



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Air Traffic Organization Policy

ORDER
JO 7110.126

Effective Date
July 17, 2018

SUBJ: Consolidated Wake Turbulence Radar Separation Standards

1. Purpose of This Order. This order provides procedural guidance to FAA Order JO 7110.65, Air Traffic Control, and the Pilot/Controller Glossary, related to the use of Wake Turbulence procedures and radar separation minima.

2. Audience. This order applies to all air traffic personnel at facilities authorized to use this order for operational air traffic control services.

3. Where Can I Find This Order? This order is available on the MyFAA employee website at https://employees.faa.gov/tools_resources/orders_notices/.

4. Requirements.

a. Facilities must receive a Letter of Authorization from the Director, Air Traffic Procedures, AJV-8, prior to the implementation of Consolidated Wake Turbulence Radar Separation Standards (CWT) procedures.

b. At facilities authorized to use this order for air traffic control services, the applicable provisions of FAA Order JO 7110.65, Air Traffic Control, are superseded by the corresponding provisions contained in this order.

c. Personnel providing air traffic control service must receive training on CWT procedures prior to implementation, or prior to assuming an operational position if the training occurs post implementation.

d. Terminal Automation Systems must have the CWT functions activated and all operational personnel appropriately trained prior to the use of this order.

e. Tower facilities must be equipped with a Flight Data Input/Output (FDIO), Electronic Flight Strip Transfer System (EFSTS), an equivalent electronic flight progress strip system or develop manual procedures to indicate the Wake Category on flight progress strips.

f. Facility documents must be updated, as appropriate, to reflect CWT procedures.

g. Facilities must submit a weekly report of any wake encounter reports and Mandatory Occurrence Reports (MOR) concerning wake turbulence for the first six months after implementation.

h. Air Traffic Procedures, AJV-8, must notify Air Traffic Safety Oversight Services (AOV) of facilities authorized to use CWT procedures and separation minima.

5. Background. Over the last several years, knowledge about wake vortex behavior in the operational environment has increased due to multiple advances in measurement techniques, available automated surveillance data, and improved understanding of physical processes. The FAA has undertaken an

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effort to recategorize the existing fleet of aircraft and modify the associated wake turbulence separation minima.

Prior to the Recategorization (Recat) effort, approach and departure wake turbulence separations were based on Maximum Certificated Gross Takeoff Weight (MCGTOW). These separations have proven to be very safe for wake vortex hazards. This results in greater than necessary separation distances, especially within the heavy weight class. For example, the current heavy-behind-heavy separation is four miles. This separation is appropriate for a B767 following a B747, but not necessary when the B747 is following the B767.

Under the Recat 1.5 program, aircraft are classified according to wingspan and the aircraft's ability to withstand a wake encounter, as well as the certificated takeoff weight. This method results in six categories of aircraft for wake turbulence separation purposes. The categories separate the current heavy and large weight classes into four wake categories: two for heavy and two for large. The A388 and A225 become their own Wake Category, and the current weight class of small remains as its own Wake Category.

Recat Phase II, both Appendix A and Appendix B, describes a pairwise separation matrix developed for the most common ICAO type identifier aircraft that comprise 99% of the operations at 32 airports within the U.S. Each aircraft is addressed as both a leader and a follower in each pair. The development of a pairwise separation matrix relies on wake-based data, rather than weight-based data. Separation reduction is achieved with a better understanding of wake behavior and with pairwise separation of aircraft.

All four of these sets of separation standards have been approved by Safety and Technical Training (AJT) and AOV and have been proven safe operationally. Each set of standards have shown operational benefits for certain aircraft pairings compared to other sets of standards.

The goal of CWT is to use the most operationally advantageous set of separation standards derived from the four current set of standards. This has resulted in using all time-based wake turbulence separation standards from FAA Order JO 7110.65. Radar-based wake turbulence separation will be based on a categorical system that further refines the grouping of aircraft to provide throughput gains at many of today's constrained airports and yet will be manageable at all airports throughout the NAS.

Original Signed by *Sharon Kurywchak*

Sharon Kurywchak
Director (A), Air Traffic Procedures

6/25/18

Date

Appendix A. Aircraft Wake Categories

Category A – A388.

Category B – Pairwise Upper Heavy Aircraft.

Category C – Pairwise Lower Heavy Aircraft

Category D – Non-Pairwise Heavy Aircraft.

Category E – B757 Aircraft.

Category F – Upper Large Aircraft excluding B757 aircraft.

Category G – Lower Large Aircraft.

Category H – Upper Small Aircraft with a maximum takeoff weight of more than 15,400 pounds up to 41,000 pounds.

Category I – Small Aircraft with a maximum takeoff weight of 15,400 pounds or less.

TBL A-1
Aircraft Types Categorized

A	B	C	D		E	F		G		H	I
Super	Upper Heavy	Lower Heavy	Non-Pairwise Heavy		B757	Upper Large		Lower Large		Upper Small	Lower Small
A388	A332	A306	A124	DC85	B752	A318	C130	AT43	E170	ASTR	BE10
	A333	A30B	A339	DC86	B753	A319	C30J	AT72	E45X	B190	BE20
	A343	A310	A342	DC87		A320	CVLT	CL60	E75L	BE40	BE58
	A345	B762	A3ST	E3CF		A321	DC93	CRJ1	E75S	B350	BE99
	A346	B763	A400	E3TF		B712	DC95	CRJ2	F16	C560	C208
	A359	B764	A50	E6		B721	DH8D	CRJ7	F18H	C56X	C210
	B742	C17	AN22	E767		B722	E190	CRJ9	F18S	C680	C25A
	B744	DC10	B1	IL62		B732	GL5T	CRJX	F900	C750	C25B
	B748	K35R	B2	IL76		B733	GLEK	DC91	FA7X	CL30	C402
	B772	MD11	B52	IL86		B734	GLF5	DH8A	GLF2	E120	C441
	B773		B703	IL96		B735	GLF6	DH8B	GLF3	F2TH	C525
	B77L		B741	K35E		B736	MD82	DH8C	GLF4	FA50	C550
	B77W		B743	KE3		B737	MD83	E135	SB20	GALX	P180
	B788		B74D	L101		B738	MD87	E145	SF34	H25B	PAY2
	B789		B74R	MYA4		B739	MD88			LJ31	PA31
	C5		B74S	R135			MD90			LJ35	PC12
	C5M		B78X	T144						LJ45	SR22
			BLCF	T160						LJ55	SW3
			BSCA	TU95						LJ60	
			C135	VMT						SH36	
			C141							SW4	

NOTE –

1. Currently, Small Plus aircraft are defined as aircraft that weigh more than 12,500 pounds and 41,000 pounds or less. This order changes the lower boundary of Upper Small aircraft to 15,400 pounds, which coincides with the boundary of ICAO Light Aircraft and Medium Aircraft; however, be aware, there are some Small Plus aircraft contained in the Lower Small Category I.

2. The A225 is treated as a NOWGT aircraft.

3. TBL A-1 contains the most common aircraft for all Wake Categories; however, all aircraft are contained in the automation database and will display their associated wake category on the radar display and machine generated flight strip.

Appendix B.

Amend the following paragraphs in FAA Order JO 7110.65

2-3-4. TERMINAL DATA ENTRIES

Title through TBL 2-3-3, block 2A, no change

TBL 2-3-3

Block	Information Recorded
3.	Number of aircraft if more than one, aircraft Wake Category indicator, type of aircraft, and aircraft equipment suffix.

TBL 2-3-3, block 4 through TBL 2-3-4, block 2A, no change

TBL 2-3-4

Block	Information Recorded
3.	Number of aircraft if more than one, aircraft Wake Category indicator, type of aircraft, and aircraft equipment suffix.

TBL 2-3-4, block 4 through TBL 2-3-5, block 2A, no change

TBL 2-3-5

Block	Information Recorded
3.	Number of aircraft if more than one, aircraft Wake Category indicator, type of aircraft, and aircraft equipment suffix.

No further changes to paragraph

5-5-4. MINIMA

Title through a.4., no change

NOTE-

Wake turbulence procedures specify increased separation minima required for certain categories of aircraft because of the possible effects of wake turbulence.

b. through WAKE TURBULENCE APPLICATION, no change

g. Separate aircraft by the minima specified in TBL 5-5-1 in accordance with the following:

1. When operating within 2,500 feet and less than 1,000 feet below the flight path of the leading aircraft over the surface of the earth of a Category A, B, C or D aircraft.

2. When operating within 2,500 feet and less than 500 feet below the flight path of the leading aircraft over the surface of the earth of a Category E aircraft.

3. When departing parallel runways separated by less than 2,500 feet, the 2,500 feet requirement in subparagraph 2 is not required when a Category I aircraft departs the parallel runway behind a Category E aircraft. Issue a wake turbulence cautionary advisory and instructions that will establish lateral separation in accordance with subparagraph 2. Do not issue instructions that will allow the Category I aircraft to pass behind the Category E aircraft.

NOTE-

1. The application of paragraph 5-8-3, Successive or Simultaneous Departures, satisfies this requirement.

2. Consider runways separated by less than 700 feet as a single runway because of the possible effects of wake turbulence.

REFERENCE-

FAA Order JO 7110.65, Para 3-9-6, Same Runway Separation.

TBL 5-5-1

Wake Turbulence Separation for Directly Behind

		Follower								
		A	B	C	D	E	F	G	H	I
Leader	A		4.5 NM	6 NM	6 NM	7 NM	7 NM	7 NM	7 NM	8 NM
	B		3 NM	4 NM	4 NM	5 NM	5 NM	5 NM	5 NM	5 NM
	C					3.5 NM	3.5 NM	3.5 NM	5 NM	5 NM
	D		3 NM	4 NM	4 NM	5 NM	5 NM	5 NM	5 NM	5 NM
	E									4 NM
	F									
	G									
	H									
	I									

WAKE TURBULENCE APPLICATION

h. ON APPROACH. In addition to subparagraph g, separate an aircraft on approach behind another aircraft to the same runway by ensuring the separation minima in TBL 5-5-2 will exist at the time the preceding aircraft is over the landing threshold.

NOTE-

Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.

**TBL 5-5-2
Wake Turbulence Separation for On Approach**

		Follower								
		A	B	C	D	E	F	G	H	I
Leader	A		4.5 NM	6 NM	6 NM	7 NM	7 NM	7 NM	7 NM	8 NM
	B		3 NM	4 NM	4 NM	5 NM	5 NM	5 NM	5 NM	6 NM
	C					3.5 NM	3.5 NM	3.5 NM	5 NM	6 NM
	D		3 NM	4 NM	4 NM	5 NM	5 NM	5 NM	6 NM	6 NM
	E									4 NM
	F									4 NM
	G									
	H									
	I									

i. through j., no change

1. Wake turbulence separation must be applied in accordance with TBL 5-5-2.
2. An average runway occupancy time of 50 seconds or less is documented;
3. CTRDs are operational and used for quick glance references;

REFERENCE-

FAA Order JO 7110.65, Para 3-1-9, Use of Tower Radar Displays.

4. Turnoff points are visible from the control tower.

No further changes to paragraph

5-8-3. SUCCESSIVE OR SIMULTANEOUS DEPARTURES**TERMINAL**

Except for when wake turbulence separation is required, separate aircraft departing from the same airport/heliport or adjacent airports/heliports in accordance with the following minima provided radar identification with the aircraft will be established within 1 mile of the takeoff runway end/helipad and courses will diverge by 15 degrees or more.

REFERENCE-

FAA Order JO 7110.65, Para 3-9-7, Wake Turbulence Separation for Intersection Departures.

FAA Order JO 7110.65, Para 3-9-8, Intersecting Runway/Intersecting Flight Path Operations.

FAA Order JO 7110.65, Para 5-5-4, Minima, Subparagraph g.

Note 1 through FIG 5-8-3, no change

FIG 5-8-3 Note, References, delete

b. through FIG 5-8-5, no change

FIG 5-8-5 Note, delete

No further changes to paragraph

7-4-3. CLEARANCE FOR VISUAL APPROACH

Title through c3, no change

d. When wake turbulence separation is required, aircraft must be informed of the preceding airplane manufacturer and/or model.

NOTE--

Visual separation is not authorized when the lead aircraft is a super.

REFERENCE-

FAA Order JO 7110.65, Para 7-2-1, Visual Separation.

EXAMPLE-

“Cessna Three Four Juliet, following a heavy Boeing 747, 12 o’clock, seven miles.”

or

“Cessna Three Four Juliet, following a Seven-Fifty-Seven, 12 o’clock, four miles.”

REFERENCE-

FAA Order JO 7110.65, Para.2-4-21, Description of Aircraft Types.

FAA Order JO 7110.65, Para 5-5-4, Minima, Subparagraph g.

No further changes to paragraph

7-4-4. APPROACHES TO MULTIPLE RUNWAYS

Title through c., no change

1. Parallel runways separated by less than 2,500 feet. Unless approved separation is provided by ATC, an aircraft must report sighting a preceding aircraft making an approach (instrument or visual) to the adjacent parallel runway. When an aircraft reports another aircraft in sight on the adjacent final approach course and visual separation is applied, controllers must advise the succeeding aircraft to maintain visual separation. Do not permit an aircraft to overtake another aircraft when wake turbulence separation is required.

NOTE-

Visual separation is not authorized when the lead aircraft is a super.

REFERENCE-

*FAA Order JO 7110.65, Para 5-5-4, Minima, Subparagraph g.
FAA Order JO 7110.65, Para 7-2-1 Visual Separation.*

No further changes to paragraph

7-6-7. SEQUENCING

Title through c.1., no change

2. When parallel runways are less than 2,500 feet apart, do not permit an aircraft to overtake another aircraft established on final within the facility's area of responsibility when wake turbulence separation is required.

REFERENCE-

FAA Order JO 7110.65, Para 5-5-4, Minima, Subparagraph g.

PILOT/CONTROLLER GLOSSARY

AIRCRAFT WAKE CATEGORIES - For the purposes of Radar Wake Turbulence Separation Minima, aircraft are categorized as Category A through Category I. Each aircraft is assigned a category based on several performance and physical characteristics in addition to the MCGTOW.