R&S®Series 4200 Radiocommunications System

Reliable radiocommunications for civil aviation

SITA and Rohde & Schwarz have concluded an agreement for the supply of more than 400 VHF transceivers of the R&S®Series 4200 over the next few years.

International selection procedure

SITA (Société Internationale de Télécommunication Aéronautique) is a communications service provider for airlines and operates a worldwide communications network with integrated radio stations that enables the exchange of data between aircraft in flight or on the ground and the airlines' operations centers (see box on opposite page) or the ATC centers. This network will be expanded and modernized in the years to come. Following an international selection procedure, SITA decided in favor of the R&S®XU 4200 VHF transceivers of the R&S®Series 4200 from Rohde & Schwarz (FIG 1). Since the radios will be installed at sites worldwide, some of which are very difficult to access, they must ensure extremely reliable and failsafe operation. In addition, maintenance must be reduced to a minimum. For these reasons, the transceivers are equipped with a high-precision oscillator that needs to be calibrated only after 15 years of operation. This means that preventive maintenance, which would require on-site personnel at the radio stations, does not have to be performed.

Worldwide data network

An IP-based network makes it possible to update, monitor and remote-control every radio from an operations center. Software updates and expansion of functionality, e.g. adaptation to future data infrastructures or introduction of VHF digital link (VDL) mode 2 [*], can be carried out without requiring any personnel on site. This concept also allows the remote modification of parameters as well as monitoring and reading of operating data such as component temperature.

Just as the airlines can monitor their aircraft from the ground via SITA's services, SITA uses the new generation of the R&S®Series 4200 to get an overview of the technical condition of the radio system and can thus ensure that the data service is available to its demanding customers at all times.

Bernhard Maier

FIG 1 The R&S®XU 4200 VHF transceiver from the R&S®Series 4200.

R&S®Series 4200 radio family

Their modular and compact in design makes the R&S®Series 4200 radios for use in civil and military air traffic control extremely reliable and ready for upcoming transmission standards. Essential functions of the radios are software-implemented, and new features can be added by means of software download. The radios can be remote-controlled and monitored via the standard LAN interface.

More information and data sheet at www.rohde-schwarz.com (search term: Series 4200)

REFERENCES

[*] R&S®Series 4200 Radiocommunications System – Ready for tomorrow's requirements: next generation of ATC radios. News from Rohde & Schwarz (2006) No. 191, pp. 52–56

This article presents the R&S®Series 4200 and describes VHF digital link mode 2 in greater detail.

SITA – a communications service provider for airlines

The tough competition on the market for air travel and air transport forces airlines to optimally use their fleets and their capacities. To improve the planning for the deployment of the aircraft, dispatchers and maintenance crews need as much information as possible about the current location and technical condition of the aircraft. The more up-to-date the information, the higher the safety of planning and the better the capability to respond to unforeseen events.

This is why airlines began in the 1980s to automatically send aircraft information from the different flight phases to their operations centers via ground radiocommunications stations. This data provided dispatchers at all times with a current overview of the exact location of the aircraft. In the years that followed, further messages were transmitted that showed the aircraft engineers the technical condition of aircraft and engines. In addition, the dispatchers were able to inform the pilots via radio data about the weather or changes in flight plan. Pilots are less distracted due to the reduction in voice communications, and they do not have to write down the information transmitted because it can be printed out in the cockpit. FIG 2 shows an overview of the multitude of messages exchanged during the various flight phases via the aircraft communications addressing and reporting system (ACARS).

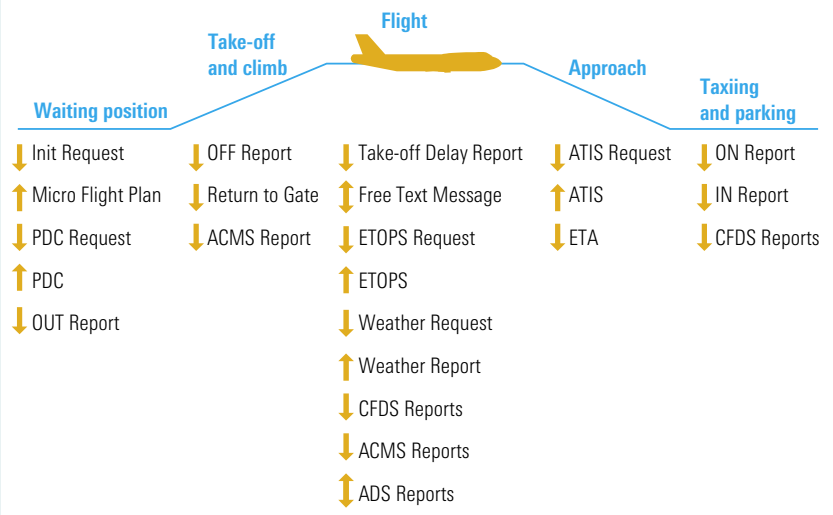

FIG 2 A multitude of ACARS messages are sent during the different flight phases.

Since airlines require all this information about their entire fleets, radio coverage must be ensured worldwide, or at least wherever airlines operate aircraft. SITA as a communications service provider for airlines maintains a worldwide communications network with data links and servers to provide access to the data transmitted by the aircraft. More than 880 radiocommunications stations at airports and on land ensure data exchange between aircraft and ground stations at all times. Amplitude modulation with a data rate of 2.4 kbit/s has so far normally been used for data transfer via the air interface (MSK, minimum shift keying).

The SITA network will be expanded and modernized in the years to come. On the one hand, an increasing number of airlines are using the ACARS service, which means that radio coverage has to be extended to areas that have so far not been covered. On the other hand, modern aircraft transmit more and more information about the technical condition of the individual units and components. Especially the new Airbus A380 sends large amounts of data to dispatchers and technicians via this service. To handle this data volume, the VDL mode 2 transmission method has been defined on the air interface. It attains a gross data rate of 31.5 kbit/s (D8PSK, differential eight phase shift keying) and will step-by-step replace the old analog AM-MSK method in the years to come.

The radiocommunications systems in many aircraft are already equipped with this technology, which will become mandatory for new aircraft in Europe as of 2014. In the future, VDL mode 2 will not only be used for the airlines' fleet management but also for air traffic control. The ATC controller will then be able to communicate with the pilot not only via voice but also via data telegram (CPDLC, controller pilot data link communications). This will reduce the work load as well as prevent radio-frequency congestion.