

Publications and Training Solutions

Course Syllabus: 523-0789089

COURSE TITLE: Pro Line 21 Retrofit

PREREQUISITES: Students should have basic knowledge of aircraft avionics systems and a working command of the English language (interpreters are available for special cases).

PURPOSE: This course provides line maintenance personnel with training to operate and perform flightline maintenance for the Proline 21 system.

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

1. Provide an overall understanding of Proline 21 Avionics principles and operation.
2. Identify system components and the functional/operational characteristics of each line replaceable unit (LRU).
3. Identify typical aircraft system interface/system architecture.
4. Perform fault isolation to a faulty LRU using built-in test diagnostics.

COURSE LENGTH: 4 Days

TRAINING DEVICES:

1. Pro Line 21 Retrofit Test Rig (If available)

TRAINING MATERIALS:

1. PowerPoint Presentation with LCD projector
2. Information sheets/handouts
3. Student Training Manual
4. Proline 21 Continuum Diagnostic Guide 523-0780797
5. Integrated Flight Information System (IFIS) Diagnostic Guide 5230806300

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REFERENCES:

- | | |
|---|-------------|
| 1. Integrated Avionics Processing System (IAPS) Installation Manual | 523-0780793 |
| 2. Electronic Flight Instrumentation System (EFIS) Installation Manual | 523-0780792 |
| 3. Aircraft Data Acquisition System Installation Manual | 523-0780796 |
| 4. Integrated Flight Information System (IFIS) Installation Manual | 523-0780854 |
| 5. Flight Management System (FMS) Installation Manual | 523-0780795 |
| 6. Flight Control System (FCS) Installation Manual | 523-0780794 |
| 7. Air Data System (ADS-3000) Installation Manual | 523-0780415 |
| 8. Attitude Heading System (AHS-3000) Installation Manual | 523-0780184 |
| 9. Communication Navigation and Surveillance (CNS) Installation Manual | 523-0780702 |
| 10. Turbulence Detecting Weather Radar (TWR) System Installation Manual | 523-0774651 |
| 11. Proline 21 Continuum Diagnostic Guide | 523-0780797 |
| 12. Integrated Flight Information System (IFIS) Diagnostic Guide | 523-0806300 |
| 13. Configuration Tool Users Guide | 523-0808701 |

COURSE OUTLINE

0. Welcome & Introductions

- A. Course Overview
 - i. Welcome
 - ii. Student Registration

1. Chapter 1 – Data Bus

- A. Why we use Data Buses
- B. ARINC Data buses
 - i. ARINC 429
- C. ARINC 453

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2. Chapter 2 – Integrated Avionics Processing System (IAPS)

- A. Overview
- B. System architecture
- C. Integrated Card Cage (ICC)
 - i. Description
 - ii. Theory of operation
- D. Power supply module (PWR)
 - i. Description
 - ii. Theory of operation
- E. Internal environmental controller (IEC)
 - i. Description
 - ii. Theory of operation
- F. Input Output Concentrator (IOC)
 - i. Description
 - ii. Theory of operation
- G. Maintenance Diagnostic Computer (MDC)
 - i. Description
 - ii. Theory of operation
- H. Configuration Strapping Unit (CSU)
 - i. Description
 - ii. Theory of operation
- I. Detailed functional theory
 - i. IAPS power distribution
 - ii. Temperature monitoring
 - iii. Overheat reporting
 - iv. Power supply inhibit
- J. Maintenance and troubleshooting

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- i. PWR fault indications
- ii. IEC fault indications
- iii. Status messages
- iv. Diagnostics

3. Maintenance Diagnostics

- A. Overview
- B. Maintenance Diagnostic Computer (MDC)
 - i. Description
 - ii. Theory of operation
 - iii. Operation

4. Electronic Flight Instrument System (EFIS)

- A. Overview
- B. Adaptive Flight Display (AFD)
 - i. Primary Flight Display (PFD)
 - 1. Description
 - 2. Theory of operation
 - 3. Reversionary mode select
 - ii. Multifunction Display (MFD)
 - 1. Description
 - 2. Theory of operation
 - 3. Reversionary mode select
- C. File Server Unit (FSU)
 - i. Description
 - ii. Theory of operation
- D. Reversion Switch Panel (RSP)
 - i. RSP switchology description
 - ii. Operation
 - iii. Detailed theory of operation

5. Integrated Flight Information System (IFIS)

- A. Overview

- B. File Server Unit (FSU)

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- C. Cursor Control Panel

 - D. Adaptive Flight Display with Ethernet
 - i. Features
 - ii. Cursor Control Panel Operation
 - iii. Electronic Charts
 - iv. Database Effectivity
 - v. Configuration Page
 - vi. Subscription Page
 - vii. Enhanced Maps Features

 - E. Summary
- 6. Air Data System (ADS)**
- A. Overview

 - B. Air Data Computer (ADC)
 - i. Description
 - ii. Theory of operation

 - C. Maintenance and troubleshooting
 - i. Status message
 - ii. Diagnostics
- 7. Attitude Heading System (AHS)**
- A. Overview

 - B. Attitude Heading Computer (AHC)
 - i. Description
 - ii. Theory of operation

 - C. Flux Detector Unit (FDU)

 - D. External Compensation Unit (ECU)

 - E. Maintenance and troubleshooting

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- i. Diagnostics
- ii. Post installation check
- iii. Compass compensation procedure
- iv. Automatic leveling procedure

8. Flight Guidance System (FGS)

- A. Overview
- B. Flight Control Computers (FCC)
 - i. Description
 - ii. Theory of operation
- C. Flight Guidance Panel (FGP)
 - i. Description
 - ii. FGP switchology description
 - iii. Operation
 - iv. Theory of operation
- D. Primary Servos (SVO)
 - i. Description
 - ii. Theory of operation
- E. Autopilot and yaw damp theory of operation
 - i. Description of fail passive system
 - ii. Description of yaw damp system
- F. Autopilot diagnostics
 - i. Entering and using autopilot diagnostics
 - 1. Report Mode
 - 2. Input Mode
 - 3. Output Mode

9. Flight Management System (FMS)

- A. Overview
- B. Flight Management Computer (FMC)

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- i. Description
 - ii. Theory of operation
- C. Control Display Unit (CDU)
 - i. Description
 - ii. Theory of operation
- D. Data Base Unit (DBU)
 - i. Description
 - ii. Theory of operation
- E. Flight Management Data Base operations
 - i. 28 day database load

10. Data Loading Systems

- A. Overview
- B. Data Base Unit (DBU)
- C. Collins Portable Access Software (CPAS)

11. Radio Sensor System (RSS)

- A. Overview
- B. Global Positioning System (GPS)
 - i. Description
 - ii. Theory of operation
- C. VOR/ILS/MB/ADF Receiver (NAV)
 - i. Description
 - ii. Theory of operation
- D. Distance Measuring Equipment (DME)
 - i. Description
 - ii. Theory of operation
- E. VHF Comm receiver/transmitter (VHF)
 - i. Description
 - ii. Theory of operation

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iii. Datalink/CPDLC/Link 2000+

F. Mode S transponder (TDR-94D) with Traffic Alert and Collision Avoidance System (TCAS)

- i. Description
- ii. Theory of operation
- iii. Video presentation (TCAS II Operations CHANGE 7.0 523-0779-512)

G. HF

- i. Description
- ii. Theory of operation

H. Radio Altimeter (ALT)

- i. Description
- ii. Theory of operation

I. Radio Tuning Operations

- i. Description
- ii. Operations
- iii. Theory of operations

J. General Maintenance Procedures for Comm /Nav /Pulse Equipment

- i. Flight line diagnostic procedures

12. Aircraft Data Acquisition System (ADAS)

- A. Overview
- B. Data Acquisition Unit (DAU)
- C. Data Concentrator Unit (DCU)/Engine Data Concentrator (EDC)

13. Weather Radar (WXR)

- A. Overview
- B. Microwave Radiation Hazards
- C. Weather radar theory
 - i. Video Presentation (The Next Generation Weather Radar 523-0778-191)

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D. Receiver Transmitter Assembly (RTA-8XX)

- i. Description
- ii. Operation
- iii. Theory of operation

E. Maintenance

- i. Radome maintenance
- ii. Flight line diagnostic procedures

14. Summary

A. Review & Course Critique

EQUIPMENT TYPE:

EQUIPMENT	NOMENCLATURE	PART NUMBER
351B-6A	Servo Mount	792-6784-001
ACT-3010	Aircraft Configuration Table	822-0044-001
ADC-3000	Air Data Computer	822-1109-001 thru -007, -009, -010, -011, -013 thru -016, -018, -019, -020, -022, -122
ADC-3010	Air Data Computer	822-2083-001
ADF-4000	ADF Receiver	822-1470-001
AFD-3010	Adaptive Flight Display (PFD, MFD)	822-1084-402, -404, -406, -408, -460, -480
AFD-3010E	Adaptive Flight Display (PFD, MFD)	822-1753-408, -460, -480
AHC-3000	Attitude Heading Computer	822-1110-001, -002
AHC-3000A	Attitude Heading Computer	822-1378-001
AHC-3000S	Attitude Heading Computer	822-1800-001

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CCP-3000	Cursor Control Panel	822-1746-002, -102
CDU-6200	Control Display Unit	822-1485-XXX
CHP-3000	Course Heading Panel	822-1279-002
CHP-3010	Course Heading Panel	822-1280-002
CKP-3000	Course Knob Panel	822-1281-002
CMU-4000	Communication Management Unit	822-1739-001, -151
CSU-4100	Configuration Strapping Unit	822-0014-104
DAU-650	Data Acquisition Unit	622-9344-001
DAU-4003	Data Acquisition Unit	822-1075-002
DBU-4100	Data Base Unit	822-0014-104
DCP-3000	Display Control Panel	822-1134-002, -102
DCP-3020	Display Control Panel	822-1476-012
DCP-3030	Display Control Panel	822-1828-002, -062, -102, -162
DCP-3040	Display Control Panel	822-2117-002
DCU-3001	Data Concentrator Unit	822-1483-001, -002, -101, -201, -250, -301
DIU-3010	Display Interface Unit	822-2063-001
DME-4000	DME Transceiver	822-1466-001
ECU-3000	External Compensation Unit	822-1200-998 (FSU-related)
ECU-3000	External Compensation Unit	822-1200-999 (CMU-related)
FCC-4006	Flight Control Computer	822-0809-030
FCC-4009	Flight Control Computer	822-1148-216
FCC-4011	Flight Control Computer	822-1373-121
FCP-4003	Flight Control Panel	822-0182-001

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FDU-3000	Flux Detector Unit	822-1193-001
FGC-3000	Flight Guidance Computer	822-1108-XXX
FGP-3000	Flight Guidance Panel	822-1107-XXX
FMC-6000	Flight Management Computer	822-0868-XXX
FSU-5010	File Server Unit	822-1543-101
ICC-4009	IAPS Card Cage	822-1407-001
IEC-4000	IAPS Environmental Controller	822-0288-001
IEC-4001	IAPS Environmental Controller	822-0333-001
IMT-3010	Instrument Mount	822-1140-003,-120
IOC-4100	I/O Concentrator	822-1362-XXX
LHP-4000	Lightning HIRF Protector	822-0287-201
LHP-4001	Lightning HIRF Protector	822-0332-201
MDC-3000	Maintenance Diagnostic Computer	822-1139-301
MDC-3110	Maintenance Diagnostic Computer	822-1987-002
MMT-120	Modular Mounting Tray	622-9669-001, -002, -003
MMT-125	Modular Mounting Tray	622-9670-001, -002, -003
MMT-130	Equipment Mount	622-9671-001, -002
MMT-3000	Modular Mounting Tray	822-1227-001
MMT-3010	Modular Mounting Tray	822-1290-001, -002, -003, -004
MMT-5000	Equipment Mount	822-1811-003
NAV-4500	VOR/LOC/GS/MB/ADF Receiver	822-1465-001

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NAV-4500	VOR/LOC/GS/MB Receiver	822-1579-001
OCM-4100	Options Control Module	822-1463-200, -201
PWR-4000	IAPS Power Supply	622-9945-022
RTA-852	Receiver/Transmitter/Antenna Unit	622-8439-001 thru -004, -011
RTA-852L	Receiver/Transmitter/Antenna Unit	622-9080-001 thru -006, -011
RTA-854	Receiver/Transmitter/Antenna Unit	622-8440-001 thru -004, -011
RTA-858	Receiver/Transmitter/Antenna Unit	622-8441-001 thru -004, -011
SMT-85A	Servo Mount	622-5028-001
SMT-87A	Servo Mount	622-0259-001
SMT-87B	Servo Mount	622-0260-001
SVL-4000	Linear Actuator	622-9968-001
SVL-85	Linear Actuator	622-8171-008
SVO-80A	Primary Servo	622-3015-001
SVO-85A	Primary Servo	622-4404-101, -102
SVO-85B	Primary Servo	622-5027-101
UMT-11	Universal Mount	622-5211-001
VHF-4000	VHF Comm Transceiver	822-1468-001, -101, -201, -301, -002, -102, 202, -302
VHF-4000E	VHF Comm Transceiver	822-1872-001, -101, -201, -301
VIR-4000	VOR/LOC/GS/MB Receiver	822-1467-001
WXI-711A	Weather Radar Indicator without SLV Button (Not actually part of the TWR-850 system, but may be used in	622-9736-223

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	place of the WXP-850A/B for control purposes.)	
WXI-711A	Weather Radar Indicator with SLV Button (Not actually part of the TWR-850 system, but may be used in place of the WXP-850A/B for control purposes.)	622-9736-224
WXP-850A	Weather Radar Control Panel	622-8394-001 thru -004, -011 thru -014
WXP-850B	Weather Radar Control Panel	622-8393-001 thru -004, -011 thru -014
XMA-1000	XM Weather Receiver Antenna (optional)	822-2030-001
XMWR-1000	XM Weather Receiver (optional)	822-2031-001, -002