

# THEORY AND HANDS-ON TRAINING IN AVIONICS

Develop your skills on our  
avionics products and systems



**Collins Aerospace**

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# TRAINING CENTER

Collins Aerospace has had a presence in France since 1959 and is based in Blagnac, close to Toulouse, to benefit from the local growth of the aerospace industry in this area.

Our highly qualified engineers and technicians are working on Airbus projects as well as the development, integration and maintenance of military and commercial solutions for other aircraft manufacturers, airlines, ministries of defense, integrators and other companies in France, in Europe and worldwide. Our key capabilities are: avionics for military transport aircraft, helicopters and UAV systems; commercial avionics; and data.

We rely on a flexible structure, advanced methodologies and an inside line on cutting-edge technologies. ISO 9001, ISO 14001, Far 145, Part 145, Part 21G, EN AS-9100, the Production approval Certificate for Manufacturers of Aeronautical Equipment and, more recently, CCAR 145 certification testify to our commitment to a high level of quality.

For over 20 years, we have maintained a team of instructors entirely devoted to serving you.

This training center is part of the Services Business Unit, whose mission is to provide after-sales service on equipment manufactured by Avionics, including those manufactured in France.

Our four full-time instructors have dedicated training facilities and are supported by a whole team of highly qualified technicians and engineers. The success of our training center grows out of this close cooperation, for what we have to offer is not just the skills of individual instructors, but the industrial expertise of an entire company.

The training department constitutes an entry point into our company and showcases our technical capabilities.

Through general courses, our know-how – recognized by cutting-edge businesses the world over – is made available to all areas of activity requiring a high level of technological skills: Aeronautics, electronics, radio communication, GPS, radio navigation, radio direction finding, automatic testing, communications networks, computer hardware repair, strategic communications, data transmission, automatic HF connectivity.

Please feel free to contact our training department directly:

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# PRESENTATION OF COURSES

## GENERAL COURSES

Basic Principles in avionics is especially designed for people wishing to be sensitized in the aeronautical field, while Initial Avionics is adapted for technical staff to acquire the concepts necessary to progress in the aeronautical field.

Radio Navigation, Radio Communication and Airborne Systems courses provide an opportunity for technical staff to boost their theoretical training quickly with solid fundamentals and through the experience of industry professionals.

These courses are also appropriate for more experienced technicians who wish to keep up with the latest developments in modern avionics.

More specific training courses, such as Radar and Microwave Frequency are designed for specialists.

## SYSTEM COURSES

Based on Collins Aerospace equipment, these courses provide you with a comprehensive study of the architecture and maintenance of avionics systems:

Pro Line II, Pro Line 4™, Pro Line 21™, Pro Line Fusion®, 900 Series, FMS, ACARS, IPC-A-610, TCAS, SATCOM, HF ALE, HF E-Mail, Data Link System AIRBUS Environment, Automatic Dependent Surveillance (ADS-B).

## EQUIPMENT COURSES

These courses let you study specifics of our products in detail.

These courses are designed for technicians familiar with the principles of radio communication, radio navigation and troubleshooting microprocessor cards.

Courses can be provided at:

- LRU level (Line Replaceable Unit)
- SRU level (Shop Replaceable Unit)
- Component level
- « On-Job Training »

*Note: all courses can take place at the customer location and can be customized as required.*

# BASIC PRINCIPLES IN AVIONICS

## DATES

March 17-18, 2020

December 8-9, 2020

## DURATION

2 days

2 days

## OBJECTIVES

- Present architecture of radio communication and radio navigation equipment available to the pilot.
- This course is open to personnel in contact with the aeronautics sector wishing to learn some avionics. Established electronics knowledge is not necessarily a prerequisite.

## PROGRAM

- The Pilot and his Aircraft
  - All the necessary pilot functions to proceed with a safe flight
  - Presentation of an airplane cockpit, the automatic pilot function, flight data display
- Radio communication: Why and with whom?
  - Communications with Air Traffic Control (while in flight or during long range navigation).
- How is navigation accomplished?
  - Short range (beacon, radar, management of aircraft in flight)
  - Long range (GPS, gyro references)



*Photo courtesy of Airbus*

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# RADIO COMMUNICATION

## DATES

March 9-13, 2020

## DURATION

5 days

## OBJECTIVES

- Acquire knowledge of various radio communications devices (HF, VHF, UHF)
- Acquire familiarity with technical and technological aspects of transmission-reception
- This training is dedicated to repair shop technicians familiar with electronics

## PROGRAM

- Review of HF, VHF and UHF radio waves
- Review of different modulating signals : AM, FM, USB, LSB
- Description of the various technical characteristics of transceivers (sensitivity, selectivity, distortion)
- Review of how the different types of VHF (AM / FM) and UHF transceivers work
- Review of how the three parts of an HF transceiver (AME, SSB) work
  - Exciter
  - Power amplifier
  - Coupler
- Technologies related to transceivers
  - Phase locked loop (PLL)
  - Frequency synthesizer
  - Automatic gain control (AGC)
  - Automatic frequency control (AFC)
  - Modulator, demodulator (FM, synchronous)
- Practice making primary measurements on Collins Aerospace equipment



# RADIO COMMUNICATION CONCEPTS

## DATES

Upon request

## DURATION

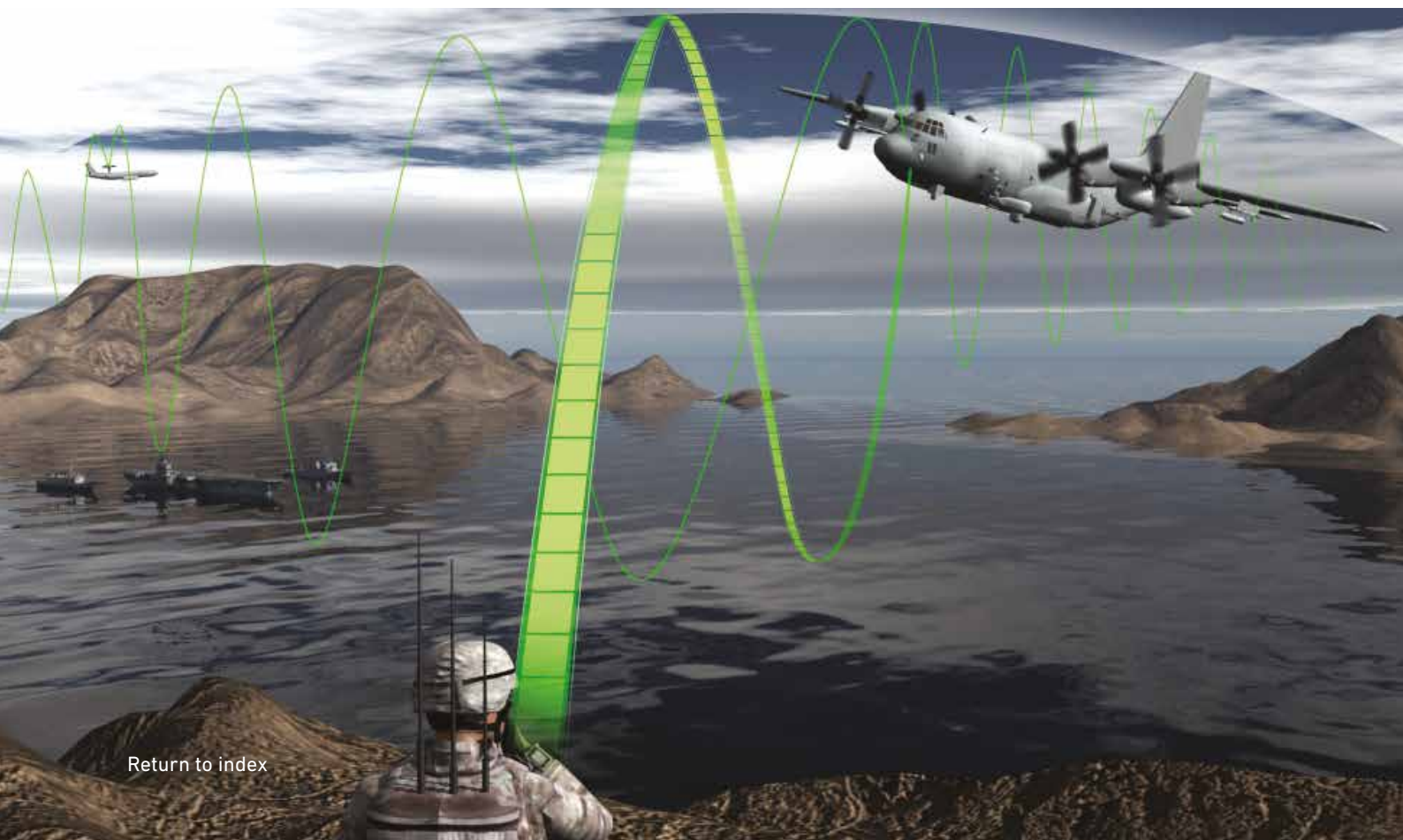
5 days

## OBJECTIVES

- This general training course present to the trainee the different type of modulation in use in aeronautics communications
- Data links systems in HF, VHF SATCOM will be studied, as well as the military radio communication (Frequencies jump, HF automatic link)

## PROGRAM

- Radio Basics
- Propagation and Electromagnetic waves
- Modulation types
  - AM, FM, various phase modulations including: DPSK, QPSK and 8PSK and QAM
- Communication VHF Data Link
  - ACARS, VDL mode 2, introduction VDL mode 3
- SATCOM Communications
  - Services, network, channel (P, R, C, T)
  - SWIFT 64
- VHF Anti jamming
  - HAVEQUICK Function
  - WOD, TOD, Net ID
- Long Distance HF Communications
  - Single Side Band principle
  - HF/AM and HF/SSB Comparison
  - SELCAL Function
  - Automatic link
  - HF ALE, HF DL
- Data link HF
  - Presentation of HF data link system
  - HF Messenger



# AIRBORNE RADIO COMMUNICATION

## DATES

March 31 April 2, 2020

September 1-3, 2020

## DURATION

3 days

3 days

## OBJECTIVE

- Acquire knowledge on radio communication principles used on aeronautic platforms. Acquire knowledge of HF, VHF and SATCOM systems operation with technical overview of transmit and receive principles and basics on troubleshooting and test procedures.

## PROGRAM

- Generalities: Needs and operational use, The radio link
- Electromagnetic wave and propagation
  - What is an OEM, electromagnetic radiation
  - Spectrum and frequencies in use
  - Propagation modes
  - Interaction and effects on propagation
- Radio Link
  - Analog modulation (AM, FM, SSB, ...)
  - Numerical modulation (QAM, PSK, ...)
  - Software Defined Radio overview (SDR)
  - Network overview (ACARS, CPDLC)
  - Radio link efficiency, gain and loss, noises cosite
- Overview of typical radiocommunication system (schematic diagram, specification, operational modes, test)
  - Receiver, (selectivity, sensitivity, distortion, ...)
  - Transmitter (power, range, efficiency, constraints, ...)
  - RF power line (coaxial, feeder line,...)
  - Antenna (impedance, gain, directivity, range, shape, loss, SWR)
  - Coupler (function and utility)
  - Control Panel
  - Connectors, Ground plane, User interfaces
  - Test and troubleshooting basis
- Optional practice
  - Laboratory practice at RCF repair center on equipment
  - Aircraft practice at customer facility according to availability and assistance



# RADIO NAVIGATION

## DATES

April 20-24, 2020

September 7-11, 2020

## DURATION

5 days

5 days

## OBJECTIVES

- Give trainees an overview of the principles of radio navigational aids used in aeronautic
- Provide detailed information on these aids by presenting fundamentals, characteristics and performance levels achieved
- Present corresponding equipment

## PROGRAM

- Review of the fundamentals of radio navigation equipment
  - Principle in Localization: Radial, terrestrial References, Track, Waypoint, Route
  - VFR/IFR rules
  - Precision, Availability, Integrity
  - Area-Rnav, Primary means navigation
- Conventional radionavigation means principles of operation
  - Description of the systems ADF VOR, ILS, DME, MLS, MMR
- Example of Symbology displayed on the cockpit.
- Principle of Satellites Navigation System
  - GNSS, SBAS/GBAS augmented position accuracy generalities
- Performance Based Navigation
  - Generalities RNAV, RNP, RNP Containment
  - FMS
- Navigation in TMA
  - STAR and SID
  - Approach Type: Non Precision, APV, Precision

# AIRCRAFT SYSTEMS

## DATES

Upon request

## DURATION

5 days

## OBJECTIVE

- Acquire general knowledge of the various avionics systems

## PROGRAM

- Mechanics of flight
  - Principle of lift
  - Relationships between angle of attack, speed and lift
  - Flight envelope: turning, climbing and descent
- The air data system
  - Pressure and atmosphere (standard pressure, baro settings, airspeed)
  - Air data system description, indications
  - Description of the use and utility of the parameters IAS, MACH, TAS, SAT, TAT, V/S, SSEC and ALT
- The heading and attitude reference system
  - Gyro's and Accelerometers basics
  - Heading determination, flux valve AHRS
  - Laser Ring Gyro, INS, IRS basics
- Automatic pilot, guidance computer
  - Theory of AutoPilot operation
  - Flight control and servo's
  - Description of the various vertical and lateral modes
- EFIS/MFD/PFD/ND
- How the various boxes work
  - Improvement in relation to FIS
  - Radar system integration
- Concepts
  - Flight Management System (FMS)
  - MCDU
- Overview of the Pro Line Fusion avionic concept



# AVIONICS ARCHITECTURE

## DATES

June 22-26, 2020

September 14-18, 2020

## DURATION

5 days

5 days

## OBJECTIVE

- In complement to the general courses, this training based on the avionics of an aircraft class air transport presents to trainees the pilots needs: to fly the plane, to navigate, to communicate. It will be study the utilization of the avionics (radio communication, radio navigation, and flight control).

## PROGRAM

- What does the pilot need to maneuver its plane?
- Parameters followed by the pilot for the control of his plane
  - Commands of flight
  - 3 axis (pitch, yaw, roll)
  - The speed and the attitude of the plane
  - The Air Data Computer and Inertial Reference System, Gyro, Ring Laser Gyro, IRS, AHRS
- The automatic navigation
  - Auto Pilot/Flight Director
  - Control of the flight plan
  - The cautions and warnings
  - Display of information to the pilot
  - FMS/FMC, MCDU, FCU
  - ACARS, FWC, CMS
  - EFIS, MFD, PFD, HSI, ADI, DMC
- General principles of radio navigation sensors
  - To navigate: radio sensors
  - To locate the aircraft on a map: FMS, VOR, ADF, GPS, MMR, DME
  - To land: MLS, GPS, MMR, ILS
  - For security: Radio altimeter, TAWS, TCAS Weather radar, Data recorder (FDRS)
- To communicate
  - The radio communication system
  - The voice: VHF, HF, SATCOM
  - The data: ACARS, ATC transponder, SATCOM, FSA (SIU/NSU/TWLU) HFDDL HFDR, VHFDL/VDR, DMU
- The future
  - Free Flight,
  - CNS/ATM, FANS, WAAS, LAAS
  - ADS-B, GNSS/GLS/LDGPS

# HELICOPTER ARCHITECTURE

## DATES

March 23-27, 2020

May 11-15, 2020

## DURATION

5 days

5 days

## OBJECTIVE

- Complementary to the general courses, this training based on the avionics of a helicopter presents to trainees the pilots requirement: to fly, to navigate, to communicate. It will study the use of the avionics (radio communication, radio navigation, and flight control).

## PROGRAM

- How should the pilot manage to operate his helicopter:
- Parameters controlled by the pilot to fly its aircraft
  - Flight control
  - 4 axis (pitch, yaw, roll, collective pitch, cyclic pitch)
  - The speed and the altitude of the aircraft
  - The Air Data computer and Inertial reference system
  - Gyro, Laser Gyro Ring, IRS, AHRS
- The automatic guidance
  - Auto Pilot Flight Director
  - Flight plan Control, flight and parameters
  - Display of information to the pilot
  - EFIS, MFD, PFD, HSI, ADI, DMC
- General principles of radio navigation sensors
  - To navigate: radio sensors
  - To locate the aircrafts on a map: FMS, VOR, ADF, GPS, DME
  - To land: GPS, ILS
  - For the security: Radio altimeter, TCAS, Weather radar Windshear
- To communicate: the radio communication systems
  - The voice: VHF, HF
  - The data: ACARS, ATC transponder, HFDDL/HFDR, VHFDDL/VDR
- The future
  - Free Flight
  - CPDLC, CNS/ATM, FANS, WAAS, LAAS
  - ADS-B, GNSS/GLS/LDGPS



# RADIO NAVIGATION AND AREA NAVIGATION

## DATES

April 7-9, 2020

October 6-8, 2020

## DURATION

3 days

3 days

## OBJECTIVE

- Acquisition of the Radio Navigation basics thru the use of conventional means based on NAVAIDS operation and a better understanding towards the global Area Navigation or RNAV concept using the GNSS components

## PROGRAM

- Aircraft systems
- Conventional CNS/ATM
  - Explain the conventional Navigation function as part of a CNS airborne system operation
  - The Air Navigation and description of flight legs
  - Definition of Radio Navigation
  - Specific resources used by a conventional airborne system
  - The functions and their use to fly the different legs: ADF, VOR, ILS, DME, TACAN, and RA
  - Limitations and drawbacks of the conventional system
  - The changeover towards the RNAV or Area Navigation
- The RNAV expectations and RNP requirements tied to the PBN concept
  - RNAV procedures and their benefits
  - Multi sensors RNAV computer function as part of the FMS operation
  - Principles of GNSS and the different ways of Augmentation
  - The standalone GNSS for positioning and MMR for additional Navigation and Landing functions
  - Multi sources positioning, flight path definition and course track
  - Classification based on RNP requirements for track keeping
  - RNP mandatory monitoring and alerting functions
- Use of Airborne RNAV means in France and abroad
  - RNAV PBN current approach procedures: LNAV, LNAV-VNAV Baro, APV-LPV, RNP AR APC.
  - RNAV Precision approaches GLS Cat1 and specific to Aircraft manufacturers
  - The benefits of RNAV concept and its roaring implementation thru new GNSS networks



# GPS POSITIONING

## DATES

Upon request

## DURATION

2 days

## OBJECTIVES

- Gain general knowledge of GPS
- Present civilian and military applications and their technical specificities

## PROGRAM

- General system description
  - Ground control segment
  - Space segment
  - User segment
- GPS background
- Technical presentation and system optimization
  - Spectrum spread technique
  - PY and C/A codes
  - Structure of receiver
  - RAIM
- Features and performance of the various civil and military applications (presentation on relevant Collins products)
- Demonstration using the GPS receiver
- Introduction on GNLU/MMR



# ADATE

## DATES

Upon request

## DURATION

5 days

## OBJECTIVES

- Acquire general knowledge of ADATE software syntax in order to be able to measure and use some statements to help the troubleshooting of a unit under test
- The technician will be able to copy, modify and use in memory part of the program test in order to do some specific tests and measurements to help the detection of a faulty component
- This knowledge will be used on RFT-900, RFT-1000, CTS-2000 and ITS-700 ADATE test software

## PROGRAM

- Theory: 2 days
  - ADATE menus
  - Use of functions keys
  - Use of a test program and block
  - Files needed for a complete test program (.blk/.pro/.cbt/...)
  - Program structure explanation
  - Statements explanation (variables, arithmetic operation, Boolean functions,...)
  - Example of test software with explanation of each statement
- Practical part: 3 days
  - ADATE software interface practice
  - Writing of a small software with use of statements learned (display of text, of operation result, logical functions use, ...)
  - Modification of a test software (add loops, stops, pauses,...), to help the troubleshooting of an equipment under test
- The practical part is done on computers with all the bench interfaces (simulation mode for all resources).

# HUMAN FACTORS

**DATES**

Upon request

**DURATION**

1 day

**OBJECTIVE**

- To be aware that human factors in the form of environmental, behavioral, and ergonomic could cause inadvertent airworthiness escapes that could potentially cause aircraft safety problem. The syllabus follows the PART 145 recommendation (Guidance Material chapter 145.A.30 (e) Training syllabus for initial human factors training).

**PROGRAM**

- General/Introduction to human factors
- Human error
- Human performance and limitations
- Environment
- Procedures, information, tools and practices
- Communication
- Teamwork
- Professionalism and integrity
- Organization's HF program

# DO-178B

## DATES

Upon request

## DURATION

2 days

## OBJECTIVES

- The course is addressed to engineering people working on software applications installed on avionics equipment
- Acquire general knowledge of DO-178B/DO-178C (study & homologation of the systems and equipment software)

## PROGRAM

- Generalities
  - Introduction to Certification and safety
  - General principles
  - DO-178B usage
  - Effect of software levels
- Overview of software life cycle processes
  - Planning
  - Development
  - Verification
  - Configuration management
  - Quality Assurance
  - Certification Liaison
- Architecture choice and additional consideration (particular cases of software, tools)
- Development and verification activities  
Clarifications of DO-178B : DO-248B

# DO-178C

**DATES**

Upon request

**DURATION**

2 days

**OBJECTIVES**

- The course is addressed to engineering personnel working on software applications embedded in avionics equipment
- Acquire general knowledge of DO-178C , understand its concepts and learn how to use it
- For already DO-178B aware trainees, familiarize with evolutions since DO-178B

**PROGRAM**

- Generalities
  - Introduction to Certification and safety
  - General principles
  - DO-178C usage
  - Effect of software levels
- Overview of software life cycle processes
  - Planning
  - Development
  - Verification
  - Configuration management
  - Quality Assurance
  - Certification Liaison
- Architecture choice and additional consideration (particular cases of software)
- Development and verification activities (third day)
- Changes since do-178B
- Supplements
  - Software Tool Qualification
  - Model-Based Development and Verification
  - Object-Oriented Technology
  - Formal Methods
  - DO-278A; CNS/ATM and safety
- Supporting information for DO-178C and DO-278A: DO-248C



# AVIONICS CERTIFICATION

**DATES**

Upon request

**DURATION**

1 day

**OBJECTIVE**

- The course is addressed to personnel interested in certification process overview

**PROGRAM**

- Certification Basis: regulations
- Different type of certification/qualification (Part 21)
- Safety process and system qualification overview (ARP4754, ARP 4761)
- Software qualification process overview (DO-178B)
- Hardware qualification process overview (DO-254)
- Environmental qualification process overview (DO-160)



# HF-9000 SYSTEM

**DATES**

November 3-5, 2020

**DURATION**

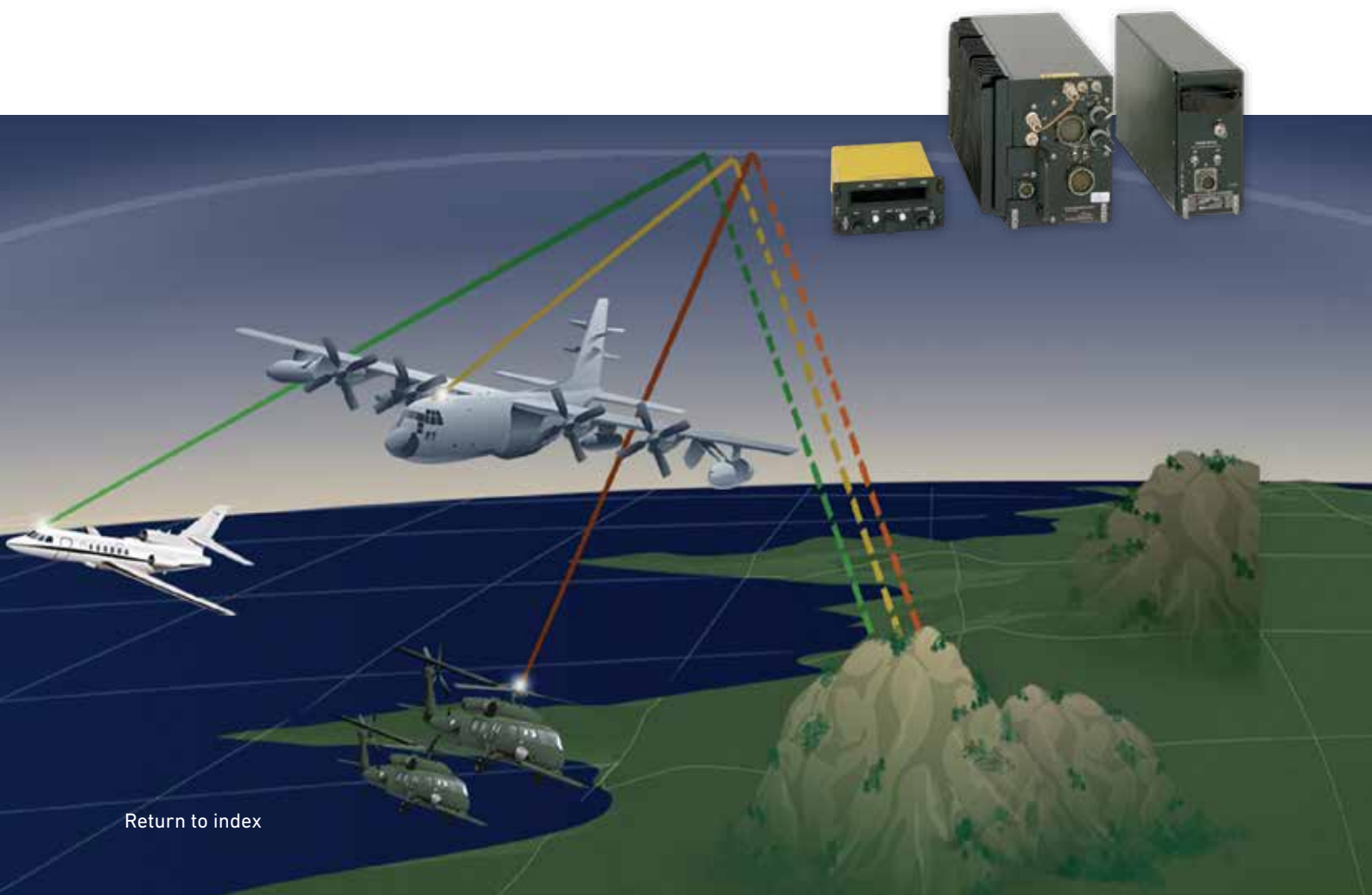
3 days

**OBJECTIVE**

- Acquire general knowledge of theory of operation for the HF-9000 system

**PROGRAM**

- Introduction of optical fibers
- Optical fiber connector installation
- Radio frequency basic
- Specification HF-9000
- HF-9000 Block diagram study including:
  - Control box HF-9010
  - Transmitter-Receiver HF-9030/9070
  - Coupler HF-9040/9042
- HF-9000 Interconnection
- HF-9000 operations using a dedicated bench





# SATCOM SATELLITE COMMUNICATION SYSTEM

## DATES

November 17-19, 2020

## DURATION

3 days

## OBJECTIVE

- This course provides students with the skills and background knowledge required for troubleshooting and isolating defective components in the Collins Aerospace SATCOM system SAT-906/B and SAT-2100/B, using tools, applicable manuals, block diagrams and maintenance guides

## PROGRAM

- Introduction SATCOM System Familiarization
  - Historical background
  - Identify SATCOM System Segments (space, ground, airborne)
  - Identify services (Aero L, I, H, H+, Swift64, SBB, safety)
  - Identify AES components (SDU, RFU, HPA, SRT, HST, antenna)
  - Identify associated components (BSU, LNA, HPR, splitter, combiner)
- SATCOM operation with MCDU
- Main menu, Directory Display, Number Entry, GES Select
  - Priority, BITE Status, Directory Index
  - SDU log and HSDU log menu
- SATCOM maintenance with MCDU
  - BITE pages
  - LRU indication
  - Fault history
  - Maintenance mode
  - Test launching
- SATCOM maintenance on aircraft with SATCOM Tool
  - Owner Table Requirement (ORT)
  - Event Handler
  - Instrumentation Port



# ALE AND HF CPS AUTOMATIC LINK ESTABLISHMENT CONFIGURATION USING HF-CPS SOFTWARE

## DATES

November 23-27, 2020

## DURATION

5 days

## OBJECTIVES

This course will present the basics of long distance HF Radio Communication, the training enables students to efficiently use the HF Communication Planning System (HF-CPS) software tool to create Master and Operational databases to include frequencies, Self Addresses, Net Addresses, Channels, and Scan Lists

Upon completing this course, the student will be able to:

- Demonstrate knowledge of ALE databases by creating correct complete Master and Operational databases
- Demonstrate knowledge of database configuration and system parameters
- Output a datafill file and load it into the radio

## PROGRAM

- General HF: HF Propagation
  - Principles of radio propagation, HF/SSB modulation
  - Comparison and benefit of HF against amplitude modulation
  - Propagation prediction software PropMan 2000™
  - Introduction
  - Example of frequencies determination
- Basic Automatic Link Establishment (ALE)
  - Theory – the need for Automatic Link Establishment
  - HF-CPS HF Administrator Role (Frequency Management and Network Administration)
  - Configuration parameters and System parameters
  - Other addresses, Self addresses
  - Scan Lists, Net addresses, Channels, Groups
  - Messages, Scanning, Sounding
  - Link Quality Analysis (LQA)
- Network Designer's Guide
  - Steps to successful network design
  - Identifying the stations and networks
  - Propagation and frequency selection/assignment
  - Net calls and slot times
  - Assigning ALE addresses
  - Building datafill files
- Building the Master and Operational Databases
  - Database structure, content and security
  - Frequencies and frequency designators
  - Addresses, parameters,
  - Customization – radios, reports, forms, parameters, users
  - Outputting the datafill file, loading the radio
  - Operating in ALE

## 900 SERIES

### DATES

Upon request

### DURATION

5 days

### OBJECTIVES

- Familiarize trainees with the basics of radio equipment used on air transport airplanes
- Present technical characteristics of Collins Aerospace equipment built to the specifications of ARINC-900

### PROGRAM

- Review of the basics of radio navigation equipment (ADF-900, VOR-900, ILS-900, DME-900, Transponder TPR-900/901, Radio-altimeter LRA-900, MMR GLU-920) and radio communication equipment VDL (VHF-900), HF DL (HFS-900/900D)
- Running equipment demonstrations of Collins Aerospace equipment on the test bench
- Presentation of the ARINC-900 communication format and the CFDS (Centralized Fault Display System) philosophy
- Interpretation of the built-in self test (BIT)





# TCAS AND MODE S, COLLISION AVOIDANCE SYSTEM

## DATES

June 8-12, 2020

## DURATION

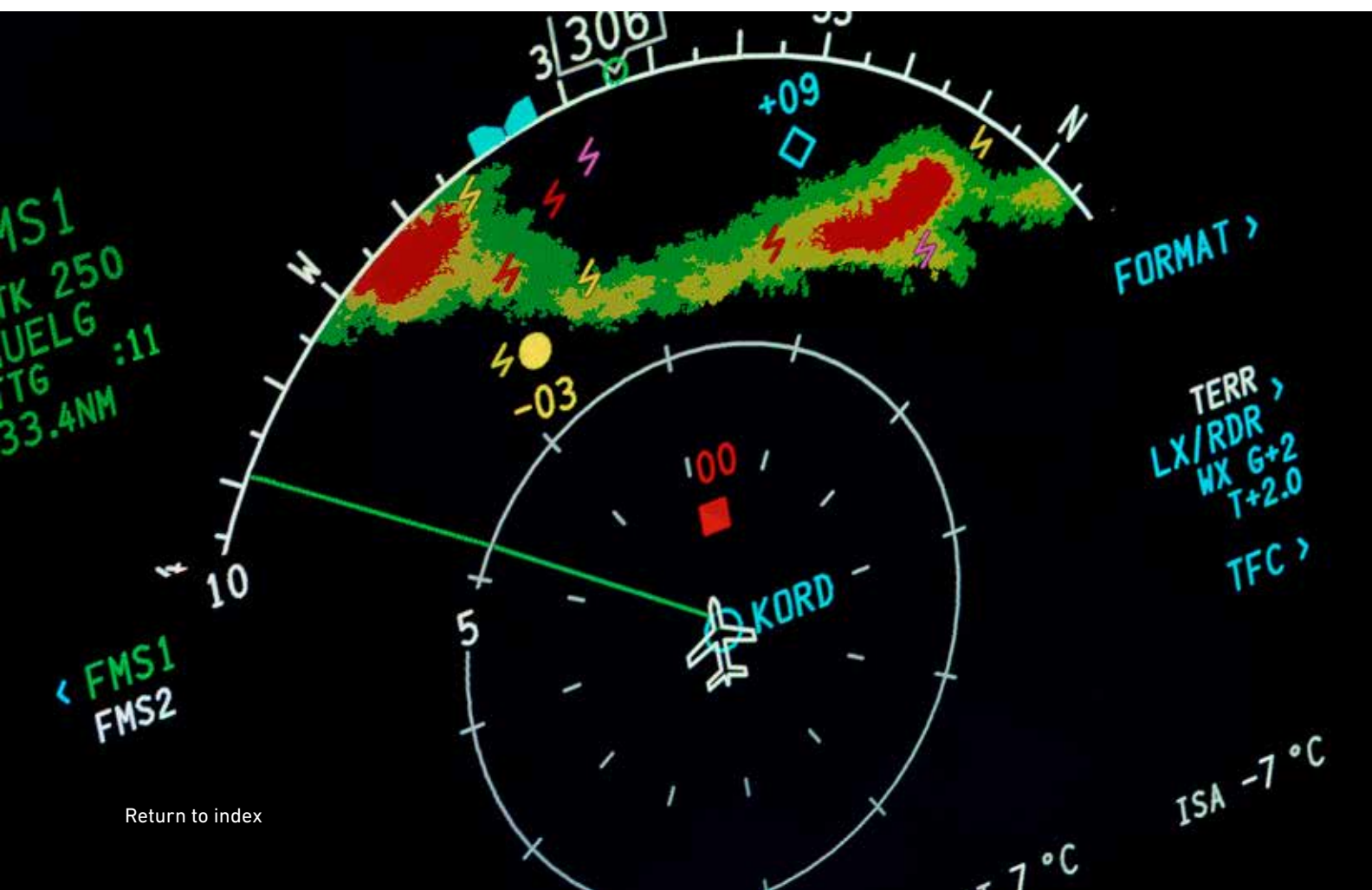
5 days

## OBJECTIVES

- Acquire general knowledge of TCAS and Mode S transponder basics
- Familiarize trainees with the Collins TCAS and with aircraft maintenance procedures

## PROGRAM

- Review of TCAS and Mode S transponder basics
  - Selective interrogation, Whisper-Shout sequence
  - TAU criteria, surveillance zone, level of sensitivity
  - Data link (Uplink, Downlink Formats)
- Operation, controls, instructions
- Description of the system mode S transponder, the TCAS, the antenna, the control box
  - Interconnection, input/output, cross-strapping
  - Basics of the TCAS directional antenna
- System tests
  - Self test, BITE
  - Presentation of test facilities in lab



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## PRO LINE II

### DATES

Upon request

### DURATION

5 days

### OBJECTIVES

- Discover specificities of the PRO LINE II series
- Acquire general knowledge of equipment
- Learn to interpret test failure codes correctly

### PROGRAM

- Review of CSDB communication protocol
- Functional survey of the following equipment
  - VHF-22/CTL-22
  - VIR-32/CTL-32
  - DME-42/IND-42
  - ADF-60/CAD-62/CTL-62
  - TDR-90/CTL-92
  - ALT-55/DRI-55/ALI-55
  - Theory of operation
  - Specifications
  - Interconnection and installation options
  - Self test
- Demonstration of new computer assisted maintenance and troubleshooting techniques
- Introduction to PRO LINE II series 400 equipment that uses ARINC-429



## PRO LINE 4™

### DATES

Upon request

### DURATION

5 days

### OBJECTIVE

- Introduce trainees to the new “Integrated Digital Avionics” concept, PRO LINE IV, installed on CRJ, SAAB, F-2000 aircrafts

### PROGRAM

- Introduction to PRO LINE IV
- Primary Flight Display (PFD)
  - Presentation of attitude , altitude, air speed and navigation parameters
- Multi-Function Display (MFD)
  - Turbulence detection radar
  - TCAS display
  - Diagnostics
- Engine Indication and Crew Alerting System (EICAS)
  - Engine parameters
  - Presentation of the hydraulic circuit

The Integrated Avionics Processing System (IAPS).

This course will be based on Falcon 2000 and Regional Jet avionics.

This course may be done at customer facility in order to tailor practice and theory to customer's aircraft.



# PRO LINE 21™

## DATES

June 15-19, 2020

## DURATION

5 days

## OBJECTIVES

- This course provides flight crews with operational training and flight line technician with level I maintenance for Pro Line 21 system
- Introduce trainees to the new "Integrated Digital Avionics" concept PRO LINE 21, installed on Bombardier Challenger 300, Hawker 800XP, Raytheon PFP-3, Cessna CJ1/CJ2, Beechcraft King Air

## PROGRAM

- Data Bus
- Integrated Avionics Processing System (IAPS)
- Electronic Flight Instrument System (EFIS)
  - AFD, RSP, CCP
- Engine Indicating and Crew Alerting System (EICAS)
  - MFD, CCP, DCU, RDC
- Air Data System (ADS)
- Attitude Heading System (AHS)
- Attitude Heading Computer (AHC)
  - External Compensation Unit (ECU)
- Flight Guidance System (FGS)
  - FCC, FCP, SVO, Servo Linear Actuator
  - Autopilot and yaw damper
- Flight Management System (FMS)
  - FMC, CDU, DBU
- Flight Management
  - Data Base
  - Operations
- Radio Sensor System (RSS)
  - RIU, ACP and CPE, Radio Tuning Operation
  - VHF, VOR/ILS/MB/ADF, DME, HF, HF Antenna Coupler, RA, Mode S transponder, TCAS
- General Maintenance, Procedures for Comm/Nav/Pulse Equipment
- Weather Radar (WXR)
  - Microwave Radiation Hazards AC 20-68B
  - Weather radar theory
  - Receiver Transmitter Assembly (RTA-8XX)
- Lightning Detection System, TAWS
- Maintenance diagnostics computer (MDC)

This training can be upon request based on a specific aircraft version (call us).

Link to all Pro Line 21 training versions:

<https://portal.rockwellcollins.com/web/publications-and-training/instructor-led-training-ilt>



# PRO LINE FUSION® EDS (EMBEDDED DISPLAY SYSTEM)

## DATES

Upon request

## DURATION

XXXXXXXXXX

## OBJECTIVE

- This course provides flight line technicians with level I maintenance for Collins Pro Line Fusion integrated avionics system, new concept touch-control primary flight displays installed on King Air, Challenger 604, Citation CJ3.

## PROGRAM

- **A. Training Core System: Displays**
  - Displays: AFD-3710 architecture, MKP, CCP
  - Multiwindows concept and format Touch screen menu's organization, Main symbology,
  - On Board Maintenance
- Training Core System: System Sensors
  - Acquire familiarity with Attitude Heading System AHC-3000 and Air Data System, ADC-3010
- Training Core System: Flight Control system
  - Acquire familiarity on APS-3000 architecture: Servo's, FGP.
  - IAPS: IOC, IEC, FGC.
  - FGC Operation: Vertical guidance, Lateral Guidance, Auto trim
- Training Core System: FMS Familiarization
  - The FMS course covers the architecture of an FMSA-6000 system and the generation of flight plans
- Training Core System: Aircraft interface
  - PM, EICAS, Applications Software (EICAS-6000) Data Concentrator Unit
- Training Core System: Onboard Maintenance System Application (OMS)
  - Built in test, fault log download
- Training Core System: Data Loading (ODLA)
  - Loading Aircraft Files and DataBase
  - Loading Configuration Tables and configuration management.
- **B. Training Surveillance: Software organization (ATF-3510)**
  - Synthetic Vision System (SVS) and ITAWS
  - Advanced Terrain
- Training Surveillance: Weather Radar (WXR)
  - MultiScan™ Weather Radar
  - Principle of MultiScan and Operation
- **C. Training CNS: Communication**
  - VHF-4000
  - RIU-4000 Acars Router
  - HF-9000
  - SATCOM Inmarsat, SATCOM Iridium
- **D. Training CNS: Navigation Sensors**
  - Acquire familiarity with technical aspects of Pro Line 21 Nav radio's.
  - Nav-4000/4500: VOR/LOC/GS , MKR, ADF
  - DME-4000
  - ALT-4000
  - GPS-4000S



# PRO LINE FUSION® IPS (INTEGRATED PROCESSING SYSTEM)

## DATES

September 21-25, 2020

## DURATION

5 days

## OBJECTIVES

- This course provides flight line technicians with level I maintenance for Collins Aerospace Pro Line Fusion
- Introduce trainees to the new "Integrated Digital Avionics" concept Pro Line Fusion installed on **Bombardier Global 5000/6000**

## PROGRAM

- Display et Display Control System (D and DCS)
  - AFD, CTP, CCP, MKP, RSP
- Integrated Processing System (IPS)
  - IPC-6210, IPC-6220, Installed application software
- Data Concentration System (DCS)
  - DMC, APM, EICAS, Installed application software
- Data Loading
  - IMS, Aircraft data loads and Configuration Management
- Onboard Maintenance System (OMS)
  - Onboard diagnostics, Aircraft Condition Monitoring and Diagnostics download
- Enhanced Vision System (EVS)
  - EVS Infrared Sensor Unit, EVS Infrared Window, AIT
- Synthetic Vision System (SVS)
  - SVS Modules, Installed application software
- Air Data System (ADS)
- Attitude Heading System (AHS)
  - Attitude Heading Computer (AHC)
  - External Compensation Unit (ECU)
- Integrated Flight Information System (IFIS)
  - Applications: File Server, Electronic Charts, Enhanced Map, Graphical Weather
- Automatic Flight Control System (AFCS)
  - FCS Application, FCP, SERVOS, FD
  - Autopilot and yaw damper
- Flight Management System (FMS)
  - Flight Management Data Base Operations
- Communications System (COMM)
  - Digital Audio System, Radio Management, VHF-4000, HF-9000
- Navigation System (NAV)
  - NAV-4000, DME-4000, GPS-4000 ALT-4000
- Traffic and Surveillance System (TSS) and TAWS
  - TSS-4100 and the application TSSA-4100
- Terrain Awareness Warning System (TAWS)
  - CCM-6210 and TPM-6000
- Weather Radar (WXR)
  - MultiScan™ Weather Radar Receiver Transmitter Assembly
  - Weather Radar Fundamentals and MultiScan™ Theory
  - Operation



# ACARS DATA LINK SYSTEM

## DATES

October 27-28, 2020

## DURATION

2 days

## OBJECTIVES

- Provide the fundamental knowledge in datalink communication
- Overview of system operation through Control Display Unit type CDU 6100 examples

## PROGRAM

The course presents the principle of Ground to Air link establishment and the data message exchange via VHF, HF et SATCOM media. Using simulation software representing a real Control Display Unit CD 6000 the different menus will be studied.

- Contents
  - What is Datalink in aeronautical
  - Datalink communication chain
- ACARS and Low Speed VHF Datalink
  - VDL mode 1, Protocol Characteristics
  - VDL mode 2, Protocol Characteristics
  - ACARS Over AVLK (AOA)
  - HFDL System Description
- SATCOM: the AMSS system
  - Constellation and Operations
- Datalink General Components
  - Airline ground processing systems
  - Datalink Service Providers (DSP)
  - Datalink airborne systems
- Basic Datalink Applications
  - OOOI (out-off-on-in), Weather
  - Free text telex, Maintenance
- Airline Operations Communication (AOC)
  - Flight initialization
  - Weather information
  - FMS position reports
  - Flight plan
  - Diversion Report
- Airline Maintenance
  - Automatically sent reports
  - Aircraft performance monitoring
  - Engine condition monitoring
  - Manually sent reports
- ATC
  - Departure Clearance
  - Oceanic Clearance
- Configuration
  - Aircraft System configuration
  - Peripheral
  - Discrete input

# DATA LINK SYSTEM ON AIRBUS ENVIRONMENT

## DATES

October 13-14, 2020

## DURATION

2 days

## OBJECTIVES

- The purpose of this training is to provide Airbus aircraft operators with basics on datalink systems and operations
- The course is based on the use of datalink for communication and surveillance in airspace management (CNS/ATM concept) applied to AIRBUS configuration

## PROGRAM

The course presents the principle of Ground to Air link establishment and the data message exchange via VHF, HF et SATCOM media.

- Contents
  - What is Datalink in aeronautical
  - Datalink communication chain
- ACARS and Low Speed VHF Datalink
  - ACARS: extension to ATC, limitations
  - VDL modes: POA , AOA, VDLM2
  - Airborne components functional description
  - VHF data radio
- SATCOM: the AMSS system
  - Constellation and Operations
- HFDL System Description
  - Principle of HF link and HF data Radio
- Datalink General Components
  - Airline ground processing systems, Datalink Service Providers (DSP),
  - Data Link airborne systems
- Typical Datalink Applications
  - OOOI (out-off-on-in), Weather, Maintenance
- Airline Operations Communication (AOC)
  - Flight initialization, FMS position reports, Flight plan
- Airline Maintenance
  - Automatically sent reports, Aircraft performance monitoring, Engine condition monitoring
- ATC applications
  - Departure Clearance, Oceanic Clearance, D-ATIS
  - FMS Waypoint Position Reporting (FMS WPR) Configuration
- Aircraft System
  - Peripheral
  - Discrete input
- ATSU environment
  - Databases definition
  - ATSU initialization and database loading
  - Datalink applications softwares (ATSU, FMS, CMS, DMU)
  - ATSU Hosted AOC software
- ATN Concept, Applications, programs and operations
  - ATN specifications
  - Context Management CM, ADS-B, CPLDC (messages, annunciation)
  - ACR environment overview

# FMS, TAWS, TCAS

## DATES

October 20-22, 2020

## DURATION

3 days

## OBJECTIVES

- This training provides fundamental knowledge on FMS, TAWS and TCAS systems
- Overview of each system functions and typical architecture
- Overview of each system use by pilots

## PROGRAM

- FMS
  - Theory (1.5 day) with the objective to operate the system, to study the functionalities of the system and provide basic elements on how the pilot should manage the flight
  - Participants will be guided on the procedure of loading the databases, pre-flight operation, flight plan creation, tuning, and performances menu
  - Practice will be conducted using Collins Aerospace FMS desktop simulator (½ day)
- TAWS
  - Acquire general knowledge of TAWS basics. Familiarize trainees with aircraft operation and maintenance.
  - Glossary, historical, norms and classes, database, priority alerts
  - Reactive and predictive functions; optional functions, specific functions
  - Displays and aural warning, typical architecture
  - Self Test and maintenance
- TCAS/ACAS
  - Acquire general knowledge of TCAS basics. Familiarize trainees with aircraft operation and maintenance
  - Selective Interrogation, Whisper Shout, TAU criteria, area surveyed, sensitivity, Datalink capabilities
  - Operation and displays aural warning
  - Typical Architecture
  - Self Test and maintenance



# CABIN ENTERTAINMENT: ADVANCED CABIN MANAGEMENT SYSTEM (ACMS)

## DATES

Upon request

## DURATION

1 day

## OBJECTIVES

- Maintenance personnel will be provided with in-depth knowledge and skills to efficiently and effectively troubleshoot ACMS
- Upon completing this course, the student should be able to efficiently and effectively troubleshoot the ACMS system using DIAG3K Software and system manuals

## PROGRAM

- Documentation Overview
  - Installation and Maintenance Manual, Fault Isolation Manual, DIAG3K User Manual, System Software Specification, Installation drawings (examples)
- Specific System Layout
  - System Operation Review, power distribution, component locations, access, addressing, controls and indicators
- Special Tools
  - Maintenance PC and DIAG3K Software, Pronto Software Load Tool
  - System Interface/Download Cables, Switch Panel Removal Tool
  - Multi-Drop Secondary Bus (MDSB) Jumpers
- Maintenance PC installation and configuration
  - Using DIAG3K software
- Pronto Remote Control
- Loading 2050 System Software
- Troubleshooting Scenarios
- Collins Aerospace Procedures

## OPTIONS

- Practice on customer aircraft (one extra day)
- Possibility to combine with other trainings from *Cabin Entertainment*





# CABIN ENTERTAINMENT: ADVANCED CABIN MANAGEMENT (CMS-1)

## DATES

Upon request

## DURATION

1 day

## OBJECTIVES

- Maintenance personnel will be provided with in-depth knowledge and skills to efficiently and effectively troubleshoot CMS-1
- Upon completing this course, the student should be able to efficiently and effectively troubleshoot the CMS-1 system using DIAG3K Software and system manuals

## PROGRAM

- System Overview
  - Function
  - Primary Controller
  - Components
- Specific System Layout
  - Component
  - System Architecture
- Special Tools
  - Component addressing
- Troubleshooting
  - Maintenance PC
  - Using DIAG3K
  - CMS-1 Diagnostic Screens
- Loading System Software

## OPTIONS

- Practice on customer aircraft (one extra day)
- Possibility to combine with other trainings from *Cabin Entertainment*





# CABIN ENTERTAINMENT: FALCON CABIN MANAGEMENT SYSTEM (FCMS)

## DATES

Upon request

## DURATION

2 days

## OBJECTIVES

- The student will acquire an understanding of the Falcon Cabin Management System (FCMS)
- Upon completion of this course, the student will be able to: identify FCMS LRUs, understand system operation, understand basic troubleshooting procedures to include diagnostic software tools, load system software

## PROGRAM

- Introduction to the FCMS
  - Cabin system
  - Entertainment possibilities
- FCMS system operation
  - System Overview
  - MDSB, 1394b overview
  - Audio Video Sources
  - Component locations
  - Communication devices
  - Source devices
  - Switch panels
  - Monitors
- FCMS system maintenance
  - A-Type Switch Panel and Addressing
  - TSC MDSB and Addressing
  - Galley TSC Maintenance Screen
  - Maintenance Laptop setup
  - Diagnostic Client – Loading, Operation
  - Volume adjustment

## OPTIONS

- Practice on customer aircraft (one extra day)
- Possibility to combine with other trainings from *Cabin Entertainment*

# CABIN ENTERTAINMENT: VENUE™ (HD-CMS)

## DATES

Upon request

## DURATION

2 days

## OBJECTIVES

- Maintenance personnel will be provided with in-depth knowledge and skills to efficiently and effectively troubleshoot VENUE (HD Cabin Management System)
- Upon completing this course, the student should be able to efficiently and effectively troubleshoot the VENUE system using TST diagnostic Software and system manuals

## PROGRAM

- Introduction
  - Cabin control and entertainment
- System overview
  - System operation
  - Aircraft layout
  - MCD, HDAV, PSW, Aux and switch panels, PPC, monitors
  - Communication devices, sources devices, RS-232
- System diagnostic
  - Performing a continuity check using TST
  - Performing a system check using TST
  - Maintenance laptop setup

## OPTIONS

- Practice on customer aircraft (one extra day)
- Possibility to combine with other trainings from *Cabin Entertainment*



# CABIN ENTERTAINMENT: AIRSHOW® 400, 410 AND 4000

## DATES

Upon request

## DURATION

1 day

## OBJECTIVES

- The student will acquire an understanding of the Airshow system
- Upon completion of this course, the student will be provided sufficient information that they will be confident in their ability to install, checkout and troubleshoot common issues on the Airshow 4XX(X) system

## PROGRAM

- Airshow Moving Map Overview
  - Purpose, Terms
- System Description
  - AS 4XX(X) equipment, capabilities and features
  - Controls and indicators, internal and external interfaces
- Component Overview and System Communication
  - Data Communications Unit
  - Flight Deck Controller
  - ARINC, RS-232 and 485 communication
- Installation Highlights
  - Tray Installation
  - Connections to SATCOM, to FMS and ADC
  - Required tools and procedures
- Initial System Checkout
  - System settings and adjustments
  - Ground Test Procedure
- Troubleshooting
  - No video, no audio, no maps
  - Aircraft symbol pointing incorrectly
  - Maintenance screens

## OPTIONS

- Practice on customer aircraft (one extra day)
- Possibility to combine with other trainings from *Cabin Entertainment*

# CABIN ENTERTAINMENT: AIRSHOW® 500

## DATES

May 18, 2020

December 1, 2020

## DURATION

1 day

1 day

## OBJECTIVES

- The student will acquire an understanding of the Airshow system
- Upon completion of this course, the student will be provided sufficient information that they will be confident in their ability to install, checkout and troubleshoot common issues on the Airshow 500 system

## PROGRAM

- Introduction to Airshow 500
  - Mechanical Design : Tray Mount, Flange Mount
  - Functional Description : 2D maps, 3D maps, Relative Location Indicator, Flight Instrument Panel View, Heads Up Display, Time Zone Globe, World Clock View, On-board Settings Editor
  - System External Interfaces: Front Panel, Back of Unit, Block Diagram
- Airshow 500 Installation/Removal
  - Installation: Kits, Tray and Flange Mount, Interactive Controller, Flight Deck controller (FDC) Installation, Time to Destination (TTD) Controller Installation
  - System Setup
  - Data Loading procedures
- Airshow 500 Operations
  - GUI Settings Editor: Select Language, Basic Settings Tab, Advanced Settings Tab
- Airshow 500 Checkout and Troubleshooting
  - System Access Maintenance Mode
  - 429 Troubleshooting

## OPTIONS

- Practice on customer aircraft (one extra day)
- Possibility to combine with other trainings from *Cabin Entertainment*



# CABIN ENTERTAINMENT: VENUE™ HD CABIN SYSTEMS COMMONALITIES AND DIFFERENCES ON AFTERMARKET, FALCONS AND GLOBALS

## DATES

Upon request

## DURATION

2 days

## OBJECTIVES

- This course provides line maintenance personnel with training on system components, concept of operation, and operation of the diagnostic tools
- Identify Venue Aftermarket, Falcon and Global Line Replaceable Units (LRUs), identify optional and third-party Venue HD products, Explain the baseline system operation, Perform conformity checks using the Galley Touchscreen (GTS) and Test and Simulation Tool (TST) Perform System Status checks using the GTS and TST

## PROGRAM

- Venue Systems Overview
  - Cabin control, Entertainment
- Venue system components/operation
  - Media Center Device (MCD), Dual Blu-ray Player (BDP)
  - 2052-1-xx Cabin Environmental Controller (CMM, RDE)
  - High Definition Audio Video controllers (HDAV) 300x and 600x
  - Personnel Switch (PSW), Touchscreen Controller (TC6000)
  - LCD High Definition Monitors (HDM), High Definition Monitors (Smart) LAM
  - High Definition Touchscreen Monitors (HTSE, GTS)
  - Smart Remote Electronics Box (SRMEB), Electronic Control Module (ECM)
  - Aux Panels, Cabin Remote, Tailwind 500/550
  - 2033 Radio Frequency (RF) and Infrared (IR) controller
  - 2501 "A" Type Switch Panels, 3rd Party Communication devices
  - 1Flight Deck Controller (FDC), Wireless Access Point (WAP) 3000 & 4000
  - Application Media Server Unit (AMSU), Power Distribution Equipment (PDE)
  - Test and Simulation Tool (TST) and GTS
  - Venue Software Loading : Loadable Software Package (LSP), Loadable Configuration Package (LCP), Airshow Software Loading
  - Maintenance Operations
- Venue HD system diagnostics
  - Software and Maintenance Laptop setup
  - Performing a conformity check using GTSE and TST
  - Performing system checks using GTSE and TST

## OPTIONS

- Possibility to combine with other trainings from *Cabin Entertainment*



# CABIN ENTERTAINMENT: TAILWIND® 5XX

## DATES

Upon request

## DURATION

2 days

## OBJECTIVES

- The student will acquire an understanding of the Tailwind 5xx system
- Upon completion of this course, the student will be provided sufficient information that they will be confident in their ability to install, checkout and troubleshoot common issues on the Tailwind 5xx system

## PROGRAM

- Satellite Television Overview
  - Terms, Providers, Satellite,
  - Transponders Antenna polarization, Receiver
- System Overview
  - What is Tailwind 5xx? Where does it work?
  - Airborne considerations, Factors affecting Performance
- Component Overview
  - Tailwind 5xx sub systems
  - FMU, TMU, SSP, CPIF, RDU, IMU, CDM
- System Software
  - Software types, CPIF & RDUS Application
  - Databases, Maintenance software
- System Operation
  - System modes, Antenna subsystem mode
  - Calibration, System initialization
  - Normal operation
- Maintenance Practices
  - Tools, Maintenance Ports
  - Maintenance menus, Software downloading
  - TAIT demo

## OPTIONS

- Practice on customer aircraft (one extra day)
- Possibility to combine with other trainings from *Cabin Entertainment*

# AUTOMATIC DEPENDENT SURVEILLANCE (ADS-B)

## DATES

May 26-27, 2020

December 10-11, 2020

## DURATION

2 days

2 days

## OBJECTIVE

- This course provides engineering and maintenance personnel with training to understand TCAS and transponder major installation points needed for ADS-B certification. This course also provides overview of Transponder and ACAS operation and maintenance review.

## PROGRAM

Introduction: airspace surveillance goals and means

- XPDR Theory
  - System Architecture
  - Mode A, C and S functions
  - Mode S uplink downlink
  - Elementary Enhanced surveillance
  - Squitters
- TCAS/ACAS
  - History
  - Principle (Tau, range, altitude, bearing, TA, RA)
  - Displays
  - Architecture
  - Modification 7.1
  - Antenna performance
- ADS-B
  - Overview
  - Mandatory/regulation information
  - OUT functions
  - IN functions
  - Architecture overview
  - Strapping required (TCAS/XPDR)
  - Required labels: Non GNSS and GNSS data
  - Ground Flight testing requirements
  - BDS 0,5 0,6 0,8 0,9 6,1 6,2 6,5
  - Non transponder aircraft system test
- Test of transpondeur et TCAS/ACAS
  - Self-Test/Built-In Test Equipment
  - LRU Front Panel Self-Test Button
  - BITE Testing using Control Head
  - ADS-B failure annunciations
  - Recommended maintenance data update for ADS-B (labels 35x)

# COLLINS AEROSPACE EQUIPMENT COURSES

## OBJECTIVES

- Training personnel in charge of equipment maintenance and troubleshooting
- The purpose of this theoretical and practical training is to familiarize participants with the functional string of the equipment's circuits
- During training, the operator will be able to perform maintenance, repair and troubleshooting tasks based on hands-on example
- After completing training, trainees should be able to carry out equipment performance evaluation procedures. In the context of hands-on sessions, in case of failure, the trainees should be able to apply a logical technical approach leading to diagnosing and correcting the problem by replacing the appropriate component.

## PROGRAM

- Review of equipment basics
- Presentation of the system
- Characteristics and performance levels
- General operation
- Interconnection
- Comprehensive study of the equipment (diagrams, flowcharts)

## EQUIPMENT COVERED

- Any equipment (old or new generation) upon customer request
- See summary board of unscheduled courses already available, page 49

## DATES/DURATION

- Upon request/to be defined with customers
  - Control box
  - Interpreting failure codes
  - Test bench performance check
  - Settings and adjustments



## CUSTOMIZED TRAINING

We place particular importance on providing customers with training adapted to expressed needs: thus, you have the assurance of our technical skills but also a guarantee of success founded on the cooperative effort that goes into defining course content.

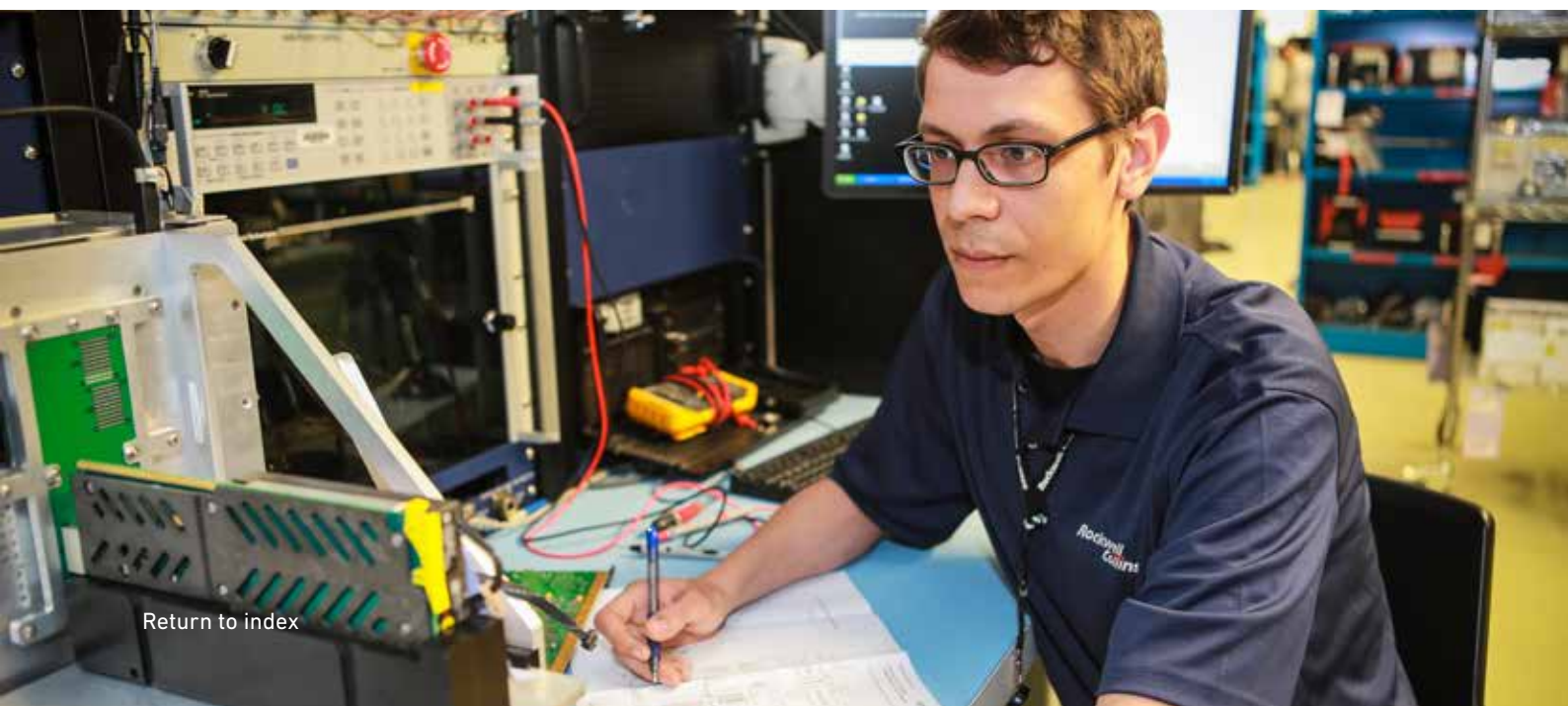
From this perspective, our first concern is to pinpoint your expectations and constraints so that we may offer you training that is closely suited to the needs of trainees.

Collins Aerospace in France organizes training in French, English or Spanish, at our facilities or at customer premises. How long training lasts is a function of the level required the trainees' professional background and the amount of hand-on training desired. We also offer ON-JOB TRAINING that is entirely hands on (see page 48).

We have defined three levels of maintenance training courses:

- **Level I (A to D)**
- **Level II (A to G)**
- **Level III ( only for Collins Aerospace agreed repair shops, may be subject to intellectual property extra cost)**
  - A. **Basics/System Description**
  - B. **Specifications/Interface**
  - C. **Utilization**
  - D. **Bite/Failure Code Analysis**
  - E. **Analysis of Block Diagrams**
  - F. **Acceptance Testing**
  - G. **Primary Adjustments**
  - H. **Comprehensive study of electronic diagrams**
  - I. **Component-level troubleshooting**
  - J. **Complete adjustment procedure**

We propose, then, a training plan that takes into account the number of persons to be trained and the deadline for completing training.





## COLLINS AEROSPACE LEVEL DEFINITION

- **Level I = ATA-104 levels I, II, and III**

This is a Flight Line Maintenance level to LRU replacement.

Sometimes called Organizational level (OLM).

Also applicable to pilot training RC level I is FAMILIARIZATION and FLM flight line maintenance with training to troubleshooting and removing failed LRU using onboard Maintenance Diagnostic data.

The training course will train the student to isolate a failure to a Line Replaceable Unit (LRU) and remove and replace the LRU, and perform testing procedures using BIT and/or special/standard test equipment as described in the equipment's instruction book.

- **Level II = ATA-104 Level IV**

This is an Intermediate level to card replacement (ILM).

The training course will train the student to isolate a failure to a defective Shop Replaceable Unit (SRU), remove and replace the SRU, and perform testing procedures using BIT and/or special/standard test equipment as described in the equipment's instruction book.

This is bench training to remove a single LRU, repair by replacing the card.

- **Level III = ATA-104 Level V**

This is a Depot level to component replacement (DLM).

This is bench training to repair LRU by replacing a component on a card, assemble and test for return to service.

The training course will train the students to recognize and isolate malfunctions to the defective component, remove and replace the defective component and perform equipment alignment and testing procedures using BIT and/or special/standard test equipment as described in the equipment instruction manual.





# FLIGHT LINE MAINTENANCE

## DATES/DURATION

To be defined according to the equipment that is the subject of training and according to customer requirements.

## OBJECTIVES

- Training personnel in charge of ground maintenance of Collins Aerospace equipment
- This course can be adapted to train personnel on a specific aircraft equipment type
- In this course, operators will learn about operating procedures, how the equipment works and how to interpret the built-in self test (BITE) and maintenance operations to be performed

## PROGRAM

- Review of equipment basics
- Presentation of the system
- General operation
- Operating procedures
- Interpreting failure codes
- Preventive and corrective maintenance



# HANDS-ON LAB TRAINING (ON-JOB TRAINING)

## DATES/DURATION

To be defined according to the equipment that is the subject of training and according to customer requirements

## OBJECTIVES

- Training personnel in charge of equipment maintenance and troubleshooting
- During training, the operator will be able to perform maintenance, repair and troubleshooting tasks based on hands-on examples
- In the context of this hands-on training, trainees should be able to apply a logical technical approach leading to diagnosing and correcting the problem by replacing the appropriate component

## PROGRAM

- Presentation of the system
- Equipment characteristics and performance levels
- Test bench performance check
- Test run on test stand
- Removal and reinstallation
- Settings and adjustments
- Troubleshooting

## NOTES:

- This course can be given at our facilities or at your premise
- See summary board of unscheduled courses already available, page 51

## EQUIPMENT TRAINING CAPABILITY LIST

**RADIO  
NAVIGATION****ADF**

ADF-60A/462  
ADF-4000  
51Y-7/A/B/C/D  
ADF-700/900  
DF-206NFC (NRAN-28) \*  
DF-206A (AN/ARN-149)\*

**DME/TACAN**

DME-40/42/442  
DME-4000  
DME-700/900/2100  
TCN-118 (AN/ARN-118) \*  
TCN-500 (AN/ARN-153) \*

**VOR ILS MARKER**

ILS-700/720/900  
NAV-4000/4500  
VIR-30/31/32/432  
VIR-4000/4500  
VOR-700/900  
GLU/GNLU-9X0  
VIR-130A (AN/ARN-147)\*

**RADIO ALTIMETER**

860F-1/2/4  
ALT-50A/55B  
ALT-1000  
LRA-700/900/2100

**DF/SAR/CSAR**

DF-301/DF-430/  
MDF-124V1 V2  
RSC-125G / DF-500

**TCAS ATC**

TDR-90/94/94D  
TPR-900/901  
TTR-920/921  
TPR-710A /720  
ISS-2100  
TTR-2100/4100

**GPS**

GPS-4000  
GLU-9XX - GNLU-9xx

**RADIO COMMUNICATION****HF**

CPL-920D  
490S-1  
628T  
HF-121 (AN/ARC-230)  
HF-230  
HFS-700/700D  
HFS-900/900D/2200

HF-9000

HF-9000D\*

HF-9500 \*

**VHF**

618M-3/4/5  
VHF-20/21/22/422  
VHF-2100/2200  
VHF-4000  
VHF-700/700A/700B  
VHF-900/900B/920  
RT-1000 (AN/ARC-186) \*

**V/UHF**

AN/ARC-182 \*  
AN/ARC-210 \*  
TALON (RT-8XXX)\*

**MODEM/DATALINK**

MDM-2001/2201/2401  
MDM-2002/2202/2402  
MDM-3001

**COMM INTERFACE UNIT**

CIU-906  
CIU-600X  
DLM-7XX/9XX

**AVIONICS SYSTEM/OTHER****AIR DATA**

ADS-80  
ADC-85/86/87  
ADC-850  
ADC-3000

**ATTITUDE HEADING SYSTEM**

AHC-3000  
AHC-85

**DISPLAYS**

AFD-2000/3010/2100  
EFD-74  
EFIS-85/86/87  
EDU-766D/776D  
EFD-4076/4077  
MFD-255  
ETC-4xxx  
TCP-2100  
DCP-2100  
CCP-2100  
MKP-2100  
AFDX-2XXX  
ISC-2200

**AUTO PILOT/FMS/FCS**

APS-65  
APS-80/85  
FCC-400x/70x//85/86  
IAPS Pro Line IV & 21

**WEATHER RADAR**

WXR-2100/21  
WXR-700/701

**CABIN ENTERTAINMENT**

ACMS  
AIRSHOW 4xx(x)/500  
CMS-1  
FCMS  
TAILWIND 5XX

**OTHER**

Workmanship Standards

# REGISTRATION FORM

To be returned by mail or email at:

Collins Aerospace, France – Training Center  
6 avenue Didier Daurat 31701 Blagnac, France  
trainingfrance@rockwellcollins.com

Phone: +33 5 61 71 78 10

Fax: +33 5 61 71 78 87

## COURSE REGISTRATION AND AUTHORIZATION REQUEST FOR TRAINING

Customer: First and last name \_\_\_\_\_

Job Title \_\_\_\_\_

Company Name \_\_\_\_\_

Company Address \_\_\_\_\_

Street or PO Box \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Country \_\_\_\_\_

Phone \_\_\_\_\_

e-mail \_\_\_\_\_

Course Title
Date
Signature

Language

☐ French

☐ English

Trainee's list

Surname, Forename	Job Title	Date and place of birth	Passport Number	Nationality

Your purchase order number \_\_\_\_\_

Invoice address \_\_\_\_\_

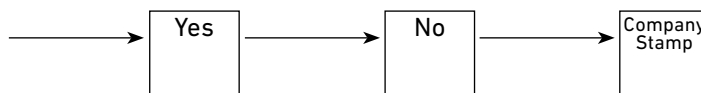
VAT number \_\_\_\_\_

Total cost

Euros

Convention:

N° 73.31.00170.31



Date \_\_\_\_\_

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## PRICE

Training duration per day	Price per person	Group rate
5 days	3380 €	15 600 €
4 days	2700 €	12 500 €
3 days	2030 €	9350 €
2 days	1350 €	6250 €
1 day	675 €	3120 €

### CONDITIONS: COMPANY GROUP RATE

A five person minimum is required to apply the group rate and is limited to 10 person maximum.

### CONDITIONS: PRICES PER PERSON

Training course is confirmed with minimum four attendees, all companies included.

The prices are applicable only at Collins Aerospace France Training Center.

These courses can be delivered in French or English at our facilities or customer premises with associated material supplied in English or French where applicable.

- Any training cost referenced "upon request" is not subject to stated pricing
- For training at customer premises, Collins Aerospace will quote accordingly



# GENERAL TERMS AND CONDITIONS

All scheduled courses are governed by a bilateral occupational training agreement.

Our registration number is 73 31 00170 31 Training is carried out in French or in English language at our Blagnac facility, located at the following address:

Collins Aerospace  
6 Avenue Didier Daurat  
31700 BLAGNAC

Collins Aerospace does not handle trainees' additional expenses (food, lodging, transportation) Lunch is included in the training rate.

In case of cancellation, the customer shall pay to Collins Aerospace a lump sum for compensation described as follows:

Date of cancellation's notice	Amount compensation courses' sell price
Less than 7 days	100%
From 7 to 14 days	50%
From 15 to 30 days	30%

Collins Aerospace reserves the right to cancel training if there are fewer than four participants registered.

Registration for any one of our courses implies acceptance of all terms and conditions.

## PRACTICAL INFORMATION

Course schedule: 9 a.m. to 12 noon - 1:30 to 4:30 p.m.

## ACCOMMODATION

Upon request, training department secretaries can book hotel reservations in participant's name.

To learn more, go to  
[collinsaerospace.com](https://collinsaerospace.com)

**COLLINS AEROSPACE FRANCE**

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[trainingfrance@rockwellcollins.com](mailto:trainingfrance@rockwellcollins.com)

[collinsaerospace.com](https://collinsaerospace.com)