

# NEW RADAR AT THIRUVANANTHAPURAM AIRPORT

## Thiruvananthapuram Airport

Thiruvananthapuram international airport is one of the promising gateway-airports in India. It is the first airport of Kerala state which was constructed in 1932 as part of the Royal Flying Club under the initiative of Colonel Goda Varma Raja, husband of HRH Princess Karthika Thirunal of Travancore. The first civil aviation movement from Thiruvananthapuram airport was in the year 1935. On royal patronage of H.H Maharaja Chitra Thirunal, Tata Airlines made its maiden flight to the airport using DH-83 Foxmoth aircraft under command of India's first pilot Nevill Vincent. Since then, this airport was being used for domestic operations. The first international aircraft operation from this airport took place in December 1977. The airport was accorded international airport status on 1<sup>st</sup> January 1991 and it was the first international airport in a non-metro city of India.

Thiruvananthapuram airport recorded more than 25000 aircraft movements in 2012-13. The airport handled around 3 million international and domestic passengers during this period and more than 40000 tonnes of cargo.

Thiruvananthapuram international airport is licensed by DGCA for public air transport operations. This airport possesses ISO 9001 and ISO 14001 certifications and was recently adjudged as the best AAI-managed airport in the country.

## Air Navigation Services

Thiruvananthapuram airport provides Air Navigation Services (ANS) to aircraft operating to and from Thiruvananthapuram airport and also to aircraft overflying Thiruvananthapuram including those transiting the airspace under the jurisdiction of Thiruvananthapuram Area Control centre (ACC). Aircraft operating from airports of Madurai, Trichy, Tuticorin and Agatti are also controlled from Thiruvananthapuram ACC. The lateral limits of Thiruvananthapuram ACC extend upto

Cochin in the north, Trichy in the east, upto 200 NM in the west and around 170 NM in the south. The vertical limits extend upto 25,000 feet.

Air Traffic Controllers (ATCOs) provide Air Traffic Services (ATS) to all aircraft in Thiruvananthapuram airspace using various Communication, Navigation and Surveillance (CNS) equipments installed and maintained by AAI CNS personnel. These equipments include VHF radio, DVOR, NDB, DME, ILS, ADS-B, primary and secondary radars etc.

## Use of Radar in ATC

One of the objectives of ATS is to prevent collision between aircraft. ATCOs achieve this objective by providing standard separation, either in the vertical plane or in the horizontal plane, between all aircraft under their jurisdiction. Radar is a tool used by ATCOs to provide standard separation between aircraft. Aircraft are separated by a distance of 10 NM (reduced to 5 NM within 60 NM from radar station) if they are identified on radar. In the absence of ATC radar, this separation will increase substantially, sometimes as high as 80 NM, which will reduce the efficiency of the ATS system.

Use of radar in ATS will improve the airspace capacity, reduce delays and thus the fuel burn and will also present ATCOs with real-time update of the position of aircraft. Advanced radar systems like the one which is being commissioned at Thiruvananthapuram have the capability of exchanging digital data between the ATCO and the pilot.

## Description of the New Radar System

The new RL-2000 ASR (Airport Surveillance Radar) co-located with MSSR-1 RSR (Route Surveillance Radar) is supplied and installed at Thiruvananthapuram International Airport by M/s ELDIS, Pardubice, Czech Republic. Airports Authority of India has undertaken

the project of replacing the eighteen-year old ASR and MSSR with the new state-of-art technology radar at a cost of 1.60 lakh Euros. It is a part AAI's continuing endeavour of modernizing Air Navigation Services (ANS) with new radars, ADS-B (Automatic Dependent Surveillance – Broadcasting) equipment and ATS automation systems at various locations in India. The data from the new radar is integrated with the INDRA ATS Automation System of the local Approach Control and Area Control Centres at Thiruvananthapuram. The same data is also provided to and integrated with Chennai ATS Automation System, along with other radar feeds, for providing satisfactory radar coverage at the required redundancy levels, over the entire southern Indian airspace.

#### ***Primary Surveillance Radar (PSR) – Model RL-2000***

PSR is an independent and non-cooperative surveillance system, which means that the radar finds the position of the target independently without the cooperation of the aircraft. The PSR finds the aircraft position in terms of the radial distance and direction with reference to the radar centre by sending trains of microwave frequency pulses and receiving the signals (echo) reflected by the aircraft. This system does not provide aircraft identity or any other aircraft data to the ATCO.

RL-2000 is the latest generation of ELDIS primary surveillance radars for Terminal Approach Control application. The radar meets the ICAO (International Civil Aviation Organization) and EUROCONTROL standards and recommendations. The RL-2000 features fully solid-state highly modular configuration, fail-safe system and low life-cycle cost.

ELDIS PSR provides enhanced system stability and powerful clutter (un-wanted reflections by terrain, trees, building etc.) suppression to block all false reports while maintaining excellent target detection upto 60 NM, including enhanced performance for target accuracy and resolution. Frequency diversity (using four radio frequencies instead of single frequency) and pulse

compression techniques are incorporated for better detectability and accuracy at lower radio-frequency (RF) power. RL-2000 configuration includes weather channel for displaying the position and intensity of clouds in an airspace 60 NM around Thiruvananthapuram airport.

#### ***Monopulse Secondary Surveillance Radar (MSSR) – Model MSSR-1***

Basic RL-2000 configuration is extended by providing the MSSR-1 system along with the PSR. This configuration extension is representing integrated system solution to the terminal airspace of Thiruvananthapuram airport. MSSR-1 has a maximum range of 250 NM.

The MSSR-1 is an independent cooperative surveillance system. Unlike in RL-2000, it requires the cooperation of the aircraft for finding the position and other details. The transmitter of the MSSR-1 interrogator is designed for generating interrogations (queries), which are transmitted into space with the help of an antenna system, where they are intercepted by onboard aircraft transponders. The aircraft transponder in turn replies with its identity, altitude and other relevant data useful for the Air Traffic Control (ATC). With the help of Mode-S (Mode- Select) feature of MSSR-1, aircraft can be addressed independently with its unique address. The data link functionality in the Mode-S radar system can be used to exchange digital data between the pilot and Air Traffic Controllers.

The radar system configuration includes operational and standby channels with automatic switchover processed at the system level. The maintenance and repair actions are reduced to the minimum and sophisticated remote control and monitoring system allows an unattended system operation.