



EUROPEAN AVIATION SAFETY AGENCY



Operational Evaluation Board Report

Final Report dated: **22 OCT. 2010**

**CESSNA CITATION
525C
(CJ4)**

European Aviation Safety Agency
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Cessna 525C – CJ4



Revision Record

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Executive Summary

1. Manufacturer Application

The Cessna Aircraft Company has made an official request to EASA, Certification Directorate - Flight Standards, for an OEB evaluation of the Cessna Citation model 525C (CJ4). The application was received by EASA on March 2nd 2010.

2. OEB Process & Recommendations

EASA /OEB Section Manager Business Jets, UK CAA Flight Examiner and Inspectors from Swedish Transport Agency and Austro Control GmbH have taken part in the evaluation of the CJ4.

The first part of the operational evaluation was carried out in June 2010. This comprised a T5 test of a single pilot type rating training course using a full flight simulator at Flight Safety International's facility in Wichita, Kansas, USA.

Operational Suitability flights were completed on 24th June 2010 in aircraft N525CZ (airframe serial number 04).

As a second part of the evaluation, 3 complete T3 tests comprising Differences Training from the CJ1 to the CJ4 and 'reverse' Differences Training from the CJ4 to both the CJ1 & the CJ3 were completed. This report makes recommendations for Differences Training between the CJ4 and other variants of the C525 'family' of aeroplanes, based on the above evaluations, information provided by Flight Safety International and the OEB members' knowledge of the other variants. These recommendations are represented in the ODR and MDR tables shown in Chapter 5 and Appendix 3.

The OEB has made an assessment of the training implications for operating the CJ4 with a crew of two pilots. Whilst these recommendations are detailed at Appendix 7 they are limited in their scope as crew procedures will vary between operators and the development of standard crew procedures and operating techniques must, therefore, remain the responsibility of the individual operator.

A Flight Standardization Board (FSB) of the Federal Aviation Administration (FAA) had already performed an evaluation and prepared their report at an earlier stage.

The individual Boards are responsible for reporting their findings to their respective Authorities in separate reports. This report is the EASA OEB report.

The Operational Evaluation was conducted in compliance with the EASA Terms of References for OEBs and the Certification handbook. Further guidance from the Common Procedures for Conducting Operational Evaluations (Common Procedures Document) was followed.

Following the T2 Evaluation carried out over the period 25th – 28th January 2010, EASA has decided that the CJ4 should be included in the "C525" licence endorsement with requirement for Differences Training between the CJ4 and the rest of the "CJ family" the T3 tests carried out by the OEB team confirmed this decision.

This report specifies the EASA minimum requirements for the initial Type Rating Training Course on the C525C (CJ4), Differences Training to and from the other C525 variants and for checking and currency requirements. The report is published to assist in the development of training programs for private and commercial operations and to assist the NAA's in their approval process. The report is valid until amended, superseded or withdrawn by subsequent operational evaluation determinations.

EASA /OEB Section Business Jet Manager, the OEB team members and operational and certification experts have participated to evaluate operational suitability, operational documentation, including

MMEL, and a number of training courses (single pilot/FSTD, and 3 Differences Training modules). As part of this evaluation process, the Normal, Abnormal, and Emergency procedures were reviewed in the aircraft and recommendations for improvements and/or optimization have been implemented as appropriate.

The CJ4 is an airplane with systems technology comparable to many larger aircraft and the capability to out-perform many of those operating in the same environment. The OEB therefore strongly advise that all training organisations, for both commercial and private operators, follow the recommendations in this report.

Pilots without any previous experience with EFIS, FMS and integrated avionics, and those with limited or no experience of high performance aeroplanes will benefit from additional training which should be completed before starting the type rating course.

Pending final acceptance of new rules on the training of pilots in Single-pilot, High Performance Complex Aeroplanes (SP HPCA) the OEB strongly advise that prospective training organisations apply at least the pre-selection criteria and training minima shown at Appendix 6 for those pilots with limited experience of high performance aeroplanes. Training organisations are also requested to highlight the recommendations for Supervised Operating Experience (SOE) also detailed at Appendix 6. The scope of the evaluation was limited to Approach Category 1 operations and standard take-off minima.

In outline, the OEB recommends:

- Type rating assigned to aircraft model C525C under the endorsement C525
- The initial minimum training syllabus in accordance with Appendix 1
- Special emphasis training focussed in certain areas detailed at Appendix 2
- Supervised Operating Experience for single pilot operators, as detailed at Appendix 6.
- Differences training between the CJ4 and any other variant within the C525 type rating.
- Differences training, checking and recent experience between variants in accordance with the ODR and MDR tables shown in Chapter 5 and Appendix 3.
- Preliminary training or familiarisation before a course of differences training in accordance with the ODR and MDR tables shown in Chapter 5 and Appendix 3.

The OEB recommends this report for approval and adoption by NAAs.

3. Procedures, requirements and associated AMC references

EASA has conducted this OEB evaluation in accordance with EU-OPS 1, JAR-FCL 1 and JAR-FSTDs' requirements. This evaluation was based on the Certification Handbook and The Common procedures Document (CPD) and the processes detailed in the JAA Administrative and Guidance Material, Section One, Part Two, Chapter 5 and JAR-FCL 1 including associated appendices, AMC and IEM.

Note on references and reference texts:

Where references are made to requirements and where extracts of reference texts are provided, these are at the amendment state at the date of publication of the report. Readers should take note that it is impractical to update these references to take account of subsequent amendments to the source documents.



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Acronyms

AC	Alternating Current (electrical)
ACAS	Airborne Collision Avoidance System
ADC	Air Data Computer
AHRS	Attitude & Heading Reference System
AMC	Acceptable Means of Compliance
AMM	Airport Moving Map
AOC	Air Operator Certificate
ATO	Approved Training Organisation
ATPL	Airline Transport Pilot Licence
CAS	Crew Alerting System
CCP	Cursor Control Panel
CDU	Control Display Unit (FMS)
CPL	Commercial Pilot Licence
CRI	Class Rating Instructor
CRM	Crew Resource Management
DC	Direct Current (electrical)
DCP	Display Control Panel
DECU	Digital Engine Control Unit
DGCU	Digital Generator Control Unit
EASA	European Aviation Safety Agency
EFB	Electronic Flight Bag
EFIS	Electronic Flight Instrumentation System
EGPWS	Enhanced Ground Proximity Warning System
EICAS	Engine Indicating & Crew Alerting System
EPU	External Power Unit
ESIS	Electronic Standby Instrument System
FADEC	Full Authority Digital Engine Control
FGC	Flight Guidance Computer
FGP	Flight Guidance Panel
FI	Flight Instructor
FMA	Flight Mode Annunciator
FLI	First Limit Indication
FMS	Flight Management System
FNPT	Flight and Navigation and Procedure Trainer
FSTD	Flight Simulation Training Device
FTD	Flight Training Device
FTO	Flight Training Organisation
GPU	Ground Power Unit
IEM	Interpretative and Explanatory Material
IFIS	Integrated Flight Information System
IFR	Instrument Flight Rules

IR	Instrument Rating
ITR	Initial Type Rating
JAA	Joint Aviation Authorities
LSK	Line Select Key
MDR	Master Difference Requirements
MEL	Minimum Equipment List
MFD	Multi-function Display
MMEL	Master Minimum Equipment List
N/A	Not Applicable
NAA	National Aviation Authority
ODR	Operator Differences Requirements
OEB	Operational Evaluation Board
OEI	One Engine Inoperative
OTD	Other Training Device
PFD	Primary Flight Display
PPL (A)	Private Pilot Licence (Aeroplane)
RVSM	Reduced Vertical Separation Minimums
SCU	System Control Unit
SET (H)	Single Engine Turbine (Helicopter)
SOE	Supervised Operating Experience
SOP	Standard Operating Procedures
SP HPCA	Single-pilot High Performance Complex Aeroplane
TAWS	Terrain Awareness & Warning System
TRI	Type Rating Instructor
TRTC	Type Rating Training Course
TRTO	Type Rating Training Organisation

1. Purpose and applicability

This report is the result of an OEB process that was conducted during different periods in 2010

This document provides an overview of the Cessna 525C (Citation Jet "CJ4") and makes recommendations for:

- Pre-entry experience to the initial type-rating course,
- Items to receive special emphasis during training
- Supervised Operating Experience (SOE) following initial training
- Difference Training between the CJ4 and the other variants within the C525 licence endorsement.
- Operational considerations, specific to this type and its operation.
- Operating the aircraft with a crew of two pilots.

1.1 Application of OEB report

This OEB report applies to commercial operations. However, for the reasons contained in the report, the OEB also recommends private and corporate operators to follow the findings of this report.

2. General Description of CESSNA 525C (“CJ4”)

General Summary

The CJ4 is a Twin Turbo-jet aeroplane, with 2 pilots' seats and a maximum 9 passenger seats. Two Williams FJ 44-4A turbo-fan engines with Full Authority Digital Engine Control (FADEC) power the aircraft. Undercarriage flaps, modulated speed brakes and ground spoilers are hydraulically operated. The main flight controls are unassisted, cable controls except for a bleed-air rudder bias system to assist in directional control in the event of an engine-out condition.

This CJ4 received its first Type Certification in March 2010, under FAA CFR Part 23 Commuter Category including day, night, VFR, IFR and flight into known icing conditions. The aircraft is compliant with all Reduced Vertical Separation Minimums (RVSM). EASA certification is expected for the latter part of 2010.

Minimum crew is one pilot who shall occupy the left cockpit seat.

Structure

The CJ4 airframe is a conventional, pressurised, swept low-wing design using both bonded and riveted aluminium construction with some composite parts. Engines are fitted to short pylons on the tail section of the fuselage, above the line of the wings. The swept 'T-tail' structure is similar to the other "CJ" models.

Landing Gear and Brakes

The CJ4 has a fully retractable, hydraulically actuated tricycle landing gear with mechanical up-locks, pneumatic back-up deployment system and mechanical nose-wheel steering. Trailing-link main landing gear legs have an electronic, anti-skid wheel-braking system. Each leg has a single tyre, the nose-wheel is fitted with a chine each side to deflect surface contamination away from the engine intakes. The aircraft may only be operated from paved surfaces.

The hydraulic systems for undercarriage deployment and normal braking are independent (for undercarriage deployment hydraulic system, see Hydraulic System, below). Main brake pressure is provided through a dedicated DC electric hydraulic pump and accumulator. The pneumatic back-up system is shared by the two parent systems providing emergency undercarriage lowering and emergency wheel braking when required. The electronic braking and anti-skid systems both require DC power and are not connected to the Emergency Bus. The anti-skid system includes touch-down protection. With the anti skid system inoperative the required scheduled landing distance is almost doubled.

Cabin

The cabin is entered through the main cabin door with folding airstair located in the forward, left side. Emergency egress is provided through a single plug door at the opposite side behind the rear cabin window, just ahead of the right engine.

There are 4 main seats in a 'club 4' arrangement at the centre of the cabin with a further 2 forward facing seats behind. There is a further, side-facing seat (or optional 2 seat couch) opposite the main door at the front of the cabin and a further belted (toilet) seat at the back of the cabin.

There are 2 non-pressurized baggage compartments; 1 in the nose and one in the tail section, each with a smoke detection system.

Pressurisation System

The CJ4 has a fully automatic cabin pressurisation system. Cruise level, departure and landing elevation are determined from the FMS flight-plan entries made by the pilot. The rate and differential scheduling for flight is then computed automatically. Landing elevation may be entered manually. There is no manual 'rate' or pressure differential controller. Non-automatic or 'standby' control of cabin

pressure relies on the cabin altitude limiter (max 14,800') and the maximum differential pressure relief valve (max 9 psi). This abnormal operation requires the cabin to be de-pressurised by the pilot opening the 'Cabin Dump' valve before landing.

A high altitude mode will automatically schedule a lower cabin pressure (higher cabin altitude) for landing at airports above 8000' elevation.

To avoid pressure bumping on take-off, once the power levers are set to take-off power, the pressurisation system will begin to pressurise the cabin very slightly ('down' to approx -200') during the take-off roll. For this, and other reasons, reduced power take-offs are not authorised in the CJ4.

Oxygen System

A single oxygen bottle supplies the cockpit and cabin oxygen masks. The cockpit masks are quick donning with settings for oxygen/air mix, 100% oxygen and pressure flow for high altitude and smoke protection. Drop-down masks are arranged above each passenger seat. These are set to deploy automatically at approximately 14,800' cabin altitude or manually by selection from the cockpit.

The CJ4 has a manual oxygen shut-off valve in the cockpit. Whilst this is not uncommon in other aircraft, all of the other 525 series aircraft have an open system that cannot be isolated in this way. A rapid check of oxygen flow may appear normal as oxygen residual pressure is released from the line when the crew mask is tested; even with the valve selected to off. There is no CAS message or warning to the crew that this valve is selected to off and the oxygen system is disabled. This presents the significant risk that pilots familiar with other 525 aircraft may take-off unaware that the oxygen system is disabled and crews converting to the CJ4 from other 525 variants must be familiar with this feature and its implications.

Maximum Level for Single-pilot Operations.

The CJ4 cabin volume is small and decompression will lead to a rapid reduction of pressure in the cabin and cockpit. When pressurization is lost, the time of useful consciousness without additional emergency oxygen decreases critically as altitude is increased, to as little as a few seconds at 45,000'. To minimize the risk of an unassisted pilot becoming incapacitated before the mask can be fitted correctly, an altitude restriction should be established for single-pilot operations without wearing the mask (or above which altitude the pilot's mask should be worn continuously).

Wings

The wings are a 3-spar design constructed of aluminium mounted beneath the cabin, each with an integral fuel tank. Control surfaces on the wing include aileron, hinged flaps, ground spoiler panels on the top and speed brake panels above and below each wing. The right aileron incorporates an aerodynamic trim tab. Wing leading edges are anti-iced using engine bleed air. 2 stall strips and 6 vortex generators on each wing contribute to the benign handling characteristics of the CJ4.

Flight Controls

The main (dual) flight controls are all cable operated. Electrically operated aerodynamic trim tabs are fitted to the right aileron, right elevator and the rudder. A secondary power circuit and control system is provided for the elevator trim, there is no manual trim mechanism available. A rudder bias system uses engine bleed air to assist in directional control during engine-out operation.

A single autopilot is able to follow commands from one of 2 flight guidance computers (FGC) and is controlled through a single flight guidance panel (FGP) at the top centre of the main instrument panel. The FGP is equally accessible from either cockpit seat. The active FGC will take roll, pitch and yaw inputs from the selected PFD and accompanying AHRS, and compute flight guidance commands for the flight director and autopilot. Lateral flight guidance modes include roll, heading, navigation and approach modes, with a half-bank function available. 'Back-course' approach mode is also available for use where these approaches are authorised. Vertical guidance is computed by the active FGC and

is available in pitch, flight level change (speed hold) and vertical speed modes. A vertical navigation mode is also available when the primary navigation data is derived from the FMS.

Engines

The CJ4 is fitted with Two Williams FJ 44-4A turbofan engines with Full Authority Digital Engine Control (FADEC). The engines are twin-spool (co-rotational) medium bypass turbofans with mixed exhaust and high-cycle pressure ratio. Each engine produces approximately 3,600 lbs of thrust providing a considerable weight to thrust ratio of less than two and a half to one. There is no thrust reverse or thrust attenuation system.

Engine start sequence, power control, and shutdown is managed by the respective FADEC unit, each of which is independently powered by its own engine driven Permanent Magnet Alternator (PMA). Back-up electrical power for the FADEC is the main aircraft electrical system. If a complete loss of aircraft electrical power occurs, each PMA will power its respective FADEC unit to maintain engine operation. Engine start, required thrust and shut down are selected by the pilot through the cockpit engine starter control buttons, thrust lever position and run/stop buttons respectively. Distinctive détentés are provided at take-off, climb and maximum cruise power settings for ease of operation. There is no separate fuel cut-off other than through the FIRE buttons, which also isolate the hydraulic pump and the generator field circuit on the respective side for emergency engine shutdown.

Ignition System

Each engine has a dual ignition system with 2 igniters controlled by the FADEC fired either singly or together as required by the FADEC. Ignition is activated automatically for starting and on approach to land and whenever a loss of combustion, excessively low engine speed or rapid deceleration is detected by the FADEC. The pilot may also select ignition manually to on at any time. Whenever ignition is active the message IGN appears in the EICAS display beside the N1 tapes.

Fuel system

Each wing houses an integral tank which feeds, via return fuel motive flow and ejector pumps, into a feeder 'hopper' for the respective engine. Each side has a 433 usg capacity providing 2,914 lbs of useable fuel per side (= 5,828 lbs total useable capacity).

There is no cross flow system but fuel can be transferred from one hopper to the opposite hopper by the pilot moving the Fuel Transfer selector knob in the cockpit. Maximum fuel imbalance for normal operations is 200lbs.

A Single Point Refuelling (SPR) system is available through an access panel in the fuselage, just ahead of the right wing leading edge root. Normal, over-wing refuelling caps are also provided on top of the outboard end of each wing tank. Standby boost pumps are activated by FADEC for starting or if a low fuel pressure condition is detected, automatically during fuel transfer and if selected manually to 'on' by the pilot.

The Crew Alerting System (CAS) will display a message whenever an abnormal fuel system condition is detected, a fuel boost pump is activated or fuel is being transferred. A separate "Low Fuel" annunciator in the centre of the instrument panel also indicates a Low Fuel Level condition.

Instruments and Avionics

The CJ4 is equipped with dual Primary Flight Displays (PFD) and dual Multi-function Displays (MFD) Collins Proline 21 EFIS displays and Collins 3000 series Flight Management System (FMS). The aircraft is fitted with two Control Display Units (CDU) for the FMS. A second FMS computer is a sales option. The subject aircraft and simulator during the OEB evaluation was fitted with the optional, second FMS.

The avionics and the FMS are fully integrated and some of the aircraft main systems are also operated through the FMS CDU (eg pressurisation). Other main and ancillary aircraft systems are monitored

and controlled through menus available from within the PFD or MFD screens (eg TAWS, weather radar, ACAS, electrical system status and Crew Alerting System (CAS)).

The systems and avionics integration of the CJ4 means much of the information available to the pilot is via sub-menus from within a main PFD or MFD control panel selection. The availability of this information is not immediately intuitive and pilots must have specific knowledge and systems familiarity to be able to access to the information quickly, when required.

The standby instrument display is a single ESIS unit in the centre of the instrument panel. The instrument is powered by its own dry-cell battery. This instrument receives information from its own (standby) AHRS and ADC and is designed to provide attitude, heading, airspeed and altitude indications for 55 minutes following the loss of the main aircraft power supply.

The CJ4 is equipped with a fitted ELT. The OEB subject aircraft was not fitted with the optional FDR although this is a requirement for European operations in accordance with EU OPS 1.715.

Electronic Flight Bag (EFB)

The CJ4 is equipped with the Collins Integrated Flight Information System (IFIS) including electronic terminal charts (en route charts are not available from the system). Chart prioritisation is offered according to the FMS flight plan, with origin and destination charts immediately available on either MFD, however It's not possible to view a full chart page on the MFD due to the screen size. Only approximately $\frac{3}{4}$ of the chart is visible, although it is possible to scroll the chart to see the top or bottom.

Using JAR-OPS Temporary Guidance Leaflet (TGL) 36 and AMC 20-25 (draft) as a reference, the Collins IFIS complies, in most respects, with the requirements of Class 3 EFB. The installed software applications qualify as Type B. However, the IFIS system is powered through the aircraft's main DC power system. The system is not on the emergency bus and so there is no standby power for the system. The system is not therefore suitable for approval for a 'paperless' operation and back-up charts must always be carried on board.

Own ship position (FMS position) is presented on many of these charts. Where own ship position is not available the \emptyset symbol is presented in the top right corner. A digital reproduction of the chart title is continuously displayed when the chart is in view whether scrolled, zoomed or rotated.

Many of the charts are not drawn exactly to scale and the aircraft position may therefore appear incorrect. Unless a digital Airport Moving Map (AMM) has been used for the taxi chart, the error in the chart can be so large as to present the incorrect taxiway under the aircraft position symbol. This can be misleading and pilots must be made aware that, when referring to the aircraft symbol, the apparent position may be incorrect.

Caution

Due to the risk of inaccurate position display it is imperative that pilots are made aware that the IFIS charts are there for convenience and situation awareness only and are not to be used for navigation, either in the air or on the ground – particularly in conditions of low visibility.

Satellite derived graphical weather data overlays, enhanced map overlays (geo-political, airways, airspace etc) and ACARS data are also available from this system as options.

Other electronic flight bag items such as performance calculations, load sheet and aircraft log did not form part of this system at the time of the OEB evaluation. It is understood that these programmes will become available. If, ultimately, these are intended for operational use a further OEB evaluation may be required on these elements of the IFIS.

Hydraulic System

The CJ4 has a single, closed-centre hydraulic system. This is unlike all the other C525 aeroplanes, which have an open system that is pressurised on demand by the closing of a single bypass valve. The CJ4 system is continually pressurised to 3000 psi by two engine-driven pumps providing hydraulic power on demand to the four hydraulic aircraft sub-systems. Landing gear actuation, wing flaps, speed brakes and ground spoilers all use this hydraulic pressure for operation. Wheel brakes use their own dedicated hydraulic supply and accumulator and are not part of this system (see “Landing Gear & Brakes”, above).

Electrical System

The CJ4 uses two DC starter-generators as the main source of electrical power through two, Digital Generator Control Units (DGCU). DC power is then distributed through a series of DC buses and shared by way of a cross-feed bus, protected each way by 225 amp current limiters, in the event of a single generator shutdown.

Backup DC power is available from two engine-driven alternators, normally providing AC power to the windshield heating system. In the event of dual generator shutdown, one or both alternators are automatically switched through their respective Transformer Rectifier Units (TRUs) to provide essential DC power. Power storage for starting (and emergency power – see below) is available from a single 26.4 volt, 44 amp-hour lithium-ion main aircraft battery. A nickel-cadmium or lead acid battery is available as an option if required.

Emergency Power

In the event of the battery becoming the only source of electrical power, automatic load shedding is achieved by the pilot selecting the emergency bus. The battery will then supply power to essential systems, including the main pilot’s PFD, AHRS 1, ADC 1 and essential avionics for at least 30 minutes of flight. The Electronic Standby Instrument System (ESIS) display is powered by its own dry-cell battery. This instrument is supplied by its own AHRS and ADC and is designed to provide indications for 55 minutes.

Any ancillary unit (except windshield heat) that requires AC power generates its own AC through a dedicated inverter within that unit.

The main electrical system also provides back-up power to the FADEC unit for each engine. For information on normal power for the FADEC, See “Engines” above.

Crew Alerting System

The CJ4 systems are monitored through the Crew Alerting System (CAS). There are over 100 CAS messages that could appear (normally appearing in the upper part of the MFD) either on the ground or during flight. The messages are colour-coded cyan (blue) amber and red to reflect normal, cautionary and emergency conditions as appropriate. It is not reasonable for the pilot to remember all the appropriate actions for each of these and a comprehensive Quick Reference Handbook (QRH) needs to be immediately available in the cockpit for every flight.

The systems architecture is such that emergency memory items are few, however the inter-relationship between systems and their automation means that a series of messages may appear at one time, revealing a number of symptoms that may be the result of a single system fault. Uninformed reliance on the QRH may cause confusion and result in inappropriate action or delay by the pilot.

Although, the most urgent or compelling message is normally prioritised to the top of the visible list, any such situation requires a thorough understanding of the systems by the pilot.

3. Aircraft main data:

Cessna Citation CJ4 C 525 ©		
Dimensions	Length	16.26m (53'4")
	Wingspan	15.49m (50'10")
	Height	4.67m (15'4")
Engines	Number & Type	2 x Williams FJ44-4A Twinspool turbofan
Maximum Operating	Pressure Altitude	45.000 ft
MTOW		7704.5 kg (16,950 lbs)
Passenger Seats	Max seating configuration	Two cockpit seats plus max 9 passengers
Minimum Crew		1 pilot
Maximum Operating Speed		Mmo 0.77; VMO (8,000-27,884') = 305 KIAS VMO < 8,000' = 260 KIAS

4. Master Differences Requirements (MDR) & Table

Differences Training - Avionics and EFIS

The range of aeroplanes available within the C525 'family' presents a wide variation of differences. Conversion from the CJ3 to CJ4, for example, is a reasonable step for most pilots, however the transition from CJ to CJ4 requires level D Differences Training for all pilots. Much of the technology offered by the later, Collins equipped, aeroplanes may be new to the CJ pilot. Before systems and handling differences are addressed, such a significant transition may require additional training in the functionality and use of the EFIS displays, familiarity with the FMS control units and FMS navigation.

For those pilots with little or no previous experience of these systems additional training in the use of these systems, to a satisfactory level of competence should be completed prior to (or as part of) any differences training being undertaken. This training should include, as a minimum, the following:

Collins Proline 21 Avionics System

- Basic EFIS instrument flying techniques (where little or no previous EFIS experience)
- Full competence in the functionality of the Collins Pro-line EFIS (where applicable)
- PFD & MFD functionality and control including AHRS, ADC and display reversion.
- GPWS modes & over-ride functions (Predictive Windshear in CJ4)
- ACAS 1 / 2 functionality and action in the event of a Resolution Advisory (RA) or Traffic Advisory (TA)
- Radar system control and display
- DCP & CCP in CJ4 / LSK and Refs Panel in other Proline 21 aircraft

Use of FMS

Full functionality of the particular FMS in the aircraft to be flown, including.

- Initialisation
- Ancillary systems operation through FMS CDU where appropriate (CJ4)
- Flight planning
- Performance
- Fuel management and loading
- LNAV & VNAV management,
- Editing and amending flight plans
- Diversion and re-planning during flight;
- Loading and activating SID's, STARS and approaches into current flight plan
- Inhibit, "no-Link", discontinuity & transition to missed approach.

Conversely, pilots already qualified on the CJ4, with little or no experience of individual mechanical flight instruments, are likely to have established a scan pattern quite different from that required by a conventional, mechanical instrument layout. These pilots are strongly advised to obtain Differences Training on conventional instruments, including selective radial scan techniques, before flying those variants with conventional mechanical instrumentation.

The instrument display in the CJ4, when on emergency power, includes the left PFD, NAV 1 & COM 1. This arrangement enables the pilot to fly an instrument approach on emergency electrical power using the normal instrument display. However, the Collins Proline EFIS displays fitted to other 525's are not powered through the emergency bus. Consequently, when operating these aeroplanes on emergency power, any instrument approach must be flown using the standby instrument system. It is recommended that all pilots converting *from* the CJ4 to other Collins Proline equipped 525's are made aware of this and are trained to fly instrument approaches using the standby display in their 'new' aircraft.

Differences Training Level Summary.

Difference levels are summarised in the table below for training, checking, and currency. This table is an extract only and complete descriptions of difference levels for training, checking and currency are given in OPS/FCL Common Procedures for conducting Operational Evaluation Boards document.

DIFFERENCE LEVEL TABLE

<u>DIFFERENCE LEVEL</u>	<u>TRAINING</u>	<u>TESTING & CHECKING</u>	<u>PROFICIENCY CHECKING & CURRENCY</u>
A	SELF INSTRUCTION	NOT APPLICABLE (OR INTEGRATED WITH NEXT PC)	NOT APPLICABLE
B	AIDED INSTRUCTION	TASK OR SYSTEM CHECK	SELF REVIEW
C	SYSTEMS DEVICES	PARTIAL CHECK USING DEVICE	DESIGNATED SYSTEM
D	MANOEUVRE DEVICES**	PARTIAL PC USING DEVICE *	DESIGNATED MANOEUVRE(S)
E	SIMULATOR C/D OR AIRCRAFT #	FULL PC USING SIMULATOR C/D OR AIRCRAFT *	AS PER REGULATIONS (TAKEOFFS & LANDINGS IN SIMULATOR C/D OR THE AIRCRAFT)

AT LEVEL E – NEW TYPE RATING IS NORMALLY ASSIGNED

* = IOE/SLF/LIFUS/line indoc. MAY BE REQUIRED ACCORDING TO REGULATIONS
PC = PROFICIENCY CHECK

**FFS or aircraft may be used to accomplish specific manoeuvres

Master Differences Requirements (MDR) Table:

The Master Differences Requirements are from levels A to D. The Master Difference Requirement table has been produced by FAA. The OEB have reviewed the MDR table provided by the FAA and the OEB's recommended version of the MDR table is shown at Appendix 3.

5. Operator Differences Requirements (ODR) Tables

The Operator Difference Requirement tables have been produced by Cessna and reviewed by FAA and the EASA OEB.

The OEB recommended version of ODR tables are available on request directly to Cessna Aircraft Company.

6. Optional specific equipment:

The following optional equipment was evaluated by the OEB. Comments on the training and use of these systems are detailed, where appropriate, in other sections of this report.

- 2nd FMS / GPS / DME
- Mark V EGPWS
- ADF

The following optional equipment was not formerly evaluated during the OEB process. Where operational approval is sought for the use of any of these systems or any optional systems and equipment that may become available, a separate evaluation may be required.

- XM broadcast / Graphical Weather
- Datalink / ACARS
- Lightning Detection Stormscope
- FMS Performance DB
- Integrated Electronic Checklist
- Flight Data Recorder

7. Type Rating List and Licence Endorsement List

7.1 Type Rating List

The proposal of this OEB is to up-date the Class & Type Rating List as follows:

Table 7
Type Rating List (Aeroplane) – Single-pilot – Multi-engine turbojet (land)

1 Manufacturer	2 Aeroplanes		3	4 Licence endorsement
	Model	Name		
Cessna	525	CJ	(HPA) (D)	C525
	525	CJ1		
	525A	CJ2		
	525	CJ1 Plus		
	525A	CJ2 Plus		
	525B	CJ3		
	525C	CJ4	(HPA)	C510
510	Citation Mustang			

This table 7 matrix contains only AIRCRAFT that have been evaluated through a JOEB, an OEB or a Catch-Up process. Associated reports are published on the EASA Flight Standards Website and Pilot Training courses are available from the Manufacturer.

8. Specification for Training

Pre-requisites for Type Rating Training

For those pilots with little or no previous experience of instrument flying with EFIS displays, additional training to competence in both basic and applied instrument flying skills may be necessary before the specific type-rating training can begin.

The CJ4 is certified as a single pilot aeroplane. As a variant of the C525 range of aeroplanes included in the same type rating, the CJ4 is therefore defined in JAR FCL 1 as a multi-engine, High Performance Aeroplane (HPA). As a twin turbojet aeroplane, the CJ4 is also defined as a Complex motor-powered Aircraft in Regulation (EC) No 216/2008. This means that any trainee pilot must show compliance with JAR FCL 1.251 & 1.255 including ATPL or HPA theoretical knowledge, before entering type-rating training. It is possible under JAR FCL however, for a pilot with just 200 hours total flying experience, to be operating this aeroplane in the same environment as the large commercial airliners.

The performance and speed of the CJ4, particularly during departure, arrival and missed approach, is such that advance situation awareness is critical to flight safety and may quickly be lost if flight guidance management becomes a distraction through lack of integrity or workload is increased in the event of systems failure and abnormal procedures. In order to sustain the high level of operational safety to which Europe has become accustomed, the OEB strongly advise that the pre-requisites for type rating training shown at Appendix 6 are met by all applicants for training on this aeroplane. The Board further recommends that those private operators electing to fly the CJ4 with a single pilot ensure the experience of that pilot is adequate to handle the operation and management of the aeroplane in all normal and abnormal flight conditions. To this end, the experience criteria and recommended Supervised Operating Experience (SOE) shown at Appendix 6 should be applied in all cases.

Pilots undergoing training as part of a crew are recommended to hold a certificate of satisfactory completion of a Multi-Crew Co-operation (MCC) course in accordance with JAR FCL 1.261, before commencing multi-pilot training for this type rating.

Operating Procedures

The capabilities of the automation and avionics in the CJ4, as with many other EFIS aircraft, allow the pilot(s) to fly the aeroplane in a variety of different navigation and flight guidance control modes. Whilst the CJ4 has many systems and flight automation features designed to ease pilot workload, the safe operation of the aeroplane depends on sound, clearly defined operating procedures.

Commercial operators of a typical modern EFIS aeroplane will normally determine and publish to crew, their own Standard Operating Procedures (SOP) that not only define multi-crew integration but specify the navigation source, flight guidance mode selection, configuration and aircraft handling techniques to be used by their company pilots, in all phases of flight.

Whether the training is to be conducted single-pilot or as a crew, whenever possible, clearly defined SOP should be agreed with the training provider, prior to any initial or differences training, so that these procedures may be integrated into the training programme.

All operators, therefore, are urged to develop detailed SOP to minimise both workload and the risk of incorrect programming of the flight guidance system, and help retain advance situation awareness. Where these SOP do not exist, (with a private operator for example) the training provider should provide a single, simple set of procedures to be used during training. These procedures should recommend selections for the navigation source, flight guidance mode, configuration, altimetry and aircraft handling techniques in all phases of flight. Whilst the commercial operators will be expected to follow company SOP in accordance with their Authority approved Operations Manuals, private

operators must be encouraged to acquire and use similar, clearly defined and practiced procedures until sufficient familiarity allows their further development.

Use of Simulators and Other Training Devices (OTD)

Flight training should, as best practice, be performed in an approved, Full Flight Simulator. This is the safest and most effective method for training critical emergency procedures (such as engine failure above V_1 during take-off) as well as abnormal systems handling and repeat practice of other procedures. With a full flight simulator, the opportunity also exists to vary the environmental circumstances and provide an opportunity to exercise a variety of Crew Resource Management (CRM) issues.

If the aeroplane must be used for training, complementary training in a FSTD is recommended for all abnormal/emergency procedures, which could not be trained on the airplane. This complementary training on emergency and abnormal procedures should be completed as part of the type rating training course. In exceptional cases (for example, where no simulator is available), and at the discretion of the Authority, this training may be performed at a later stage, but it should be completed within 12 months. In this case, the candidate should also have a background on high performance, pressurized, multi engine turbine aircraft to ensure a basic level of knowledge and experience with specific emergency and abnormal situations.

8.1 Training Courses

The OEB attended the Cessna Aircraft Company CJ4 Type Rating training course and Differences Training Courses from the CJ4 to other aeroplanes in the "CJ family" all courses were conducted at Flight Safety International in Wichita and in San Antonio. Details of the courses attended are detailed below:

Flight Safety International – Wichita Center

Citation Jet 4, Initial Pilot course	7 th -22 nd June 2010	(Whitehead & Hermansson)
Citation Jet 1 to Citation Jet 4, Initial Differences Course	17 th – 22 nd June 2010	(Laine)
Citation Jet 4 to Citation Jet 3, Initial Differences Course	25 th – 29 th June 2010	(Hermansson)

Flight Safety International – San Antonio Center

Citation Jet 4 to Citation Jet 1, Initial Differences Course	25 th – 29 th June 2010	(Whitehead)
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All courses are available from Cessna Aircraft Company.

The Board recommends the initial pilot training syllabus be divided into the following phases:

:

- Theoretical knowledge instruction syllabus
- Flight training program
- Licensing Skills Test (LST)
- Supervised Operating Experience (SOE) (where applicable)
- Operational Line Check, if required

The type-rating training must be carried out at Approved Training Organisation (e.g. FTO or TRTO). Details of the minimum training content recommended for initial type-rating training on the CJ4 are shown at Appendix 1.

Details and recommendations for SOE are detailed at Appendix 6

8.2 Licensing requirements

The Citation CJ4 is a Multi-Engine – Turbo Jet – High Performance Aeroplane, certified for Single Pilot operations.

In accordance with JAR-FCL 1.220 (b)(2) a valid “C 525” Type Rating is required to act as Pilot in Command.

In accordance with JAR-FCL 1.175, a valid Instrument Rating is required for flights under IFR.

In accordance with JAR-FCL 1.150 (a)(3), Commercial Air Transport operations require the pilot to hold a valid Commercial Pilot’s Licence (CPL) as the minimum level of flight crew licence.

When the operator’s conversion course and the training course required for the issue of the type rating are combined according to OPS 1.945 (c) whilst the operator’s approved documentation may be used throughout the course, the licensing requirements of JAR FCL 1, for rating issue must still be met.

NB: See paragraph 8.5 “Licensing Skills Test (LST)” below.

8.3 Theoretical knowledge syllabus and test summary

The theoretical knowledge instruction shall be conducted by an authorised instructor holding the appropriate type/class rating or any instructor having appropriate experience in aviation and knowledge of the aircraft concerned, e.g. flight engineer, maintenance engineer, flight operations officer and shall cover the syllabus in AMC FCL 1.261(a), as appropriate.

A minimum format for training is outlined at Appendix 1. In addition to systems knowledge and operation, the training should also include training in the areas detailed as requiring “special emphasis during training” at Appendix 2

8.4 Flight training course summary

Flight or simulator training must be conducted by a FI, CRI, TRI or SFI/STI appropriately qualified to give instruction on the C525 or FSTD, as applicable, and with the appropriate differences training and experience on the CJ4.

In addition to all normal, abnormal and emergency procedures and aircraft handling, the flight-training programme must include full functionality of the Proline avionics system, use of the FMS and flight automation. Detailed, recommended SOP for the selection of the navigation source, flight guidance mode, aircraft configuration, altimetry and aircraft handling techniques in all phases of flight are considered essential to the safe operation of this aeroplane, especially in the single-pilot role. These SOP should be clearly defined and set out in a document available to all trainees before the start of the course.

For details of OEB recommendations for special emphasis during training on the CJ4, refer to Appendix 2.

According to the recommendations for pre-requisites and training for initial type rating on single pilot turbo jet aeroplanes as detailed at Appendix 6 (and as published on the EASA web site), a minimum of 32 hrs FSTD training should be performed, these 32 hours should consist of minimum 16 hrs in Full Flight Simulator and the remaining hours in an FSTD or OTD

When training as a crew, the SOP must include guidance on multi-crew procedures. Task details of both pilot-handling (PH) and pilot non-handling (PNH) should be clearly defined and set out in a

document available to all trainees before the start of the course. For further guidance on training CJ4 pilots as part of a crew, see Appendix 7.

8.5 Licensing Skills Test (LST)

The LST profile at Appendix 2 to JAR FCL 1.240 (for multi-pilot aeroplanes, as opposed to Appendix 3 for single pilot aeroplanes) is considered by The Board to be a more appropriate reflection of the complexity and capability of this type of aeroplane, and readily manageable by the single pilot.

Details of the OEB recommendations for Licensing Skills Test on the CJ4 are contained in Appendix 1 'Skill Test' section.

It is recommended that, subject to the provisions of this document, an LST, when completed in accordance with Appendix 2 to JAR FCL 1.240, conducted in either the multi-pilot or single-pilot role, should be acceptable for rating issue by the licensing issuing State.

8.6 Changing from Single-pilot to Multi-pilot Privileges

Pilots wishing to change from single-pilot privileges to multi-pilot operations (or vice versa) should take additional training at the discretion of the Head of Training of an approved training organisation (FTO or TRTO) and pass appropriate testing as determined by the Authority.

9. Specification for Checking

As for LST (see paragraph 8.6 Licensing Skills Test (LST) above) the Licence Proficiency Check (LPC) profile at Appendix 2 to JAR FCL 1.240 (for multi-pilot aeroplanes, as opposed to Appendix 3 for single pilot aeroplanes) is considered by The Board to be a more appropriate reflection of the complexity and capability of this type of aeroplane, and readily manageable by the single pilot.

It is recommended that an LPC, when completed in accordance with Appendix 2 to JAR FCL 1.240, conducted in either the multi-pilot or single-pilot role, should be acceptable for rating revalidation (or renewal, as applicable) by operators and the licensing issuing State.

10. Appendices

- Appendix 1 : Initial Type Rating Training Course
- Appendix 2 : Special Emphasis During Training
- Appendix 3 : Master Differences Requirements (MDR) Table
- Appendix 4: Recurrent Training & Checking
- Appendix 5: Recent Experience
- Appendix 6: EASA Recommendation – Pre-requisites for Training
- Appendix 7: Multi-pilot Operations

Appendix 1. Initial Type Rating training course

Due to the nature of the CJ4 the recommendations of Appendix 2 of this OEB report for special emphasis training should also be followed.

Ground School

The following ground school curriculum is considered to be the minimum for the initial Type Rating training and checking for the Cessna Citation CJ4 (C 525C)

Ground School - Class Room (6 days, 42 hrs total)

Consisting of:

- Classroom presentations of aircraft systems principles and construction, function, limitations, in-flight failures & pre-flight checks
- Systems operation including normal, abnormal and emergency procedures
- Operational subjects from Aircraft Flight Manual & Aircraft Operating Manual including flight planning, weight & balance & scheduled performance calculations
- Function and operation of ACAS & ACAS (ii) including response to Traffic Advisories (TA) and Resolution Advisories (RA).
- Operations in RVSM airspace
- CRM training (single-pilot) covering relevant aspects of situation awareness, decision-making, workload management & SOP, error protection and communication resources.
- CRM & MCC for multi-pilot operations covering relevant aspects of situation awareness, decision-making, workload management & SOP, error protection and co-operation, leadership and communication skills.
- Systems Integration Training in fixed base simulator to support classroom presentations (min 2 hrs. per pilot)
- Written Test(s) in performance & loading and in systems

Notes:

In total, the written tests should be of not less than 100 questions, multiple choice answers, pass mark 75 % (These tests should be completed satisfactorily before progressing to flight / simulator training)
The technical content of all training is identical for Single-Pilot and Multi-pilot operations.

Flight Training

The OEB is recommending following the recommendations stipulated in Appendix 6.

Recommended Special Emphasis Training

Taking into account the recommendations in Appendix 2 of this OEB report for special emphasis training, the recommended training should also consist, as an absolute minimum, of:

- Normal manoeuvres/procedures, aircraft handling, navigation.
- FMS navigation and Flight automation
- All abnormal & emergency manoeuvres & procedures, abnormal & emergency system operation instrument approach & landings
- Operation of ACAS & ACAS (ii)
- Operation of EGPWS & wind shear training
- Low visibility ground operations and take-offs

Note:- Steep approaches.

The CJ4 was not approved for the conduct of steep approaches at the time of the OEB evaluation. Should the aircraft become certified for the conduct of steep approach angles, further OEB evaluation may be required, following which; initial training, differences training and recurrent training should include the flying of steep approaches where the operator intends to operate to airports where a steep approach is required.

Aircraft Flight Training

Taking into account, as far as possible, the recommendations Appendix 2 of this OEB report for special emphasis training, in-aircraft training should include as much as possible of the Recommended Training listed above and particularly include:

- All normal manoeuvres/procedures, aircraft handling, navigation.
- All Abnormal & emergency manoeuvres & procedures, abnormal & emergency system operation (as much as safely possible during in-aircraft training).
- Instrument approach & Landings

Abnormal procedures (such as engine failure during take-off above V_1) and systems operation (such as ACAS & EGPWS) which cannot be safely performed during in-aircraft training, must be trained to proficiency in addition to the in-aircraft flight-training program. Such training must be performed in a qualified and approved FSTD or OTD, recommended for this purpose by the OEB.

The board recommends considering the use of 'in-aircraft' flight training for exceptional situations only.

Skill test.

The LST profile at Appendix 2 to JAR FCL 1.240 (for multi-pilot aeroplanes, as opposed to Appendix 3 for single pilot aeroplanes) is considered by The OEB to be a more appropriate reflection of the complexity and capability of this type of aeroplane, and readily manageable by the single pilot.

It is recommended that an LST, when completed in accordance with Appendix 2 to JAR FCL 1.240, conducted in either the multi-pilot or single-pilot role, should be acceptable for rating issue by the licensing issuing State.

Those pilots having completed training as part of a two-pilot crew should take the LST as the handling pilot of a constituted, two pilot crew. A statement confirming "Multi-Pilot Operations Only" should be appended to the examiner's certificate on the rating application form. The type rating should then be issued by the licence-holder's licence issuing State, restricted to Multi-Pilot Operations Only.

Those pilots having completed training in the single-pilot role should take LST acting as the only cockpit crew member throughout the test. Where the test is conducted in a full flight simulator, the examiner should not occupy the second cockpit seat.

Flight hours under supervision

(25 or 50 hrs. depending on previous total experience)

For pilots who do not already hold a turbojet aeroplane type-rating and an ATPL (A) the OEB recommends following the guidelines in the EASA Certification, Flight Standards recommendation (published on the EASA website as a OEB supporting document OPS/FCL) for Supervised Operating Experience (SOE), as part of the training. For ease of reference, the recommendations current at the time of the OEB evaluation are shown at Appendix 6

Appendix 2 Special Emphasis during training

The OEB has identified several aircraft systems and procedures (listed below) that should receive special emphasis in an approved CJ4 Training Programme:

However, due to the high performance and operational flexibility of the CJ4, the OEB strongly advise that, in addition to all normal, abnormal and emergency procedures and aircraft handling, the flight training programme includes a set of simple SOP that are defined before training starts. These SOP should include full functionality of the Proline avionics system and detailed, recommended selections for the navigation source, flight guidance mode, aircraft configuration, altimetry and aircraft handling techniques in all phases of flight.

These SOP should be set out in a document available to all trainees at or before the start of the course.

When training as a crew, the SOP must include guidance on multi-crew procedures. Task details of both pilot-handling (PH) and pilot non-handling (PNH) should be clearly defined and set out in a document available to all trainees before the start of the course.

Pilots undergoing training as part of a crew are recommended to hold a certificate of satisfactory completion of a Multi-Crew Co-operation (MCC) course in accordance with JAR FCL 1.261, before commencing multi-pilot training for the type rating.

For Single & Multi-Pilot Operations:

Ground School:

- High altitude physiology
- CRM as applicable for single or multi-pilot operations
- Setup, operation, limitations, failures and reversionary capability of the Collins Proline EFIS system
- Availability and layout of PFD & MFD sub-menu functions
- Functionality and programming of the Collins 3000 series FMS
- Use of the FMS for systems management (eg pressurisation, radio tuning, transponder etc)
- Use of the FMS for vertical navigation
- Flight automation modes including VNAV
- Access to and limitations of IFIS charts display
- Performance and loading calculations, including wet/contaminated runways
- Requirement for ballast fuel in aft CG conditions
- Crew Alerting System, abnormal operation of aircraft systems and use of checklist
- Single Point Refuelling (SPR) system
- Function of ACAS, TAWS/EGPWS & Weather Radar
- Prohibition of take-off at reduced power

Flight training:

- Comprehensive setup and use of Collins Proline EFIS displays
- Familiarity with PFD & MFD sub-menus through control panels
- Comprehensive setup and use of Collins 3000 FMS
- VNAV operations
- Detailed SOP for the choice of navigation source, flight guidance mode, aircraft configuration altimetry and aircraft handling techniques in all phases of flight
- Selection and monitoring of flight guidance / automation mode
- Loss of cabin pressure procedures
- Location and operation of cockpit oxygen control valve

- Wearing of oxygen mask during single pilot operation
- Instrument flying on ESIS display
- Actions in response to ACAS Resolution Advisory
- Actions in response to EGPWS windshear and terrain warnings
- Use of secondary pitch trim system
- Approach, landing and emergency braking following loss of DC Power
- Approaches/Landings with reduced flap settings.
- Loss of autopilot
- Emergency Descent Mode

The OEB considers that detailed knowledge of the FMS and its integration with both the Proline avionics and the autopilot is critical to the safe operation of the CJ4.

The Collins Proline integrated avionics system makes extensive use of FMS navigation both laterally and vertically. Localizer based procedures will load and display automatically from the FMS, when programmed correctly. However the display may not change to 'green needles' until the localizer is active and pilots should be made familiar with the timing of this process and how to pre-empt or override it..

ADF and VOR / DME procedures, however, can be flown readily and easily as FMS overlay procedures. The primary navigation aid for the approach being flown must always be displayed. Whilst ADF, VOR and DME should always be available on the PFD, these display selections are sometimes 'hidden' in a PFD or MFD sub-menu. It is important that training includes detailed familiarity with the selection and use of the PFD and MFD menu functions so that approaches are not flown without the required information on display.

The minimum use height of the autopilot on approach is 200 ft

Special Flight Characteristics:

Whilst the OEB did not find any major flight characteristics that require special attention during training, the performance of the CJ4, for a single-pilot aeroplane, is extreme. Handling the aircraft during take-off and climb, and during a missed approach, can be challenging due to high rates of climb. Excessive speed during the descent and arrival phase can also become critical to flight safety if high workload and inadequate SOP conspire to compromise situation awareness.

The OEB found a number of issues with the integration of systems and the Proline EFIS displays. These issues are addressed in this Appendix.

Appendix 3. Master Differences Requirements (MDR) Table

<u>Master Differences Requirements (MDR) Table</u>								
AEROPLANE TYPE RATING: C 525		FROM AEROPLANE						
		CE-525 (CJ)	CE-525 (CJ1)	CE-525A (CJ2)	CE-525B (CJ3)	CE-525 (CJ1+)	CE-525 (CJ2+)	CE-525C (CJ4)
TO AEROPLANE	CE-525(CJ)	*						D/D/D
	CE-525(CJ1)		*					D/D/B
	CE-525A(CJ2)			*				D/D/B
	CE-525B(CJ3)				*			D/D/B
	CE-525(CJ1+)					*		D/D/B
	CE-525(CJ2+)						*	D/D/B
	CE-525C(CJ4)	D/D/D	D/D/B	D/D/B	D/D/B	D/D/B	D/D/B	D/D/B

* Differences to accommodate optional equipment and aircraft modifications

Appendix 4. Recurrent Training & Checking

The requirements for a recurrent training program vary with many factors including frequency of flight and exposure to different flight conditions, route and aerodrome familiarity. Although there is a high degree of systems commonality, the C525 series of aeroplanes differs greatly across the range, in terms of avionics equipment, operations and performance. Extreme care must be exercised when developing recurrent training programmes as cross-crediting experience in one variant may not be appropriate for currency in another. Please refer to Appendix 5. Recent Experience.

It is recommended to follow the requirements of EU-OPS, subpart N, paragraph 1.965 as a minimum and to consider expansion, as appropriate, of these requirements for pilots, who have had only limited exposure and/or who do not any longer fulfil the currency requirements.

As for LST (see Appendix 1) the Licence Proficiency Check (LPC) profile at Appendix 2 to JAR FCL 1.240 (for multi-pilot aeroplanes, as opposed to Appendix 3 for single pilot aeroplanes) is considered by the OEB to be a more appropriate reflection of the complexity and capability of this type of aeroplane, and readily manageable by the single pilot.

It is recommended that an LPC, when completed in accordance with Appendix 2 to JAR FCL 1.240, conducted in either the multi-pilot or single-pilot role, should be acceptable for rating revalidation and renewal by the licensing issuing State.

Pilots intending to fly non-commercial air transport flights as the sole pilot, having completed LPC, IRR and OPC in a two-pilot role in accordance with EU OPS subpart N, should complete a satisfactory LPC and IR revalidation in the single pilot role.

Those pilots having completed training in the single-pilot role should take LPC acting as the only cockpit crewmember throughout the check. Where the check is conducted in a full flight simulator, the examiner should not occupy the second cockpit seat.

Appendix 5. Recent Experience

There are no specific currency requirements applicable to the CJ4, beyond those of EU-OPS, Subpart N, paragraph 1.970 for AOC holders or JAR-FCL 1.026 and 1.245 for private operators.

However, subject to operator approval and the provisions of EU OPS and JAR FCL, where applicable, currency in the CJ4 may be carried across either from (or to) other variants of the C525 series of aeroplanes. Care must be exercised when such cross crediting is used. The nature of the CJ4 requires reasonable currency with the FMS and avionics. Other variants of the C525 may not have the same FMS and caution should be taken before cross crediting for currency on the CJ4 with variants that do not have the Collins Proline 21 avionics (CJ).or the 3000 series FMS (CJ, CJ1 & CJ2). Whilst it may be reasonable to alternate or interchange the variants within the "C525" series for OPC and recurrency training for each pilot, caution must be exercised to ensure that all recent experience and recurrency training and checking remains appropriately valid on all the variants being flown, at all times.

Appendix 6. EASA recommendation.

Pre-requisites and training for Initial type rating on - Turbo Jet, Pressurised Turbo prop and Multi engine Turbo prop - Single pilot Aeroplanes

Prerequisites according to JAR- FCL1 regulation:

- 200hrs hours total experience
- 70hrs hours Pilot in Command (PIC)
- HPA certificate according to JAR-FCL 1.251 (a) (3)

Note 1. The course syllabus content stated in Appendix 1 to JAR-FCL 1.251 (HPA training) should include procedures for ACAS operation and operation in RVSM airspace as applicable.

Note 2. For Multi-crew operation a completion of Multi-crew co-operation training according to JAR-FCL 1.261 (d) is recommended.

Note 3. OTD according to JAR–FSTD A.005 (f) Other Training Device (OTD).
“A training aid other than FFS, FTD, FNPT or BITD which provides for training where a complete flight deck environment is not necessary.”
The applicable training aids will be assessed and recommended by EASA Certification Flight Standards as being suitable for the proposed training.

Note 4. Supervised Operating Experience (SOE) means operating as pilot in command under the supervision of a Class Rating Instructor (CRI).

Recommended by OEB					
	License and experience to start training	Combined Aircraft/OTD training	Combined FSTD/OTD training	Testing	Supervised Operating Experience (SOE)
Pilot in Command	A Pilot In Command (PIC) should undertake Training in either Combined Aircraft/OTD or combined FSTD/OTD as follows:				
	1. ATPL(A) + Any previous Jet Type Rating	12 hrs + 4 hrs FSTD or OTD*	32 hrs Total 16 hrs FFS + 16 hrs FSTD or OTD	Skill Test	0 hrs
	2. ME** Rating + IR Rating Min. 1000 hrs.	12 hrs + 4 hrs FSTD or OTD*	32 hrs 16 hrs FFS + 16 hrs FSTD or OTD	Skill Test	25 hrs Recommended
	3. ME** Rating + IR Rating Min. 500 hrs.	12 hrs + 4 hrs FSTD or OTD*	32 hrs 16 hrs FFS + 16 hrs FSTD or OTD	Skill Test	50 hrs Recommended
Co-pilot	A Co-pilot should undertake Training in either Combined Aircraft/OTD or combined FSTD/OTD as follows:				
	ME** Rating + IR Rating Min. 200 hrs. Min. 70 hrs PIC	12 hrs + 4 hrs FSTD or OTD*	32 hrs 16 Hrs FFS + 16 Hrs FSTD or OTD	Skill Test Licence endorsement: Co-pilot only	0

* 4 hrs in FSTD or OTD to train selected Emergency procedures.

** ME rating not applicable for single engine aeroplanes.

Appendix 7. Multi-pilot Operations

Pre-requisites

Pilots undergoing training as part of a crew are recommended to hold a certificate of satisfactory completion of a Multi-Crew Co-operation (MCC) course in accordance with JAR FCL 1.261, before commencing multi-pilot training for the type rating.

Standard Operating procedures

The capabilities of the automation and avionics in the CJ4, as with many other EFIS aircraft, allow the pilot(s) to fly the aeroplane in a variety of different navigation and flight guidance control modes. Whilst the CJ4 has many systems and flight automation features designed to ease pilot workload, the safe operation of the aeroplane depends on sound, clearly defined operating procedures.

Furthermore, the systems and avionics integration of the CJ4 means much of the information available to the pilot is via sub-menus from within a main PFD or MFD control panel selection. The availability of this information is not immediately intuitive and pilots must have specific knowledge and systems familiarity to be able to access to the information quickly, when required. It is important that crew actions and procedures are clearly specified in writing and reflect the distinct responsibilities of each pilot.

The performance and speed of the CJ4, particularly during departure, arrival and missed approach, is such that advance situation awareness is critical to flight safety and may quickly be lost if flight guidance management becomes a distraction through lack of integrity or workload is increased in the event of systems failure and abnormal procedures. It is imperative therefore that crew responsibilities and procedures are familiar and well rehearsed. The definition of responsibility between pilots is critical to flight safety, particularly in the terminal area.

Operators flying with two pilots as a crew must determine and publish to crew, their own Standard Operating Procedures (SOP) that not only define multi-crew integration and the normal, individual actions of each pilot, but specify the navigation source, flight guidance mode selection, configuration and aircraft handling techniques to be used by their company pilots, in all phases of flight.

A set of clearly defined SOP should be agreed with the training provider, prior to any initial or differences training, so that these procedures may be integrated into the training programme.

All operators, therefore, are urged to develop detailed SOP to minimise both workload and the risk of incorrect programming of the flight guidance system, and help retain advance situation awareness. Whilst the commercial operators will be expected to follow company SOP in accordance with their operations manuals, private operators must be encouraged to acquire and use similar, clearly defined and practiced procedures until sufficient familiarity allows their further development.

Operator Conversion Training

When the operator's conversion course and the training course required for the issue of the type rating are combined according to OPS 1.945 © whilst the operator's approved documentation must be used throughout the course, the licensing requirements of JAR FCL 1, for rating issue must still be met.

Initial Type-rating Training Course

When training as a crew, the SOP referred to above should be clearly defined and set out in a document available to all trainees before the start of the course.

Training for multi-crew operations should be according to recommendations from EASA Certification Flight Standards and published on the EASA Web site. Recommendations, current at the time of writing, for pre-requisites and minimum length of training are shown at Appendix 6.

Skill Test and Licensing Action

Those pilots having completed training as part of a two-pilot crew should take the LST as the handling captain of a constituted, two pilot crew. A statement confirming “Multi-Pilot Operations Only” should be appended to the examiner’s certificate on the rating application form. The type rating should then be issued by the licence-holder’s licence issuing State, restricted to Multi-Pilot Operations Only.

Proficiency Checks

The OEB further recommend that those pilots normally flying the aircraft as part of a two-pilot crew should take the LPC, combined with instrument rating revalidation as the handling pilot of a constituted, two pilot crew. Unless the check is also conducted in the single-pilot role, or the IR is revalidated by the cross crediting and experience requirements of Appendix 1 to JAR FCL 1.246, the LPC should not revalidate or renew single pilot privileges of the instrument rating (IR SPA) and the licence endorsement should be restricted to Multi-Pilot Operations Only.

Single-pilot Operations

Pilots intending to fly non-commercial air transport flights as the sole pilot, having completed LPC, IRR and OPC in a two-pilot role in accordance with EU OPS subpart N, should complete a satisfactory LPC and IR revalidation in the single pilot role.

E N D