

SBAS Solutions for Cargo Operations

Presented by: Tarek Sabanekh
EGNOS Workshop – Sept. 24, 2019
Rome, Italy

Product Portfolio

AVIONICS DISPLAYS and VISION SYSTEMS



COMMUNICATIONS



SYSTEMS INTEGRATION



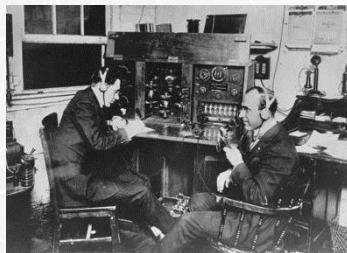
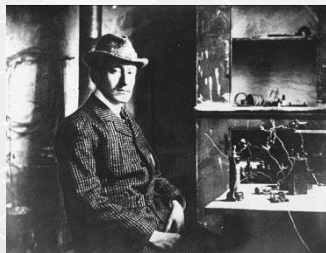
NAVIGATION



MICROELECTRONICS



Historic Highlights



1901 1903 1909 1912 1919 1921 1925 1931 1951 1951 1953 1956 1957 1960s-70s 1980s-90s

Marconi Wireless Telegraph Company of Canada incorporated

Marconi wireless station receives S.S. Titanic's distress signal

Introduced the first home radio receivers in Canada

Initiated the establishment of a Canadian radio network

CMC's transatlantic telecommunications services acquired by the Canadian Government

First Canadian company to design a complete microwave radio relay system,

Focused on aircraft navigation, monitoring and display systems, tactical radios, radar and telex switching systems

World's first trans-oceanic wireless transmission

First factory opened in Montreal

Established Canada's first experimental commercial broadcasting station

Company name changed to Canadian Marconi Company

Designed and manufactured T.V. receivers

UK-based English Electric Company Limited acquired 50.6% of Canadian Marconi

First to develop an FM-CW Doppler radar for air navigation

Focused on high-end aviation, communications, infrared sensing, marine electronics, positioning markets, avionics and system integration

Historic Highlights (2)



2001

2002

2003

2004

2005

2006

2007

2008

2013

2015

2017

2019

Company acquired
by ONCAP and
name changed to
CMC Electronics Inc.

Launch of Helihawk HUD

Launch of:

- Electro-optic hybrids
- GPS WAAS sensor

CMC acquired by Esterline
Launch of Cockpit 9000

Launch of
Aircraft Information
Server product line

Launch of Integrated Helicopter Solutions (IHS)

Acquired
Flight Visions
Launch of
EVS I-Series

Launch of:

- PilotView Electronic Flight Bag (EFB)
- CMA-9000 Flight Management System (FMS)

Launch of:

- FMS CMA-4000
- Panel switch technology
- Cockpit 4000

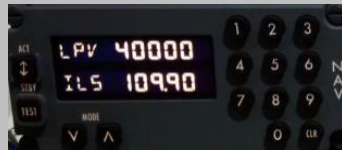
Launch of:
TacView Portable
Mission Display

Esterline acquired
Barco Defense
Aerospace and
Training business

Esterline acquired
by Transdigm

CMC's EGNOS Products

- Market segments: Air Transport, Helicopters, Biz Jet, Regionals, Trainers, Airlines, Aircraft OEMs, Avionics OEMs, Ground Station OEMs; both forward & retrofit
- LPV ARINC739 or control panel options:



3rd party
products



CMC-5025
SLS/GLS CP



CMC-3024
GNSSU
SBAS Nav +
ADS-B



CMC-5024
GLSSU
+ LPV
+ A739



CMC-6024
GLSSU
+ GBAS GLS



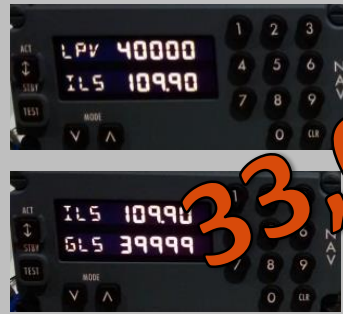
CMC-4124
GNSSA MMR
Card



CMC-4024
Primus Epic

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Card



CMC-4024
Primus Epic

33,000+ CMC GPS flying today

One Product Family, Many Platforms



Why Upgrade to SBAS/EGNOS?

Some of the reasons operators upgrade to EGNOS:

- ADS-B Out Stand-Alone
- SBAS GPS Navigation (RNP)
- SBAS Nav + ADS-B Out
- LPV
- SBAS Nav + LPV
- SBAS Nav + ADS-B Out + LPV
- LPV + GBAS
- SBAS Nav + LPV + GBAS GLS
- SBAS Nav + ADS-B Out + LPV + GBAS GLS

Why SBAS/EGNOS from CMC?

- Extremely high reliability >45,000FH
- Toughest environmental qualifications in its class, these are the same GPS boxes used on C-130s by Air forces worldwide including USAF
- Available and in production today, SBAS GPS in continuous production since 2005
- Cost: upfront & cost of ownership, more value for lower
- Landing system capabilities: SBAS, LPV and GBAS GLS in the same box
- Easy to install

A300/A310



- LPV
- GPS Nav + ADS-B Out
- FMS + GPS Upgrade

**Esterline CMC Electronics' High-Performance Flight Management Systems
Receive EASA Certification on A300-600 Aircraft**



7/11/2016
(Farnborough International Airshow – July 11, 2016) Esterline CMC Electronics (CMC) is pleased to announce that its 9000 Flight Management System (FMS) has been certified by EASA on the A300-600. The Supplier's Certificate of Approval (SCoA) was issued by EASA.



... running Pioneer Projects (2/3) in France

Partners :
EGIS AVIA
DSNA
ATI
Pildo

Airports/Procedures:
(Clermont-Ferrand)
Bou...

Nb Aircraft: 1 (+4)
Beluga – Airbus A300-600ST
Avionics: CMC Electronics

Achievements and future milestones
Successful ground tests: March 2011
Certification flight around summer

Deliverables
Initial Business Case
Lessons learned
Safety assessment methodology applied



A300-600 Beluga LPV Auto-land @TLS



A320

- ADS-B Out Stand-alone
- GPS Nav
- GPS Nav + ADS-B Out



Esterline's CMA-5024 GLSSU receives EASA approval on the A320 family for ADS-B Out

6/30/2018

Farnborough International Airshow, June 30, 2018 -- Esterline Avionics Systems and PMV Engineering are pleased to announce that PMV Engineering has obtained EASA approval for the upgrade of the older generation GPSSU by CMC's CMA-5024 GLSSU on the A320 family of aircraft.

B737-300/400/500/600/700/800 CL & NG

- ADS-B Out Stand-alone
- LPV Stand-alone
- GPS Nav + ADS-B Out + LPV



CMC Electronics' CMA-5024 receives TCCA STC certification for ADS-B out and LPV on B737NG aircraft family

4/25/2019

Montreal, April 25, 2019 - CMC Electronics is pleased to announce that Transport Canada Civil Aviation (TCCA) has approved an STC to install CMC's SBAS-capable CMA-5024 GLSSU on B737NG aircraft for DO-260B ADS-B out compliance and SBAS/GPS navigation with the option to enable LPV approach capability. FAA and EASA STC approvals are in progress and expected shortly for all B737NG aircraft types (-600/-700/-800).



737NG SEAMLESS INTEGRATION



CMA-6024

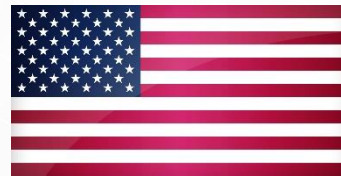


CMA-5024



GABLES G7501 Control Panel

B757/767



- ADS-B Out Stand-alone
- ADS-B Out + LPV + GBAS GLS *coming soon*



New ADS-B Out STC Featuring Esterline's CMA-5024 on Boeing 757 and 767 Aircraft

10/18/2018

Esterline Avionics Systems is pleased to announce that Airborne Maintenance & Engineering Services has received FAA Supplemental Type Certificate (ST04319CH) approval of their ADS-B Out solution featuring Esterline's CMA-5024 on Boeing 757, 767-200 and 767-300 aircraft.

B747-400

- ADS-B Out Stand-alone
- GPSSU Replacement



SUPPLEMENTAL TYPE CERTIFICATE

10070239

This Certificate/Approval is issued by EASA, acting in accordance with Regulation (EU) 2018/1139 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 129 of that Regulation and in accordance with Commission Regulation (EU) No. 748/2012 to

APTOZ EHF.

AKURGERDI 41
108 REYKJAVIK
ICELAND
EASA.21J.679

and certifies that the change in the type design for the product listed below with the limitations and conditions specified meets the applicable Type Certification Basis and, if applicable, environmental protection requirements when operated within the conditions and limitations specified below:

Type Certificate Number: EASA.IM.A.196

Type Certificate Holder: THE BOEING COMPANY

Type: 747

Model: 747-400, 747-400F

Description of Design Change:

Installation of GPS/SBAS sensors/antenna
Installation of two (TSO-145c) **CMC Esterline CMA-3024 GPS/SBAS sensors**, (TSO-C190) antennas, and associated wiring. The installed equipment and wiring will be inactive, activation is via separate STC.

EASA Certification Basis:

EASA CS-25 amendment No. 4 and CRI Special Condition H-01.

The requirements for environmental protection and the associated certified noise and/or emissions levels of the original product are unchanged and remain applicable to this certificate/ approval.

See Continuation Sheet(s)

For the European Aviation Safety Agency

Cologne, Germany, 18 June 2019

B777

- GPS Nav
- GPS Nav + ADS-B Out



Esterline develops customized CMA-5024 GLSSU for B777 aircraft under Boeing license

3/5/2019

Montreal, March 5, 2019 - Esterline's CMC Electronics (CMC) business unit is pleased to announce that they completed development and testing of a customized version of their CMA-5024 SBAS GPS for B777 aircraft under license with Boeing. This tailored version (P/N 100-601967-121) has been installed on several B777-200 aircraft with major airlines wherein the CMA-5024 fully integrates with the on-board avionics, including AMS.



AIRCRAFT	MAIN FUNCTION	APPROVALS
A300/A310	RNP NAV	STC – TCCA
A300ST (Beluga)	LPV	STC – EASA
A320 Series	ADS-B Out	STC – EASA, FAA
A320	ADS-B Out & RNP NAV	STC – EASA
A340	ADS-B & RNP NAV	STC – EASA
ATR-42/72	LPV, ADS-B & RNP NAV	STC – EASA
B737-300/400/500	RNP NAV	SB - Boeing
B737-300/400/500	LPV, ADS-B & RNP NAV	STC – TCCA, FAA, EASA
B737-600/700/800	LPV, ADS-B Out & RNP Nav	STC – TCCA, FAA, EASA
B747-400	ADS-B Out & RNP NAV	STC – EASA, FAA
B757	ADS-B Out	STC – FAA, EASA
B767	ADS-B Out	STC – FAA, EASA
B777	ADS-B Out & RNP NAV	STC – FAA, EASA
MD81/82/83/88	ADS-B Out	STC – TCCA, FAA, CASA
MD88/90	ADS-B Out	STC – FAA
Bell 412EPI (Heli)	GVS	STC – FAA

What Next?

- MCMF (Galileo, BeiDou...) & EGNOS V3
- VTOL/UAS/UAM/HAPS/SAR/EMS Precision Landing:
 - Leverage EGNOS & GBAS tech and avionics
 - Precision approach anywhere
 - Rapidly deployable and movable
 - Lower cost than GBAS ground station
 - No survey required, support moving deck/ship

