Collins Aerospace Pro Line 21 and Pro Line Fusion® Program Updates

CJP 2019 CONVENTION - SEPTEMBER 6th, 2019

CJ1+/CJ2+/CJ3/CJ4 Avionics Update Session
Objectives

• Share latest Collins Aerospace program offerings and status
  • TCAS II display and Temperature Compensation issues
  • ADS-B compliance

PRESENT

• Datalink / CPDLC roadmap
  • CJ 1+, CJ2+ and CJ3 - Pro Line Fusion® flight deck upgrade
    • Vspeeds, Datalink, Roadmap, Training

FUTURE

• Answer questions and receive feedback
TCAS II RA Display Issue (CJ3 with Pro Line Fusion®)

- **Issue**
  - Incorrect Fly-To Cue display in some scenarios (eg: corrective climb with positive pitch angle)
  - Potential conflict with RA aurals
  - Some display SW versions are not TSO-compliant
  - TCAS LRU outputs are correct, as well as aurals

- **Impact**
  - PL Fusion-equipped CJ3 are impacted
  - FAA AD required to turn off RA and install placard until the display SW is being corrected
  - This temporarily turns the TCAS II system into TCAS I (TA-only)
  - FAA does not mandate TCAS II in US airspace for impacted CJ3 aircrafts though
  - In other regions like EASA, operators may have to request temporary waivers beyond MEL grace period

- **Corrective action**
  - A SW revision has been certified by Collins, and is now available under warranty since Aug 19th
Temperature Compensation (Update from 2018)

Pro Line 21 aircrafts with FMS 3.3.x and 4.x

• Issue
  • When a “climb to” altitude is manually edited or compensated for temperature, FMS may turn aircraft in wrong direction

• Impact
  • Collins OPS bulletin in 2018 recommended operators to turn off the temperature compensation feature

• Corrective action
  • An Airworthiness Directive from the FAA is expected to mandate the removal of the temperature compensation feature
  • Removal procedure at approved service centers or dealership
  • Approach procedures are not being removed from the FMS
  • FAQs: https://www.rockwellcollins.com/Landing/FMS/FAQ-OPSB016617R1.aspx
ADS-B out

Only 4 months left!

- Still time to equip before December 31th, 2019 FAA deadline
  - June 7th, 2020 EASA deadline

- Available options with Collins equipment (TDR-94 and GPS-4000S)

<table>
<thead>
<tr>
<th>Aircraft model</th>
<th>Textron Service Centers</th>
<th>Collins Dealers</th>
</tr>
</thead>
<tbody>
<tr>
<td>CJ1+ / 525</td>
<td>Service Bulletin #525-34-90</td>
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<tr>
<td>CJ2+ / 525A</td>
<td>Service Bulletin #525A-34-41</td>
<td>AML STC #SA11222DS</td>
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<tr>
<td>CJ3 / 525B</td>
<td>Pro Line Fusion® STC #SA11219SC or Service Bulletin #525B-34-26</td>
<td>Pro Line Fusion® STC #SA11219SC or AML STC #SA11222DS</td>
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<tr>
<td>CJ4 / 525C</td>
<td>Service Bulletin #525C-34-09R2</td>
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Datalink / CPDLC 1-pager
Definitions, Benefits and Requirements

• What is CPDLC by the way?
  • “Controller-Pilot Data Link Communications”
  • Aka text messages replacing ATC voice communication
  • Using VHF DataLink (VDL) mode 2 over:
    • ACARS network in USA / North Atlantic (“FANS 1/A”)
    • ATN (B1) network in Europe (“Link 2k”)

• Benefits
  • Less errors / Safer communication with ATC
  • Faster airport clearance in congested area
    • Departure CLearence or DCL, deployed in 62 US airports
  • Dynamic en-route updates sent via text
    • US deployment starting Q3 2019, until 2022/2023
    • Unequipped aircraft will not have preferential routes to busy airspace (“Best-Equipped / Best-Served”)
  • More efficient North Atlantic Tracks (FANS 1/A required FL 290 to FL390)

• Aircraft requirements
  • VHF DataLink Mode 2 radio (+ Satcom for oceanic FANS)
  • Communication Management Unit (CMU or RIU)
  • Avionics displaying/acknowledging CPDLC messages
  • Datalink subscription service (eg ArincDirect)
  • “Push-to-load” FMS for en-route updates, once fully deployed in 2023 (“push” of new flight plan in FMS)

Is it mandatory?
• Domestic US: No (BEBS)
• North Atlantic Tracks: Yes (FANS 1/A)
• Domestic Europe: No for used aircraft below 100,000lbs MTOW and 19 seats (BEBS)
# Datalink / CPDLC

## Paths / Roadmap

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<td>Q3 2020&lt;br&gt;Optional RIU + SW key in upcoming Pro Line Fusion® STC #SA11219SC amendment with 2.0 SW (Domestic CPDLC US / Europe)</td>
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<tr>
<td>CJ2+ / 525A</td>
<td>Q1 2021&lt;br&gt;Optional RIU + SW key in upcoming Pro Line Fusion® STC #SA11219SC amendment with 2.0 SW (Domestic CPDLC US / Europe)</td>
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<td>CJ3 / 525B</td>
<td>Q3 2020&lt;br&gt;Optional RIU + SW key in upcoming Pro Line Fusion® STC #SA11219SC amendment with 2.0 SW (Domestic CPDLC US / Europe)&lt;br&gt;Additional Satcom + SW key option for oceanics FANS (North Atlantic tracks)</td>
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Citation Jets 1+/2+/3 - Pro Line Fusion® Upgrade

Bringing the latest airspace modernization and situational awareness technologies

- Currently available for the CJ3 at Textron Service Centers or Collins Aerospace Dealer Network
  - 32 aircraft flying today

- Aircraft Value-Add Bundle for latest compliance and enhanced flight deck experience
  - ADS-B out
  - LPV / RNP / RF Legs
  - Three 14.1 inch landscape touchscreens
  - Configurable windows
  - Graphical flight planning
  - High-Resolution SVS with exclusive Airport dome
  - Electronic Navigation Charts
  - USB database loading

- SW update currently under development in close collaboration with Textron Aviation (Q3 2020)
  - Adds CJ1+/2+ aircraft to STC (Textron-exclusive 6 months)
    - Adapter harness addition to reduce downtime and labor costs
  - Restores integrated Vspeeds / FMS fuel sense
  - Adds Predictive FMS performance computation
  - Adds Sirius XM option
  - Adds CPDLC / FANS / ATN B1 datalink option
CUSTOMER TESTIMONIAL

PRO LINE FUSION — CJ3

Dave Lenz, CJ3 owner, shares his thoughts after completing his Pro Line Fusion upgrade.

“The displays just light up the entire avionics panel. It’s like a big show.” — Dave Lenz
WHY UPGRADE?

➢ Do you want *modern avionics* for your CJ3?
  ○ Currently ~ 32 CJ3 Fusion installs
  ○ Increases safety and awareness, decreases single-pilot workload, better airspace access

➢ Do you want to *maximize the functionality* of your aircraft?
  ○ Larger touchscreens with configurable windows, Graphical flight planning, Hi-Res SVS, LPV, RNP, IFIS, USB

➢ Do you want to *boost the hull value* of your current aircraft, or one you’re considering purchasing?
  ○ Lifecycle savings also include tax deductions and two years of warranty on all Collins equipment

➢ Do you want a *vibrant, future-focused road map* for development?
  ○ Alignment with Collins forward-fit roadmap
  ○ Next SW update scheduled for Q3 2020 with new FMS and several improvements

*Pro Line Fusion is the next step.*
### Citation Jets 1+/2+/3 - Pro Line Fusion® Roadmap

Next amendment will bring CJ1+/2+ model types, and align with our core forward-fit SW product line for long-term support and future upgrades.

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<th>Initial STC</th>
<th>Amendment #2</th>
<th>Amendment #3</th>
<th>Notes</th>
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<tr>
<td><strong>Model type</strong></td>
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<tr>
<td>CJ1+</td>
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<td>CJ2+</td>
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<td>CJ3</td>
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<tr>
<td><strong>Features</strong></td>
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<tr>
<td>Pro Line Fusion</td>
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<td>✔</td>
<td>Landscape 14&quot; touchscreens, Graphical planning, SVS, LPV</td>
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<tr>
<td>FMS fuel sense</td>
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<td>New baseline</td>
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<tr>
<td>Integrated FMS Vspeeds</td>
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<td>New baseline (currently available via IMS/PED option)</td>
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<td>Integrated FMS Perf.</td>
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<td>New baseline</td>
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<td>Sirius XM support</td>
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<td>New option (native)</td>
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<td>FDR support</td>
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<td>✔</td>
<td>✔</td>
<td>New option (via 3rd party STC)</td>
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<td>CPDLC (US + Europe)</td>
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<td>New option</td>
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<td>Oceanic FANS</td>
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<td>Airport Moving Maps</td>
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<td>Check Market - New potential option</td>
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<td>LP Approaches</td>
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<td>ADS-B In</td>
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<td><strong>STC support</strong></td>
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<td>Adaptor harness + kit</td>
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<td>New option to reduce touch labor and downtime</td>
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<tr>
<td>Flight Simulator</td>
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<td>New option being discussed with 3rd party</td>
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CJ2+ STC Aircraft - Work in progress

- Courtesy of Textron Aviation

- First power-on just achieved Sept 4th!

- Aircraft will be visible at NBAA 2019 in Las Vegas (pending successful initial testing)

- During SW development and testing, static demos can be arranged in Cedar Rapids, IA, before demo flights start in Q3 2020 with the certified version
Q&As

• How do I upgrade my CJ3 with Pro Line Fusion® to the latest SW version?
  • *Field-loadable SW and minor wiring change will be made available free of charge to existing Pro Line Fusion® customers. This will restore integrated Vspeeds and automatic fuel sense in the FMS, add predictive performance calculations in the FMS, and enable optional CPDLC/FANS*

• How do I make my CJ1+/2+/3 with Pro Line Fusion® compliant to latest CPDLC / FANS requirements?
  • A new Radio Interface Unit part number will be made available as an option. Coupled with the latest Pro Line Fusion® SW, you will be able to purchase an FAA and/or EASA CPDLC SW key to enable full CPDLC support in those regions
  • When purchasing the FAA CPDLC SW key, one can also add an optional Satcom and FDR to comply to oceanic FANS 1/A mandate and benefit from the best North Atlantic tracks

• What pricing should I expect?
  • *Installing the latest Pro Line Fusion® system on a Pro Line 21 CJ1+/2+/3 will not cost more than today. We are expecting that the STC amendment will be easier to install for all participating dealers*
  • *We have just released an incentive program for CJ3 aircrafts committing to install Pro Line Fusion® before the new SW is certified. See your participating dealers for more information.*

• What if I am ADS-B compliant today, or plan to be before I install Pro Line Fusion®?
  • *Our upcoming Pro Line Fusion® baseline package will not include ADS-B and will therefore be below today’s pricing to account for GPS and TDR not being installed*