racecourse Road
Bangalore 560 001
India
Tel: +91 812 27322
Web site: www.bel-india.com
(Modified TRS 2215)

Thales (formerly Thomson-CSF) and Tefken of Turkey formed a joint company to produce TRS 22XX systems for the Turkish military.

Status. In production and service.

Total Produced. Approximately 99 systems had been procured through 2001.

Application. The systems are designed to form the framework of an integrated air surveillance network.

Price Range. US\$11 million per unit, depending on configuration and capabilities.

Technical Data

	<u>Metric</u>	<u>US</u>
Characteristics		
TRS 2215D		
Antenna dimensions	5x3.5 m	16.5x12.25 ft
Range on 2 sq m target	330 km	180 nm
Ceiling	30,000 m	100,000 ft
Frequency	E/F-band	S-band
Bandwidth	200 MHz	
Characteristics (continued)		
TRS 2215D (continued)		
Rotation rate	6 rpm	
Azimuth aperture	1.5 °	
Elevation aperture	2° to 4°	
Peak power	700 kW	
Mean power	10 kW	
Elevation coverage	26°	
TRS 2230D		
Antenna dimensions	5x5.5 m	16.5x6.1 ft
Range on 2 sq m target	367 km	200 nm
Ceiling	30,000 m	100,000 ft
Frequency	E/F-Band	S-band
Bandwidth	200 MHz	
Rotation rate	6 rpm	
Azimuth aperture	1.5°	
Elevation aperture	1.3° to 3.6°	
Peak power	700 kW	
Mean power	10 kW	
Elevation coverage	20°	
TRS 22XX		
Antenna dimensions	6x4.5 m	19.8x14.8 ft
Range on 2 sq m target	459 km	250 nm
Ceiling	30,000 m	100,000 ft
Frequency	E/F-Band	S-band
Bandwidth	15%	
Rotation rate	6 rpm	
Azimuth aperture	1.2°	
Elevation aperture	1.6°	
Peak power	700 kW	
Mean power	20 kW	
Elevation coverage	20°	

Design Features. Common characteristics of the TRS 2215D and TRS 2230D include a high-grade antenna pattern with low sidelobe properties at all ranges, with random frequency agility across 200 MHz in the E/F band using a compressed pulse. Several operating modes are available, including power concentration at any given elevation setting for burn-through resolution. The system is capable of pseudo-random pulse repetition frequency (PRF), intrapulse

diversity, and auto-adaptive MTI filtering. Continuous False Alarm Rate (CFAR) processing at operator-selected thresholds is a notable feature.

The TRS 2215D, unlike the fixed-site 2230D unit, is a mobile version that can be transported aboard a single trailer. Two cabins complete the station in its basic configuration, one for the transmitter and another for the receiver and processor. In the second cabin, a single console is configured. The whole system is air-

transportable (C-130 or equivalent) and can be deployed in less than an hour by six persons. A Mobile Command and Reporting Center (MCRC) is available to add capability to the mobile version for out-of-area or fluid forward edge of battle area (FEBA) operations.

Deployed with the TRS 2215D, the MCRC offers a highly flexible small-size operations center capable of supporting autonomous surveillance and control functions or providing an enhanced element within an overall air-defense system. As a redeployable air control center attached to a mobile battle group, MCRC controls a number of TRS 2215 systems and additional small gap-filler radars. MCRC comprises three multi-function consoles and one command console and communication facility, and is capable of tracking up to 90 targets simultaneously. It forms an element within the Thomson-CSF Air Command and Control System (TACCS), which is the backbone of French national air defense.

The TRS 2230D is similar to the TRS 2215D, but the antenna is semi-permanently fixed. In addition, the transmitter, receiver, and processor are permanently housed in purpose-built facilities. As standard, one console is provided, though a Control and Reporting

Center (CRC) can be configured with the antenna, or the TRS 2230D can act as a station remotely controlled by a distant CRC.

The fixed CRC can be configured to suit the clients' requirements, with any number of operating consoles. They form the basis of an air-defense network, with the MCRC (see above) usually acting in a complementary role. CRCs consist of different combinations of three main elements: a computer assembly with its associated peripherals; a display assembly; and a communications assembly comprising datalinks, ground-to-air radio, and landlines. The system also forms an element within the Thomson-CSF Air Command and Control System.

The TRS 22XX is a NATO Class I radar available in fixed or static configuration. It has a slightly enhanced range and improved ECCM capability.

Operational Characteristics. The portable systems are all transportable by C-160 (Transall) and C-130 (Hercules) aircraft. In common with NATO practice, several sites will be prepared for each system to exploit the full tactical advantage of portability. In French service, radomes are usually fitted to systems deployed in adverse climates such as the Alps, Pyrenees, and Jura Mountains.

Variants/Upgrades

TRS 2215/2230. The original radars, the TRS 2215/2230 units, are no longer produced. These systems were equipped with cylindro-parabolic reflector

antennas as opposed to the newer "D" variants that use a planar phased-array antenna, as well as incorporate additional systems.

Program Review

Background. The ANTARES (Antenna Tracking Altitude, Azimuth, and Range by Electronic Scanning) radar formed the starting point for development of the TRS 2230 radar in the mid-1970s. The ANTARES was Thomson's (now Thales) first operational system to employ electronic scanning in elevation, and was usually coaxially deployed with a 2D radar providing range and bearing data. By the late 1970s, the French Air Force had commenced an upgrade program for its inventory of fixed ANTARES sites, incorporating the new TRS 2230 cylindro-parabolic reflector antenna. One completely new TRS 2230 system was acquired for evaluation of this program and installed at Mont-de-Marsan.

Some export orders for the TRS 2215 and TRS 2230 were forthcoming, including Indonesia's 1978 order for two TRS 2215 mobile systems. Tunisia is thought to have placed an order for two TRS 2215 systems.

Export orders for the planar-array TRS 2215D or TRS 2230D included an order from Kuwait for four TRS 2230D systems in November 1984, and from Indonesia, which ordered seven under Phase III of the ATC/military surveillance upgrade program. Among other identified clients is Brazil, which acquired TRS 2230 fixed systems under the DACTA II phase of its civil and military air space surveillance and control scheme. Most of the 12 TRS 2230 stations were situated in the south of the country. For the Indonesian, Kuwaiti, and Brazilian orders, Thomson-CSF has had the wider contractual obligation of providing CRC facilities and integrating the radar into national civil/military ATC networks.

In India, Thomson-CSF and Bharat Electronics Limited (BEL) embarked on a joint venture to produce a modified TRS 2215 radar system locally. The announcement of the contract in February 1984 revealed that the radar was being produced for the

ADGES program (Air Defense Ground Environment System) by Thomson-CSF in France and at BEL's Ghaziabad plant. An initial batch of four TRS 2230D radars was supplied by Thomson-CSF, followed by a further batch of five radars assembled by BEL. These radars form part of the Indra series.

Thomson-CSF introduced the TRS 22XX radar at the 1987 Paris Air Show, where it was mounted in the static exhibition site in its transportable configuration. It is a NATO class I radar system that was slated for service with the French Air Force. The TRS 22XX began to replace the French Air Force's Palmier/Aries air-defense radar systems with the TRS 22XX in 1989. Four additional sets of this type were ordered in March 1994, with an option for four more sets. At that time, Thomson-CSF claimed it had orders for 20 of the TRS 22XX. This suggests that the initial French order was for two sets, assuming that the newer order for four is included within the 20.

In July 1988, the Finnish government chose the TRS 2215D radar as the long-range component in its new air-defense system. The full package included secondary radars, equipment to meet civil aviation requirements, and a short-range radar/missile system. The latter utilizes an improvement of the Liberty system, which was derived from the Shahine system developed for Saudi Arabia and uses the US/French VT-21 missile and the Griffon/Gerfaut radar.

In January 1990, Thomson-CSF was successful in winning an order from the Turkish government for a total of 14 TRS 22XX radars and an associated C³I system. The TRS 22XX had been selected over the General Electric FPS-117, the other finalist. The deal involved local coproduction of many components of the system by a local joint venture, Thomson-Tekfen Radars. In order to win this contract, Thomson-CSF gave the Turkish government a 10 percent discount on the originally quoted price. The initial production schedule was to produce one system every three months. The acceptance test of the first system delivered was successfully conducted in August 1996. If the production scheduled was maintained, the last unit should have been delivered in December 1999.

In January 1993, the UK Ministry of Defence issued invitations to tender for the supply of two long-range mobile air-defense radars to replace the TPS-592 systems. Thomson-CSF placed a bid with the TRS 22XX. This effort was unsuccessful, with the Siemens-Plessey AR-327 being selected for the UK's requirement.

In 1994, a complementary system was developed to use with the TRS 22XX. This system, designated Parasol, incorporated a rudimentary counter-stealth capability, but its main purpose was to warn other radar sites of possible inbound anti-radiation missiles (ARMs). The system consisted of a transportable unit containing a folded antenna array, power supply, and operator control station housed within a single ISO container. An option would have been a fully automatic version that could be attached to a tactical operation center for the integrated control of jammers and primary radars.

In early 1996, Kuwait took delivery of a TRS 22XX radar as part of its Preliminary Early Warning System (PEWS). The PEWS network has been rebuilt from the ashes of Kuwait's former early warning net that was either plundered or destroyed by Iraq during the Gulf War. The current PEWS system consists of the US-produced FPS-117 long-range radar and the TRS 2100 TIGER low-altitude radar. Although the TIGER system was adequate, Kuwait required a low-altitude radar with a better detection capability. The US\$55 million contract awarded by Kuwait for the single TRS 22XX radar seemed extremely high, but it was later revealed that Thomson-CSF would also provide an air-operations command center and associated training system.

BAE Systems and Thales (formerly Thomson-CSF) were both reported in October 2000 to be preparing bids in anticipation of Indonesia's air-defense radar system upgrade. It is suspected that Indonesia will require three to six 3D air-defense radar systems to properly enhance its existing coverage. While BAE is offering the Commander 327 system, it is unclear which system Thales is proposing. A likely candidate for the Thales' bid is the TRS 22XX.

Funding

The TRS 2215/2230 and TRS 22XX were developed by Thomson-CSF with DGA funding.

Recent Contracts

No recent contracts have been detected.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Jul		TRS 2215 ordered by Finland
Jan	1990	TRS 22XX ordered by Turkey
Mar	1994	French Air Force ordered 4 TRS 22XX
Apr	1995	Kuwaiti ordered 1 TRS 22XX

Worldwide Distribution

Brazil. 12 TRS 2230D

Finland. 6 TRS 2215D

France. 16 TRS 2230 subsequently upgraded to TRS 2230D; at least four TRS 22XX, probably 6

India. 9+ TRS 2215D plus others built locally

Indonesia. 2 TRS 2215 and 12 TRS 2230D

Iraq. 6 TRS 2230D

Kuwait. 4 TRS 2230D^(a); 1 TRS 22XX

Tunisia. 2 TRS 2215

Turkey. 14 TRS 22XX

^(a) It is unknown whether the TRS 2230Ds were destroyed or plundered by Iraq during the Gulf War. It is also unknown how many systems, if any, were returned to Kuwait per the cease-fire agreement.

Forecast Rationale

The Thales' (formerly Thomson-CSF) family of 3D E/F-band air-defense radar systems, the TRS 2215, 2230, and 22XX, has had a very successful production run. Securing sales in many countries, including Brazil, India, Indonesia, and Tunisia, approximately 100 TRS systems have been built. These systems are said to be the backbone of France's national air defense network, STRIDA (Système de Traitement et de Représentation des Informations de Défense Aérienne).

All of the known systems ordered are thought to have been delivered. No new contracts have been detected in recent years. The last publicized information that may be related to the TRS-22XX was in October 2000, when

it was reported that Thales was preparing a bid for three to six air-defense radar systems needed by the Indonesian military. A specific system was not specified, however it was presumed that the TRS-22XX would be offered. To date, there is no new information on this procurement.

With such little activity being detected, it is likely that these systems are in the final stages of their production life cycle. A limited number of new orders and/or upgrades of older systems are still possible, but the production activity of the 1980s and 1990s will not be experienced again. Barring any new orders, this report will be archived in the near future.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Designation	Application	thru 01	High Confidence Level				Good Confidence Level			Speculative			Total 02-11
			02	03	04	05	06	07	08	09	10	11	
THOMSON-CSF 3D ADGE RADAR	Prior Prod'n:	62	0	0	0	0	0	0	0	0	0	0	0
TRS 22XX	Prior Prod'n:	37	0	0	0	0	0	0	0	0	0	0	0