

THE VALUE OF PERFORMANCE

NORTHROP GRUMMAN



Park Air V5 Training

Understanding RF Principles and Communications Systems

Introduction

Knowing how to effectively specify, operate and maintain ATM communications systems requires more than knowing what the performance specification of one particular radio is, and how that radio is operated. Our long experience in training operators and maintainers on our own equipment has highlighted how valuable it is to have an understanding of some of the fundamental principles, in order to fully understand and interpret the achieved performance of a full system.

This set of courses has been designed for ATM maintenance engineers and technicians responsible for communications equipment from any vendor. The courses give an appreciation of mutual interference of RF equipment, the mitigation of this, and the measurement of real world performance at a full communications system level.

The training modules are described on the following pages.

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1 Basic RF principles (V5-O-RFBASIC)

Introduction

This module provides a general revision of basic RF principles using instructor-led questions and interactive multiple choice answers.

Target audience

- ATC maintenance engineers and technicians.

Prerequisite

- Experience in VHF/UHF radio communications.

Content

- Power, dB's, and Watts
- Losses within RF cable systems
- VSWR conditions
- Properties of interference
- Receiver sensitivity, desensitisation and signal to noise ratio.

2 Introduction to RF interference (V5-O-RFIINTRO)

Introduction

This module describes the different causes of RF interference in VHF/UHF radio communications equipment, their effects, and the different equipment and principles that can be used to mitigate against them.

Target audience

- ATC maintenance engineers and technicians.

Prerequisite

- Experience in VHF/UHF radio communications.

Content

- Definition of RF interference
- RF interference - effect on a receiver
- Transmitter generated signals that may cause interference
- Mitigation against the effects of RF interference.

3 Mitigation to RF interference (V5-O-RFIMIT)

Introduction

This module explains how to calculate the levels of RF interference between radio equipment with and without mitigation. Specifications of filter systems are described and a demonstration of how to tune a filter is given.

Target audience

- ATC maintenance engineers and technicians.

Prerequisite

- Experience in VHF/UHF radio communications.

Content

- Mitigation against each type of RF interference at a transmitter site
- Mitigation against each type of RF interference at a receiver site
- Specifications of the Park Air Z4 cavity filters
- The tuning of a Park Air Z4 cavity filter.

4 Introduction to communications systems (V5-O-SYSINTRO)

Introduction

This module introduces the various analogue and digital ground-based networks that interconnect communication systems, explaining some of their protocols and configurations.

Target audience

- ATC maintenance engineers and technicians.

Prerequisite

- Experience in VHF/UHF radio communications.

Content

- Properties of 4 wire E&M
- Properties of E1 signalling
- Properties of Ethernet networks
- IP addressing and requirements of IP communication systems
- Features of ED-137B.

5 Measurement of communications systems (V5-O-SYSMEAS)

Introduction

This module explains what kind of measurements should be made on communications systems and why they are important to system performance. It explains how to interpret test equipment results and how to make key measurements.

Target audience

- ATC maintenance engineers and technicians.

Prerequisite

- Experience in VHF/UHF radio communications
- Introduction to communications systems (V5-O-SYSINTRO).

Content

- The importance of measurements to ensure system performance at a practical and regulatory level
- The link between tests and system performance
- The use of the Park Air A6 radio test set to measure transmitters, receivers and VSWR
- Guidance on how to investigate RF interference in the system context
- An overview of system link budget calculations.

6 ED-137 VoIP Overview (V5-O-ED137OVW)

Introduction

This E-Learning module, split into seven interactive presentations, introduces the ED-137 standards, VoIP basics, and associated protocols.

Target audience

- ATM maintenance staff that have basic IT/network knowledge, requiring an overview of VoIP in the ATM environment and how the Eurocae working group WG67 is creating the ED-137 framework for its introduction.

Prerequisite

- None.

Content

- Part 1 (Introduction to the Standards and Specifications) provides an introduction to the ED-137 Standard, and includes a brief overview of the volumes
- Part 2 (Basic VoIP IPv4 Networks) presents an overview of an IP network, specifically in relation to a VoIP system
- Part 3 (Basic VoIP Protocols) presents an overview of the basic VoIP IP protocols used in ED-137 including SIP/SDP, RTP/RTP-Header Extension and R2S protocols
- Part 4 (Basic Setup and Connection) introduces the basic parameters and configuration used to establish an ED-137 VoIP connection
- Part 5 (SIP Session Rejection and Clearing) explains why connections are sometimes rejected, declined or terminated once they have been established
- Part 6 (RTP & ED-137 Header Extension) introduces ED-137 RTP Header Extension for Tx and Rx
- Part 7 (RTP & ED-137 Header Extension Detail) examines the subject in more detail; specifically looking at PTT & Squelch, PTT Types and audio summation/blocking.

Duration

The duration of this module is 160 minutes.

Note:

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