

Automatic Dependent Surveillance – Broadcast (ADS-B) Call Sign Mismatch (CSMM)

Analysis and Mitigation

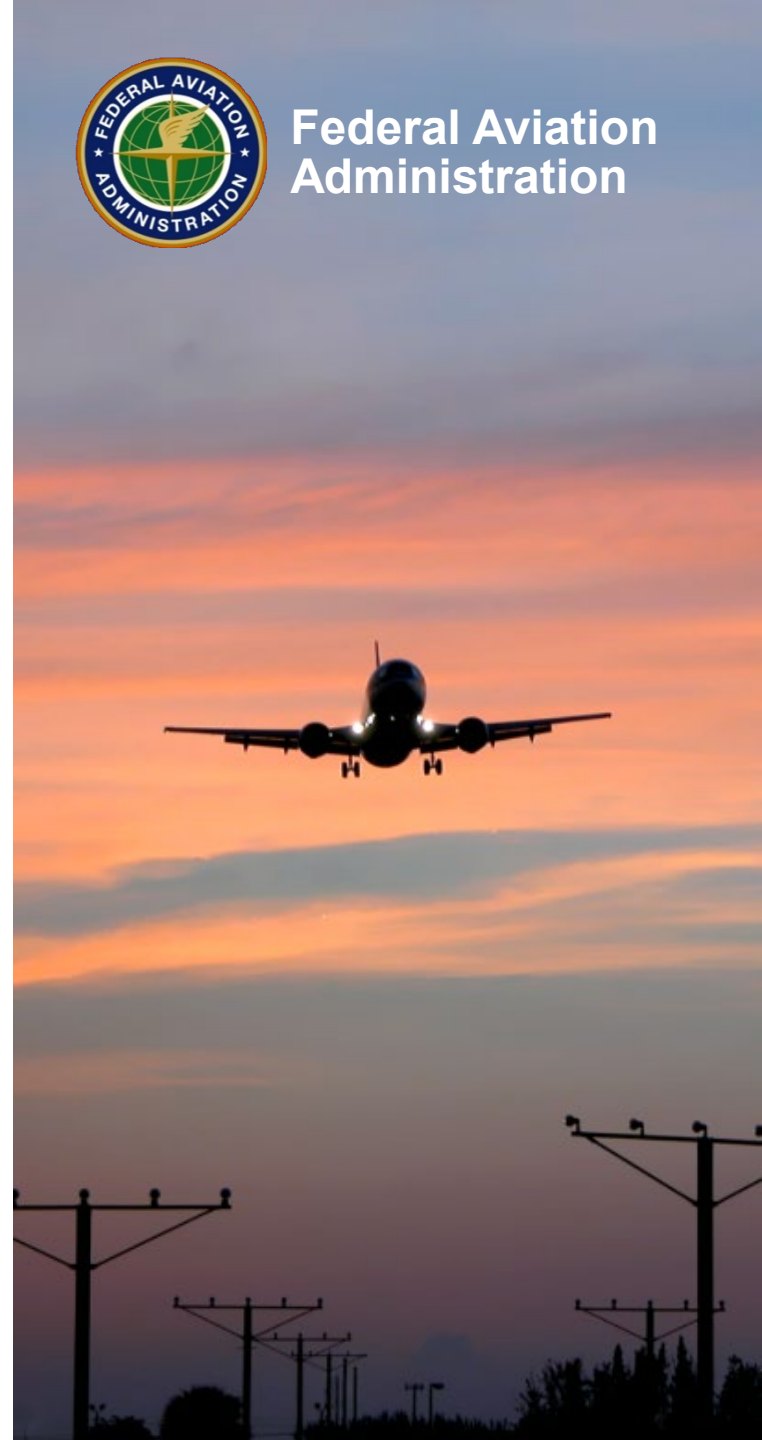
Presented to: Workshop on ICAO Aircraft
Address and Target Identification in
Surveillance Data and Flight Plan

Presented by: Paul Von Hoene, FAA

Date: June 6, 2023



Federal Aviation
Administration



Background

- **U.S. ATC system incorporates a function that alerts the controller when the aircraft identification (FP Item 7), does not exactly match the aircraft identification (ACID) broadcast by ADS-B**
 - We refer to this as a call-sign mismatch (CSMM)
- **In 2016, the FAA Air Traffic Organization (ATO) sought Flight Standards assistance to reduce the large number of CSMMs (approximately one out of every 20 flights in the U.S. NAS)**
- **Flight Standards initiated a multi-year effort to reduce the number of CSMMs by:**
 - identifying CSMM aircraft and directly contacting operators and/or owners, and
 - conducting education and outreach activities
- **Currently, the CSMM alert to controllers is deactivated to prevent distraction as we continue to reduce occurrences**
 - FAA ATC uses Mode A code as primary means to correlate track to flight plan, not ADS-B (ADS-B ACID or ICAO aircraft address)

Reasons for CSMM Mitigation

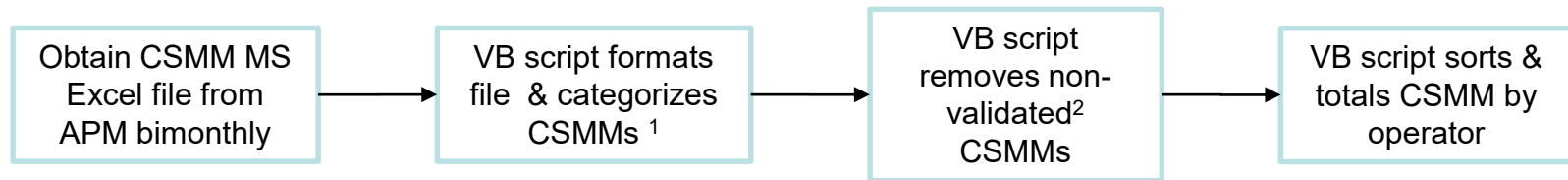
- **To ensure regulatory compliance with 14 CFR 91.227(d)(8) and (d)(11) that require:**
 - “An indication of the aircraft’s call sign that is submitted on the flight plan, or the aircraft’s registration number...”, and
 - “An indication of the aircraft assigned ICAO 24-bit address...”
- **To ensure U.S. operator compliance with international procedures**
- **To reduce the impact to ADS-B In operations**
- **To support use of ADS-B ACID in FAA ATC Automation**
 - En-Route automation can leverage the ADS-B ACID or ICAO aircraft address as part of its flight plan correlation
 - Terminal automation does not currently use ADS-B ACID or ICAO aircraft address, but we want to allow for the potential to do so

Mitigation – A Coordinated Effort

- **FAA’s primary mitigation effort is focused on ADS-B ACID as that is a larger problem and has implications for ADS-B In activities**
- **FAA’s airworthiness office focuses on ADS-B avionics issues including ICAO aircraft address issues; but ICAO aircraft address issues are much smaller in number**
 - Note: U.S. ATC does not require ICAO aircraft address in FP so we do not track those mismatches
- **Flight Standards coordinates activities with an inter-organizational ADS-B Outreach Team to get the message out on CSMM and other ADS-B related issues**

Analysis Process – CSMM Sorting

- We have automated much of the process for more frequent, timely reporting to operators, and to minimize inspector workload.
- Every two months: download a CSMM report in MS Excel format from the ADS-B Performance Monitor (APM), then use Visual Basic (VB) scripts to format, categorize and sort the CSMM reports for an inspector to analyze



ICAO	Start Time	Duration	Reports	Registration	ADS-B Flight ID	Flight Plan ID	Operat	Mode 3A	ALT	SVC Volume First	SVC Volume Last	FP DEPART	FP DEST
AD526C	03/01/2023 03:09:03	1:59:16	21504	N958AM	2806	AAL2806		2216	35025	188 - Dallas/Ft. Worth Surface	Surface	KDFW	KMSP
AD5264	03/01/2023 21:26:28	0:54:17	6802	F	AAL310	AAL310		3641	36000	1007 - Miami	203 - Miami Surface	TKPK	KMIA
AD5263	03/01/2023 22:51:54	0:38:03	7164	F	L792	AAL1772		5461	31475	1007 - Miami	203 - Miami Surface	SEGU	KMIA
AD1188	03/01/2023 23:32:15	3:48:27	53223	N	AAL809	AAL809	AAL	2264	36050	207 - Philadelphia Surface	142 - San Antonio	KPHL	KAUS
A30092	03/01/2023 23:51:15	2:56:36	29733	F	AAL2998	AAL2998	AAL	2355	32075	188 - Dallas/Ft. Worth Surface	Surface	KDFW	KPHX
AD5259	03/02/2023 05:18:43	0:57:45	8243	F	AAL300	AAL300	AAL	3767	37025	203 - Miami Surface	1007 - Miami	KMIA	EGLL
A30447	03/02/2023 18:26:37	0:39:53	9079	F	N908AT	AAL1130		0372	1475	1007 - Miami	Lauderdale/Hollywood	SKBO	KMIA
AD9430	03/03/2023 20:55:13	0:54:43	11120	N	AAL1018	AAL1018	AAL	1536	28025	1013 - Kansas City	Surface	KXNA	KDFW
AD9435	03/04/2023 01:54:41	3:57:49	50873	F	AAL100	AAL100		7155	34025	Surface	Surface	KLGA	KDFW
AD9341	03/04/2023 02:40:10	2:58:09	32604	F	AAL100	AAL100		1175	36025	203 - Miami Surface	Surface	KMIA	KDFW

¹ Categories include: Not pilot caused (ATC coding), pilot caused (call sign users), pilot caused (“N” number users)

²Non-validated CSMMs include U.S. State aircraft, Mode A = 1200 (VFR), aircraft where it appears APM has correlated a CSMM to an incorrect aircraft

APM Reported CSMM Flights

April 1 to April 30, 2023

33,978 CSMM Flights
2,344,533 ADS-B equipped aircraft flights

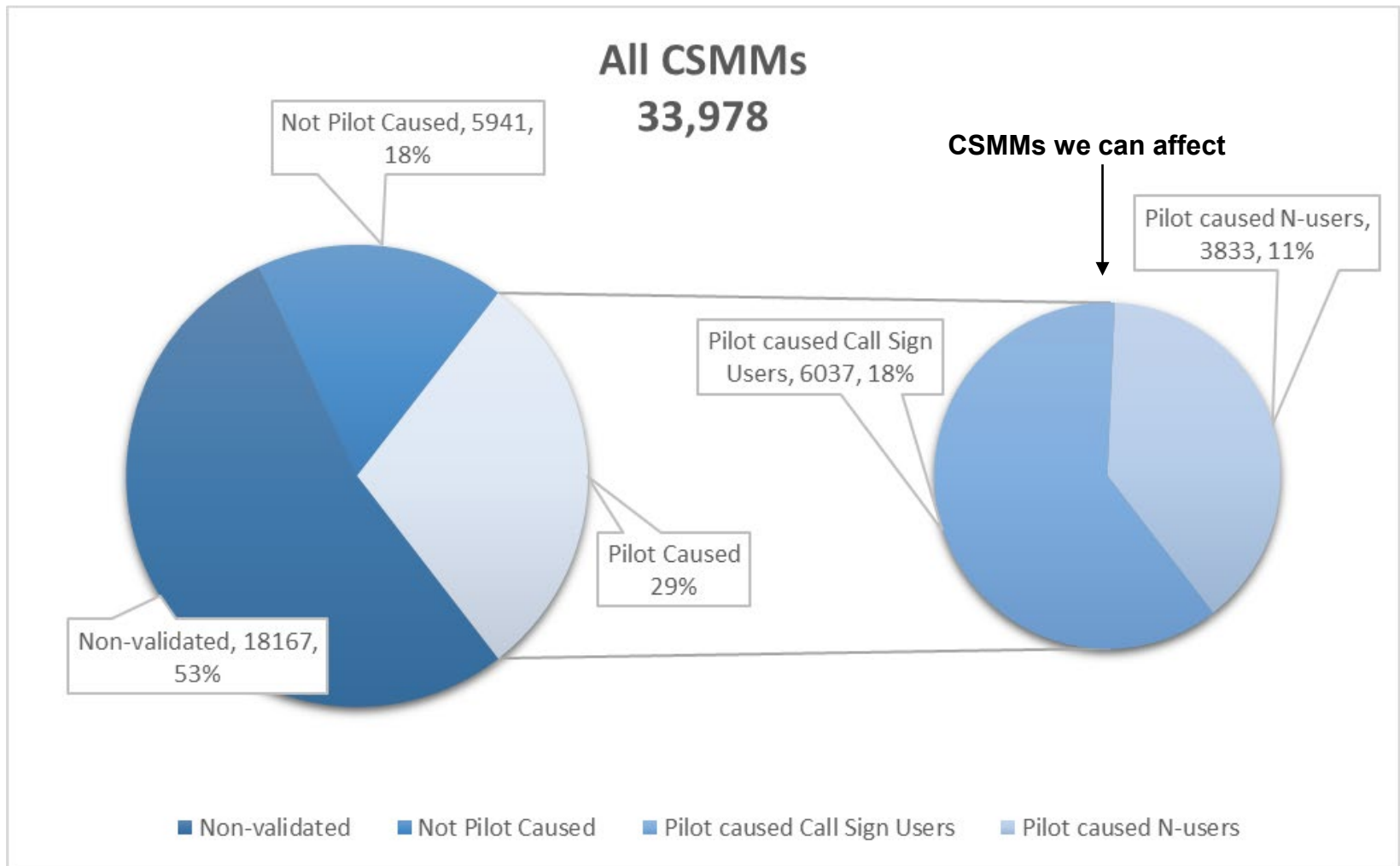
All CSMMs

- **53% (18167) non-validated**
- **18% (5941) Not Pilot Caused**
 - ATC coding issues
- **29% (9,870) Pilot Caused**

Pilot Caused CSMMs

- **61% Call Sign Users**
 - e.g. ICAO, Local, Special
- **39% “N” Number Users**

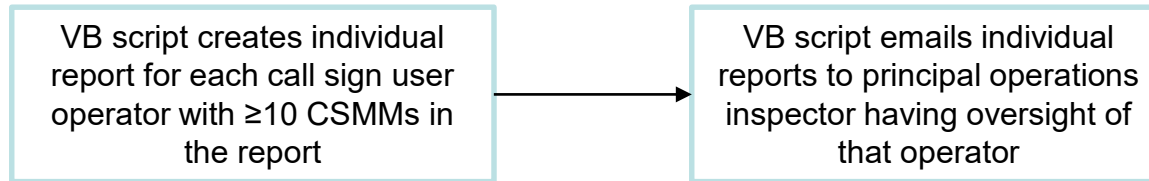
CSMM Breakdown April 2023



Analysis Process – Inspector Review

- **VB script identifies the following as pilot caused (call sign users) :**
 - Transposition [JBU123 vs JUB123], or adding zeros or spaces [JBU0123]
 - Not updating subsequent legs: [DAL5512 vs DAL5513] when first leg is 5512 and second leg is 5513
 - Dispatch codes [SWA234A vs SWA234]
- **VB script identifies the following as pilot caused (“N” number users):**
 - Incorrect registration number at installation
 - Special use call signs, such as for public good flying such as Angel Flight [ICAO NGF] and are not able [or forget] to change the ADS-B ACID
 - Flight planning companies such as Flight Plan Dot Com [ICAO DCM] assign a DCM flight ID to a particular aircraft but the ADS-B ACID is not changed
- **However, VB script cannot reliably identify the the ATC coding causes due to variety of direct entries by controller**
 - Examples: N623A > N23A; BLK = Block altitude; other shorthand coding

Mitigation – Direct Outreach



- **Outreach to call sign users:**
 - Provide CSMM list to the principal operations inspector to work with the operator to resolve
 - Provide briefings to air carrier management
 - Participate in government and industry working group to identify best practices and make recommendations
- **Outreach to general aviation operators (“N” number users):**
 - Contact aircraft owners to discuss CSMM issues
 - Work with organizations such as Angel Flight and FlightPlan.com to brief pilots on proper procedures
- **Outreach including presentations and panel discussions at trade shows and submission of magazine articles**

Outreach activities

- **Public aviation events: AOPA, Sun'n Fun, NBAA convention, Oshkosh, Heli-Expo**
- **FAA's "Know Your ADS-B" campaign**
- **Industry workshop with Performance-Based Operations Aviation Rulemaking Committee (PARC)**
- **Aviation publications**
- **Video – FAA Summer Safety Series**
- **Advisory Circular (AC) 90-114, *ADS-B Operations***
- **Quarterly ADS-B newsletter (internal FAA)**
- **Direct contact emails and phone calls to operators**

Outreach Examples



ADS-B — Call Sign Mismatch

Presenters: Jim Kenney, Jamal Wilson, Jimmy Wright, Jane Lopez, Ty Prettyman

In this session, FAA experts will explain what a call sign mismatch is, why it matters, and most importantly — how to avoid it. Many ADS-B Out transceivers provide a Flight ID field that can be changed by the pilot. It is important to understand why the ADS-B Flight ID must exactly match the aircraft ID entered on a flight plan or used during ATC communications.



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Advisory Circular

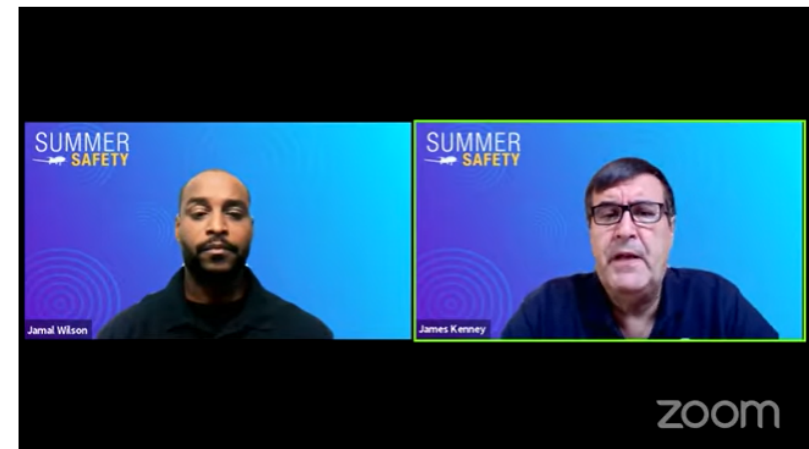
Subject: Automatic Dependent
Surveillance-Broadcast Operations

Date: 12/15/22

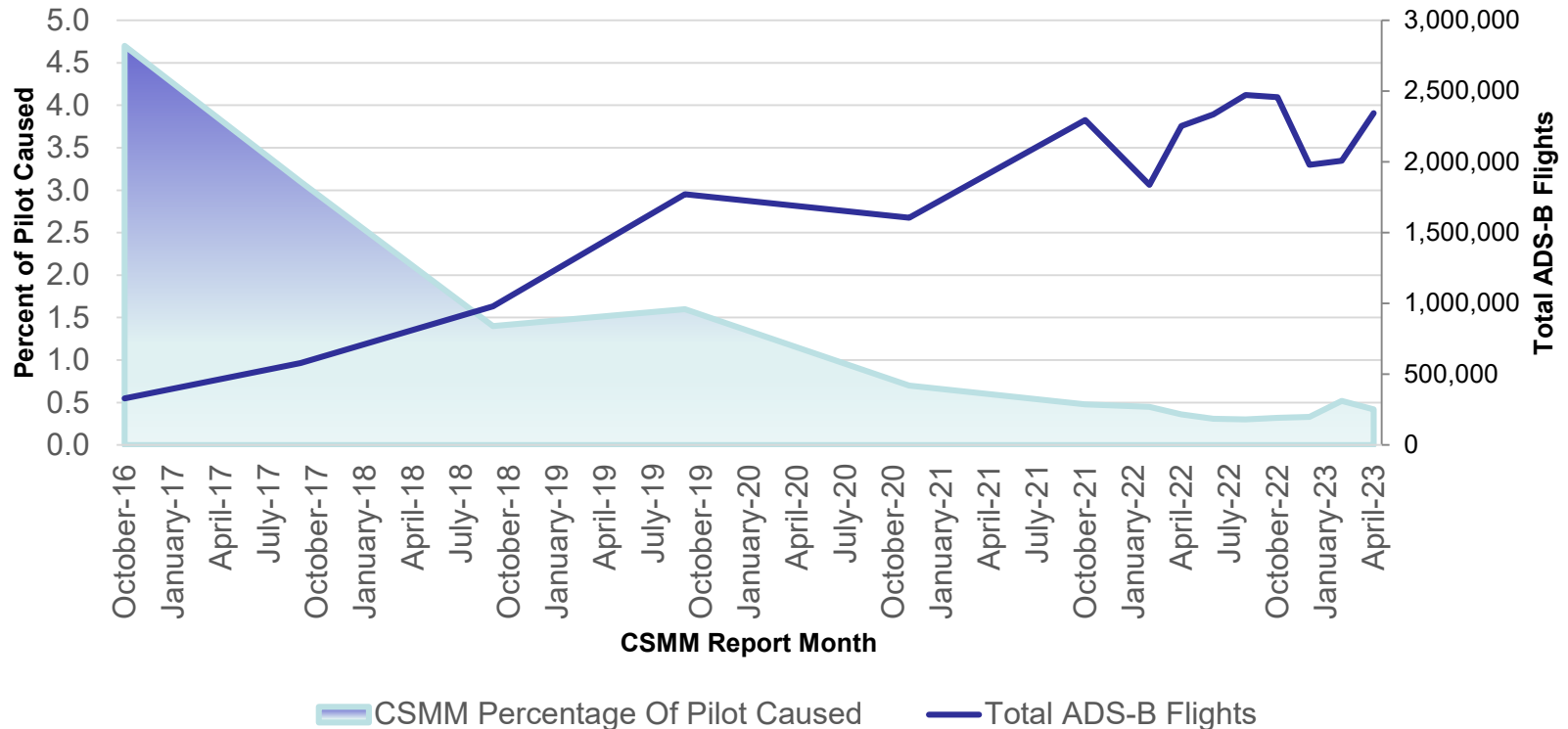
AC No: 90-114B

Initiated by: AFS-400

Change: 1



Progress Report 2016 to Present



April 2023
 0.42% Pilot Caused CSMM rate
 (less than one for every 200 aircraft)



Best Practices

- Automate ADS-B ACID setting process (e.g., uploading ADS-B ACID with FP data)
- Outreach: about the regulation, need for proper ADS-B ACID and ICAO aircraft addressing
- Prompt follow-up (bi-monthly CSMM reporting)
 - Industry needs recent data for effective resolution
- Know your equipment: how to set/change ADS-B ACID, recognize that maintenance activities could reset the ADS-B ACID to default
- Aircraft operators should verify proper ADS-B installation with the [Public ADS-B Performance Monitor \(PAPR\)](#)

Contact Information

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