U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Air Traffic Organization Policy

ORDER JO 7110.123

Effective Date:
08/03/2016

SUBJ: Wake Turbulence Recategorization – Phase II

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 Recategorization (Recat) Phase II procedures and separation minima.

2. Audience. This order applies to the Air Traffic Services facilities authorized to conduct Recat Phase II operations and listed in the facility specific appendices.

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

4. Requirements.

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order for air traffic control services, the applicable paragraphs of FAA Order JO 7110.65, Air Traffic Control, are superseded by the corresponding paragraphs contained in this order and appendices.

b. Facilities must receive a Letter of Authorization from the Director, Air Traffic Procedures, AJV-8, prior to the implementation of Recat procedures.

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

d. Terminal Automation Systems must have the Wake Turbulence Recategorization functions activated.

e. Tower facilities must be equipped with an Electronic Flight Strip Transfer System (EFSTS) or 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 Recat procedures.

g. Facilities must submit to the Manager, AJV-82, a weekly report of any wake encounter reports, Mandatory Occurrence Reports (MOR), or Electronic Occurrence Reports (EOR) concerning wake turbulence for the first eight weeks after implementation.

h. Air Traffic Procedures, AJV-8, must advise the Flight Technologies and Procedures Division, AFS-400, of all implementation dates.

i. Air Traffic Procedures, AJV-8, must notify AJI-3 of facilities authorized to use Recat procedures and separation minima.

5. Procedures. The following paragraphs contain general procedures applicable to all facilities authorized to use this order. Since the wake categories and separation standards are dependent on the

fleet mix for individual locations, paragraphs addressing specific wake categories, procedures and/or separation minima are contained in the facility specific appendices.

a. Amend the following paragraphs in FAA Order JO 7110.65.

1-2-6. ABBREVIATIONS

Add

NOTPA	Automated Terminal Proximity Alert is not available for the aircraft.

2-2-6. IFR FLIGHT PROGRESS DATA

Title through a1, no change

2. Number of aircraft if more than one, wake category indicator, type of aircraft, and aircraft equipment suffix.

No further changes to paragraph

2-3-4. TERMINAL DATA ENTRIES

Title through Table 2-3-3, block 2a, no change

Table 2-3-3, block 3 - Number of aircraft if more than one, wake category indicator, type of aircraft, and aircraft equipment suffix.

Table 2-3-3, block 4 through table 2-3-4, block 2a, no change

Table 2-3-4, block 3 - Number of aircraft if more than one, wake category indicator, type of aircraft, and aircraft equipment suffix.

Table 2-3-4, block 4 through table 2-3-5, block 2a, no change

Table 2-3-5, block 3 – Number of aircraft if more than one, wake category indicator, type of aircraft, and aircraft equipment suffix.

No further changes to paragraph

3-10-10. ALTITUDE RESTRICTED LOW APPROACH

Title to Note 1, no change

NOTE –

1. *The 500 feet restriction is a minimum. Higher altitudes should be used when warranted. For example, 1,000 feet is more appropriate for aircraft that require wake turbulence separation behind it when operating over unprotected personnel or aircraft on or near the runway.*

No further changes to paragraph.

4-8-11. PRACTICE APPROACHES

Title through a.1.(b), no change

2. Where procedures require application of IFR separation to VFR aircraft practicing instrument approaches, IFR separation in accordance with Chapter 3, Chapter 4, Chapter 5, Chapter 6, and Chapter 7 must be provided. Controller responsibility for separation begins at the point where the approach clearance becomes effective. Except for when wake turbulence separation is required, 500 feet vertical separation may be applied between VFR aircraft and between a VFR and an IFR aircraft.

REFERENCE -

FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraphs g and h..
FAAO JO 7210.3, Para 6-4-4, Practice Instrument Approaches.
FAAO JO 7210.3, Para 10-4-5, Practice Instrument Approaches.

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-
FAAO JO 7110.65, Para 3-9-7, Wake Turbulence Separation for Intersection Departures.
FAAO JO 7110.65, Para 3-9-8, Intersecting Runway/Intersecting Flight Path Operations.
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraph g.

Note 1, 2, 3 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.

5-8-5. DEPARTURES AND ARRIVALS ON PARALLEL OR NONINTERSECTING DIVERGING RUNWAYS

Title through FIG 5-8-12, no change.

NOTE –
In the event of a missed approach by an aircraft requiring wake turbulence separation behind it, apply the procedures in Para 3-9-6, Same Runway Separation, or Para 3-9-8, Intersecting Runway/Intersecting Flight Path Operations, to ensure that the larger aircraft does not overtake or cross in front of an aircraft departing from another runway.

REFERENCE -
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraph g.

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 -
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraph g and h..

b. Pilot/Controller Glossary. Remove *Aircraft Weight Classes* and insert the following:

Aircraft Wake Categories. The grouping of aircraft by a pairwise wake turbulence separation between aircraft types that will permit the optimization of a categorical system based on the local fleet mix and will expand the number of airports that can achieve capacity enhancement.

6. Background. The demand for airport capacity increases every year. The main constraint on airport capacity is the runway which accommodates only a limited number of flights per unit time. In less than visual conditions, this capacity is directly linked with the minimum radar and/or wake turbulence separation between aircraft on arrival. In all ceiling and visibility conditions, this capacity is directly linked with the minimum wake turbulence separation between departing aircraft. The minimum wake

separations between two aircraft is prescribed by FAA Order JO 7110.65 and are largely consistent with separations described in the International Civil Aviation Organization (ICAO) Procedures for Air Navigation Services — Air Traffic Management (PANS ATM).

During recent 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. In addition, the fleet mix has changed significantly since the last update to the FAA weight classes and associated wake turbulence separation minima. The FAA has undertaken an effort to recategorize the existing fleet of aircraft and modify the associated wake turbulence separation minima. As a part of this effort, a goal of safely increasing capacity at the constrained airports around the world was also given to this joint undertaking through the optimization of the proposed separations based on today's fleet mix.

Prior to the Recategorization effort, approach and departure separations were based on Maximum Certificated Gross Takeoff Weight (MCGTOW). These separations have proven to be very safe for wake vortex hazards. The goal of RECAT within the US is to take advantage of the increased knowledge of wake vortex behavior to safely reduce separations between aircraft, using the information such as the severity of the wake generated by a given aircraft from its physical and performance characteristics in addition to the MCGTOW.

Recat Phase II 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.

Original Signed by Maurice Hoffman for 8/2/16

_____ _____

Heather Hemdal Date
Director, Air Traffic Procedures

APPENDIX A
Southern California TRACON, BUR ATCT, LAX ATCT, ONT ATCT, SAN ATCT, SNA ATCT

Aircraft Wake Categories

Category A – The A380-800.

Category B – Upper Heavy Aircraft listed in Table A-1.

Category C – Lower Heavy Aircraft listed in table A-1.

Category D – Large Aircraft listed in Table A-1.

Category E – Small Plus aircraft with a maximum takeoff weight of more than 15,400 pounds up to 41,000 pounds.

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

Category G – Heavy aircraft not included in Category B or C.

TBL A-1

RECAT II 123 Aircraft Types Categorized For SCT

A (Super)	B (Upper Heavy)	C (Lower Heavy)	D (Large)		E (Small Plus)	F (Small)	G
A388	A332	A306	A318	DH8A	ASTR	BE10	A124
	A333	A30B	A319	DH8B	B190	BE20	A342
	A343	A310	A320	DH8C	BE40	BE58	B703
	A345	B762	A321	DH8D	B350	BE99	B74S
	A346	B763	AT43	E135	C560	C208	C135
	B742	B764	AT72	E145	C56X	C210	DC87
	B744	C17	B712	E170	C680	C25A	E3TF
	B748	DC10	B721	E75L	C750	C25B	E6
	B772	K35R	B722	E75S	CL30	C402	L101
	B773	MD11	B732	E190	E120	C441	VC10
	B77L		B733	E45X	F2TH	C525	
	B77W		B734	F16	FA50	C550	
	B788		B735	F18H	GALX	P180	
	B789		B736	F18S	H25B	PAY2	
	C5		B737	F900	LJ31	PA31	
			B738	FA7X	LJ35	PC12	
			B739	GLF2	LJ45	SR22	
			B752	GLF3	LJ55	SW3	
			B753	GLF4	LJ60		
			C130	GLF5	SH36		
			C30J	GL5T	SW4		
			CL60	GLF6			
			CRJ1	GLEX			
			CRJ2	MD82			
			CRJ7	MD83			
			CRJ9	MD87			
			CRJX	MD88			
			CVLT	MD90			
			DC91	SB20			
			DC93	SF34			
			DC95				

NOTE -

1. *Currently, Small Plus aircraft are defined as aircraft that weigh between 12,500 pounds and 41,000 pounds. This order changes the lower boundary to 15,400 pounds which coincides with the ICAO definition of Light Aircraft.*

2. *The A225 is treated as a NOWGT aircraft.*

3. *Table A-1 contains the most common aircraft for Categories E, F, and G; however, all Category E, F, and G aircraft are contained in the automation database and will display their associated wake category.*

Quick Reference Wake Turbulence Separation Tables

TBL – A2

Radar Separation – Directly Behind

		Trailing Aircraft						
		A	**B**	**C**	**D**	**E**	**F**	**G**
Lead Aircraft	**A**		4.5	6	7	7	8	6
	B		3	4	5	5	5	6
	C				3.5	5	5	6
	D						4	6
	E							6
	F							6
	G	6	6	6	6	6	6	6

TBL – A3

Radar Separation – On Approach

		Trailing Aircraft						
		A	**B**	**C**	**D**	**E**	**F**	**G**
Lead Aircraft	**A**		4.5	6	7	7	8	7
	B		3	4	5	5	6	7
	C				3.5	5	6	7
	D						4	7
	E							7
	F							7
	G	7	7	7	7	7	7	7

TBL – A4

Time-Based Separation – Same/Intersecting/Converging Runways and Nonradar

		Trailing Aircraft						
		A	**B**	**C**	**D**	**E**	**F**	**G**
Lead Aircraft	**A**		*2*	*2½*	*3*	*3*	*4*	*3½*
	B		*1½*	*2*	*2*	*2*	*3*	*3½*
	C				*2*	*2*	*3*	*3½*
	D						*2*	*3½*
	E							*3½*
	F							*3½*
	G	*3½*	*3½*	*3½*	*3½*	*3½*	*3½*	*3½*

TBL – A5

Time-Based Separation – Intersection Departures/Opposite Direction

		Trailing Aircraft						
		A	**B**	**C**	**D**	**E**	**F**	**G**
Lead Aircraft	**A**		*3*	*3½*	*4*	*4*	*5*	*4½*
	B		*2½*	*3*	*3*	*3*	*4*	*4½*
	C				*3*	*3*	*4*	*4½*
	D						*3*	*4½*
	E							*4½*
	F							*4½*
	G	*4½*	*4½*	*4½*	*4½*	*4½*	*4½*	*4½*

2-1-20. WAKE TURBULENCE CAUTIONARY ADVISORIES

Title through a.3., no change

b. Issue cautionary information to any aircraft if in your opinion wake turbulence may have an adverse effect on it. When traffic is known to be a Category A aircraft, include the word *Super* in the description. When traffic is known to be a Category B, C, or G aircraft, include the word *Heavy* in the description.

Note, no change

REFERENCE –
AC 90-23, Aircraft Wake Turbulence
P/CG Term – Aircraft Wake Categories
P/CG Term – Wake Turbulence

No further changes to paragraph

2-4-14. WORDS AND PHRASES

Title through a., no change

b. The word *Super* must be used as part of the identification in all communications with or about Category A aircraft.

c. The word *Heavy* must be used as part of the identification in all communications with or about Category B, C, or G aircraft.

No further changes to paragraph

2-4-21. DESCRIPTION OF AIRCRAFT TYPES

Except for wake category A, B, C, or G aircraft, describe aircraft as follows when issuing traffic information.

a through c2 example, no change

d. When issuing traffic information to aircraft following a wake category A aircraft, specify the word *Super* before the manufacturer's name and model.

EXAMPLE–
"Super A-three-eighty-eight"

e. When issuing traffic information to aircraft following a wake category B, C, or G aircraft, specify the word *Heavy* before the manufacturer's name and model.

No further changes to paragraph

3-3-5. BRAKING ACTION ADVISORIES

Title through b, no change

1. Issue the latest braking action report for the runway in use to each arriving and departing aircraft early enough to be of benefit to the pilot. When possible, include reports from wake category A, B, C, or G aircraft when the arriving or departing aircraft is a wake category A, B, C, or G aircraft.

No further changes to paragraph

3-7-3. GROUND OPERATIONS

Title to a, no change

a. Category A, B, C, or G aircraft to use greater than normal taxiing power.

b. Category E and F aircraft or helicopters to taxi in close proximity to taxiing or hover-taxi helicopters.

No further changes to paragraph

3-9-6. SAME RUNWAY SEPARATION

Title thru Wake Turbulence Application, No change

c. Do not issue clearances which imply or indicate approval of rolling takeoffs by category A, B, C, or G aircraft except as provided in para 3-1-14, Ground Operations When Volcanic Ash is Present.

d. Do not issue clearances to category E and F aircraft to line up and wait on the same runway behind a departing category A, B, C, or G aircraft to apply the necessary intervals.

d Reference, no change

e. The minima in para 5-5-4, Minima, TBL 5-5-1, may be applied in lieu of the time interval requirements in subparagraphs f and g. When para 5-5-4 is applied, ensure that the appropriate radar separation exists at or prior to the time an aircraft becomes airborne.

NOTE –

The pilot may request additional separation, but should make this request before taxiing on the runway.

f. Separate IFR/VFR aircraft departing the same runway or a parallel runway separated by less than 2,500 feet:

NOTE –
Takeoff clearance to the following aircraft should not be issued until the time interval has passed after the preceding aircraft begins takeoff roll.

1. Behind Category A aircraft:

(a) Category B – *2 minutes*.

(b) Category C – *2½ minutes.*

(c) Category D and E – *3 minutes.*

(d) Category F – *4 minutes.*

(e) Category G – *3½ minutes.*

2. Behind Category B aircraft:

(a) Category B – *1½ minutes.*

(b) Category C, D, and E – *2 minutes*.

(c) Category F – *3 minutes.*

(d) Category G – *3½ minutes.*

3. Behind Category C aircraft:

(a) Category D and E – *2 minutes.*

(b) Category F – *3 minutes.*

(c) Category G – *3½ minutes.*

4. All aircraft behind Category G – *3½ minutes.*

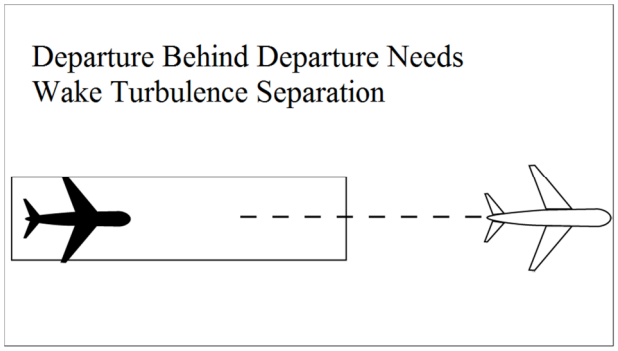
g. Separate IFR/VFR aircraft behind category D when departing the same runway or a parallel runway separated by less than 2,500 feet when flight paths will cross:

1. Category F – *2 minutes.*

2. Category G – *3½ minutes.*

h. Separate Category G aircraft behind category E and F aircraft by *3½ minutes* when departing the same runway or a parallel runway separated by less than 2,500 feet when flight paths will cross.

FIG 3-9-4
Same Runway Separation



i. Separate aircraft when operating on a runway with a displaced landing threshold if projected flight paths will cross when either a departure follows an arrival or an arrival follows a departure:

1. Behind Category A aircraft:

(a) Category B – *2 minutes*.

(b) Category C – *2½ minutes.*

(c) Category D and E – *3 minutes.*

(d) Category F – *4 minutes.*

(e) Category G – *3½ minutes.*

2. Behind Category B aircraft:

(a) Category B – *1½ minutes.*

(b) Category C, D, and E – *2 minutes*.

(c) Category F – *3 minutes.*

(d) Category G – *3½ minutes.*

3. Behind Category C aircraft:

(a) Category D and E – *2 minutes.*

(b) Category F – *3 minutes.*

(c) Category G – *3½ minutes.*

4. Behind Category D aircraft:

(a) Category F – *2 minutes.*

(b) Category G – *3½ minutes.*

5. Category G behind Category E and F aircraft – *3½ minutes.*

6. All aircraft behind Category G – *3½ minutes.*

j. Separate aircraft behind another aircraft that has departed or made a low/missed approach when utilizing opposite direction takeoffs or landings on the same or parallel runways separated by less than 2,500 feet:

1. Behind Category A aircraft:

(a) Category B – *3 minutes*.

(b) Category C – *3½ minutes.*

(c) Category D and E – *4 minutes.*

(d) Category F – *5 minutes.*

(e) Category G – *4½ minutes.*

2. Behind Category B aircraft:

(a) Category B – *2½ minutes.*

(b) Category C, D, and E – *3 minutes*.

(c) Category F – *4 minutes.*

(d) Category G – *4½ minutes.*

3. Behind Category C aircraft:

(a) Category D and E – *3 minutes.*

(b) Category F – *4 minutes.*

(c) Category G – *4½ minutes.*

4. All aircraft behind Category G – *4½ minutes.*

k. Separate aircraft behind another aircraft that has departed or made a low/missed approach when utilizing opposite direction takeoffs on the same runway:

1. Behind Category D aircraft:

(a) Category F – *3 minutes.*

(b) Category G – *4½ minutes.*

2. Category G behind Category E and F aircraft – *4½ minutes.*

l. Do not approve pilot requests to deviate from the required time intervals contained in subparagraphs f through k.

Phraseology and Reference, no change

n. Inform an aircraft when it is necessary to hold in order to provide the required time interval.

No further changes to paragraph.

3-9-7. WAKE TURBULENCE SEPARATION FOR INTERSECTION DEPARTURES

a. Apply the following wake turbulence criteria for intersection departures:

1. Separate a Category F aircraft taking off from an intersection on the same runway (same or opposite direction takeoff) behind a preceding departing category E aircraft by ensuring that the Category F aircraft does not start takeoff roll until at least *3 minutes* after the Category E aircraft has taken off.

2. Separate a Category G aircraft taking off from an intersection (same or opposite direction takeoff) behind a preceding departing Category D, E, or F aircraft by ensuring that the Category G aircraft does not start takeoff roll until at least *4½ minutes* after the Category D, E, or F aircraft has taken off from:

(a) The same runway.

(b) Parallel runways separated by less than 2,500 feet, or parallel runways separated by less than 2,500 feet with the runway thresholds offset by 500 feet or more, if flight paths will cross.

3. Separate a Category F aircraft taking off from an intersection (same or opposite direction takeoff) behind a preceding departing category D aircraft by ensuring that the Category F aircraft does not start takeoff roll until at least *3 minutes* after the Category D aircraft has taken off from:

(a) The same runway.

(b) Parallel runways separated by less than 2,500 feet, or parallel runways separated by less than 2,500 feet with the runway thresholds offset by 500 feet or more, if flight paths will cross.

4. Separate aircraft taking off from an intersection behind a preceding departing aircraft on the same runway (same or opposite direction takeoff), parallel runways separated by less than 2,500 feet, and parallel runways separated by less than 2,500 feet with the runway thresholds offset by 500 feet or more:

NOTE –
1. *The time interval begins when the preceding aircraft becomes airborne.*

2. *Parallel runways separated by less than 2,500 feet with runway thresholds offset by less than 500 feet must apply para 3-9-6, Same Runway Separation, subpara f.*

(a) Behind category A aircraft:

(1) Category B – *3 minutes.*

(2) Category C – 3½ *minutes.*

(3) Category D and E – *4 minutes.*

(4) Category F – *5 minutes.*

(5) Category G – *4½ minutes.*

(b) Behind category B aircraft:

(1) Category B, – *2½ minutes.*

(2) Category C, D, and E – *3 minutes.*

(3) Category F – *4 minutes.*

(4) Category G – *4½ minutes.*

(c) Behind category C aircraft:

(1) Category D and E – *3 minutes.*

(2) Category F – *4 minutes.*

(3) Category G – *4½ minutes.*

(d) All aircraft behind Category G – *4½ minutes.*

5. Inform aircraft when it is necessary to hold in order to provide the required time interval.

Phraseology through Reference, no change.

b. The time interval is not required when:

1. A pilot has initiated a request to deviate from the time interval contained in subparagraph a.1.

NOTE –
A request for takeoff does not initiate a waiver request; the request for takeoff must be accomplished by a request to deviate from the specific time interval.

b2, No change

3. Successive touch-and-go or stop-and-go operations are conducted with any aircraft following an aircraft in the pattern that requires wake turbulence separation, or a departing aircraft in accordance with subparagraphs a.1. through a.4., provided the pilot is maintaining visual separation/spacing behind the preceding aircraft. Issue a wake turbulence cautionary advisory and the position of the larger aircraft.

NOTE –
Not authorized with a Category A as the lead aircraft.

REFERENCE -
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraphs g and h.
FAAO JO 7110.65, Para 7-2-1, Visual Separation

b4, delete; renumber b5 to b4

4. If action is initiated to reduce the separation between successive touch-and-go or stop-and-go operations, apply the appropriate separation contained in subparagraphs a.1. through a.4.

c thru c2, no change.

3. Issue a clearance to permit the trailing aircraft to deviate from course enough to avoid the flight path of the preceding aircraft when applying subpara b1 or b2.

No further changes to paragraph.

3-9-8. INTERSECTING RUNWAY SEPARATION

Title through WAKE TURBULENCE APPLICATION, no change.

3. Separate IFR/VFR aircraft taking off behind a landing or departing aircraft on an intersecting runway if flight paths will cross (see FIG 3-9-7, 3-9-8, and 3-9-9), or an aircraft departing a parallel runway separated by 2,500 feet or more if projected flight paths will cross:

(a) Behind Category A aircraft:

(1) Category B – *2 minutes*.

(2) Category C – *2½ minutes.*

(3) Category D and E – *3 minutes.*

(4) Category F – *4 minutes.*

(5) Category G – *3½ minutes.*

(b) Behind Category B aircraft:

(1) Category B – *1½ minutes.*

(2) Category C, D, and E – *2 minutes*.

(3) Category F – *3 minutes.*

(4) Category G – *3½ minutes.*

(c) Behind Category C aircraft:

(1) Category D and E – *2 minutes.*

(2) Category F – *3 minutes*

(3) Category G – *3½ minutes.*

(d) Behind Category D aircraft:

(1) Category F – *2 minutes.*

(2) Category G – *3½ minutes.*

(e) Category G behind Category E and F aircraft – *3½ minutes.*

(f) All aircraft behind Category G – *3½ minutes.*

NOTE-
Takeoff clearance to the following aircraft should not be issued until the appropriate time interval has passed from when the preceding aircraft began takeoff roll.

FIG 3-9-7
Departure Behind Departure on Intersecting Runway

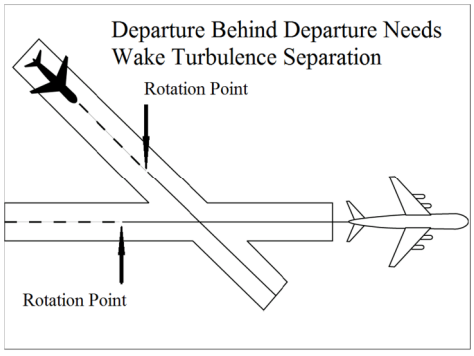


FIG 3-9-8
Departure Behind Arrival on Intersecting Runway

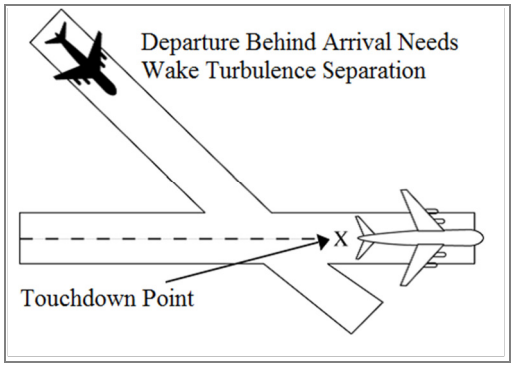
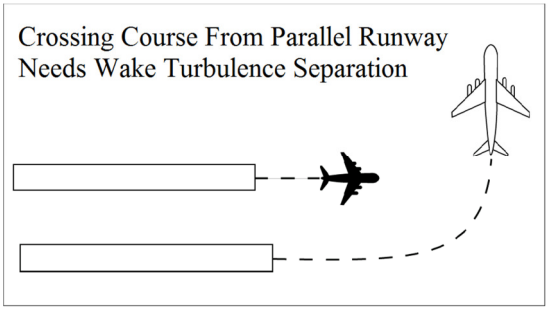


FIG 3-9-9
Parallel Runway



4. Pilot requests to deviate from the required time intervals must not be approved when wake turbulence separation is required.

b5, Delete

No further changes to paragraph.

3-9-9. NONINTERSECTING CONVERGING RUNWAY OPERATIONS

Title thru Wake Turbulence Application, no change

c. Separate IFR/VFR aircraft taking off behind a landing or departing aircraft on a crossing runway if projected flight paths will cross: (See FIG 3-9-15 and FIG 3-9-16)

NOTE-
Takeoff clearance to the following aircraft should not be issued until the appropriate time interval has passed from when the preceding aircraft began takeoff roll.

1. Behind Category A aircraft:

(a) Category B – *2 minutes*.

(b) Category C – *2½ minutes.*

(c) Category D and E – *3 minutes.*

(d) Category F – *4 minutes.*

(e) Category G – *3½ minutes.*

2. Behind Category B aircraft:

(a) Category B – *1½ minutes.*

(b) Category C, D, and E – *2 minutes*.

(c) Category F – *3 minutes.*

(d) Category G – *3½ minutes.*

3. Behind Category C aircraft:

(a) Category D and E – *2 minutes.*

(b) Category F – *3 minutes.*

(c) Category G – *3½ minutes.*

4. Behind Category D aircraft:

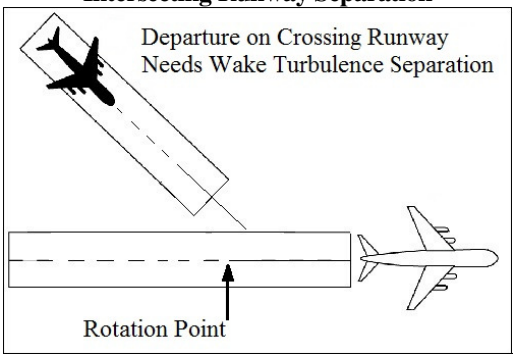
(a) Category F – *2 minutes.*

(b) Category G – *3½ minutes.*

5. Category G aircraft behind Category E and F – *3½ minutes.*

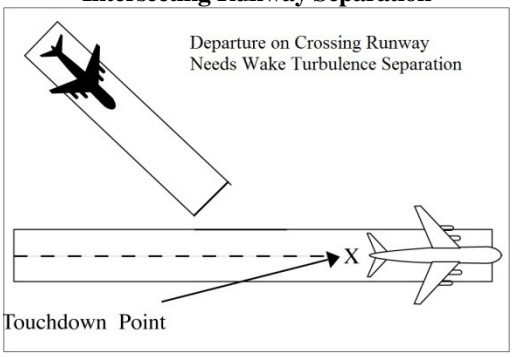
6. All aircraft behind Category G – *3½ minutes.*

FIG 3-9-15
Intersecting Runway Separation



Subparagraph d, delete

FIG 3-9-16
Intersecting Runway Separation



Renumber e to d

No further changes to paragraph

3-10-3. SAME RUNWAY SEPARATION

Title through Wake Turbulence Application, no change.

b. Issue wake turbulence advisories, and the position, altitude if known, and the direction of flight of departing or arriving aircraft on the same runway or parallel runways separated by less than 2,500 feet to:

1. Category B, C, D, E, F, and G aircraft behind category A or B aircraft.

2. Category D, E, F, and G aircraft behind category C aircraft.

3. Category F aircraft behind a category D aircraft.

4. All aircraft behind a category G aircraft.

No further changes to paragraph.

3-10-4. INTERSECTING RUNWAY/INTERSECTING FLIGHT PATH SEPARATION

Title through WAKE TURBULENCE APPLICATION, no change.

c. Separate IFR/VFR aircraft landing behind a departing aircraft on a crossing runway if the arrival will fly through the airborne path of the departure by the appropriate radar separation or the following interval: (See FIG 3-10-10):

REFERENCE -
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraph g.

1. Behind Category A aircraft:

(a) Category B – *2 minutes*.

(b) Category C – *2½ minutes.*

(c) Category D and E – *3 minutes.*

(d) Category F – *4 minutes.*

(e) Category G – *3½ minutes.*

2. Behind Category B aircraft:

(a) Category B – *1½ minutes.*

(b) Category C, D, and E – *2 minutes*.

(c) Category F – *3 minutes.*

(d) Category G – *3½ minutes.*

3. Behind Category C aircraft:

(a) Category D and E – *2 minutes.*

(b) Category F – *3 minutes.*

(c) Category G – *3½ minutes.*

4. Behind Category D aircraft:

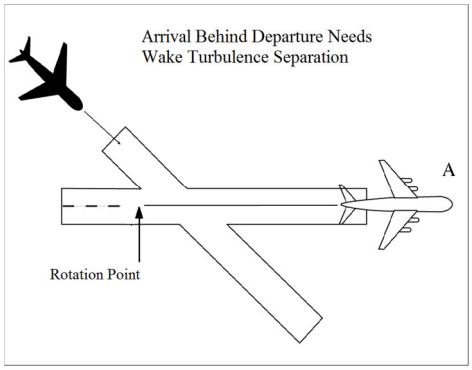
(a) Category F – *2 minutes.*

(b) Category G – *3½ minutes.*

5. Category G aircraft behind Category E and F – *3½ minutes.*

6. All aircraft behind Category G – *3½ minutes.*

FIG 3-10-10
Intersecting Runway Separation



d. Issue wake turbulence cautionary advisories including the position, altitude if known, and direction of flight to:

1. IFR/VFR aircraft landing on a crossing runway behind a departing aircraft that requires wake turbulence separation behind it if the arrival flight path will cross the takeoff path behind the departing aircraft rotation point. (See FIG 3-10-11)

NOTE –
Do not issue cautionary advisories to category G aircraft behind category D, E, or F aircraft.

REFERENCE -
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraph g.

FIG 3-10-11 through Example, no change.

2. VFR aircraft landing on a crossing runway behind an arriving aircraft that requires wake turbulence separation behind it if the arrival flight paths will cross. (See FIG 3-10-12.)

NOTE –
Do not issue cautionary advisories to category G aircraft behind category D, E, or F aircraft.

REFERENCE -
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraph h.

No further changes to paragraph

3-11-1. TAXI AND GROUND MOVEMENT OPERATION

Title through Wake Turbulence Application, no change.

d. Avoid clearances which require Category E or F aircraft or helicopters to taxi in close proximity to taxiing or hover-taxi helicopters.

No further changes to paragraph.

5-5-4. MINIMA

Title through a.4, no change

NOTE-
Wake turbulence procedures specify increased separation minima 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 Table 5-5-1 and in accordance with the following:

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

2. When operating within 2,500 feet of the flight path of the leading aircraft over the surface of the earth and/or less than 500 feet below a category D, E, or F 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 departing the parallel runway behind a Category D, E, or F 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 succeeding aircraft to pass behind the category D, E, or F aircraft.

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

2. *Do not issue cautionary advisories to category G aircraft behind category D, E, or F aircraft.*

Note 1 and 2, delete

TBL 5-5-1
Radar Wake Turbulence Separation – Directly Behind

		Trailing Aircraft						
		A	**B**	**C**	**D**	**E**	**F**	**G**
Lead Aircraft	**A**		4.5 NM	6 NM	7 NM	7 NM	8 NM	6 NM
	B		3 NM	4 NM	5 NM	5 NM	5 NM	6 NM
	C				3.5 NM	5 NM	5 NM	6 NM
	D						4 NM	6 NM
	E							6 NM
	F							6 NM
	G	6 NM	6 NM	6 NM	6 NM	6 NM	6 NM	6 NM

WAKE TURBULENCE APPLICATION

h. *ON APPROACH.* In addition to subpara g, separate an aircraft on approach behind another aircraft to the same runway by ensuring the separation minima in Table 5-5-2 will exist at the time the trailing aircraft is within 5 NM of the FAF.

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
Radar Wake Turbulence Separation – On Approach

		Trailing Aircraft						
		A	**B**	**C**	**D**	**E**	**F**	**G**
Lead Aircraft	**A**		4.5 NM	6 NM	7 NM	7 NM	8 NM	7 NM
	B		3 NM	4 NM	5 NM	5 NM	6 NM	7 NM
	C				3.5 NM	5 NM	6 NM	7 NM
	D						4 NM	7 NM
	E							7 NM
	F							7 NM
	G	7 NM	7 NM	7 NM	7 NM	7 NM	7 NM	7 NM

i. When *NOWGT* or *NOTPA* is displayed in an aircraft data block, provide *10 miles* separation behind the preceding aircraft and *10 miles* separation to the succeeding aircraft.

j., no change

1. Wake turbulence separation must be applied in accordance with Table 5-5-2.

j.2., delete

Renumber j.3. through j.5. to j.2. thru j.4.

No further changes to paragraph.

6-1-4. ADJACENT AIRPORT OPERATION

Title through WAKE TURBULENCE APPLICATION, no change.

The ATC facility providing service to and having control jurisdiction at adjacent airports must separate arriving or departing IFR aircraft on a course that will cross the flight path behind an aircraft requiring wake turbulence separation:

a. Behind Category A aircraft:

1. Category B – *2 minutes*.

2. Category C – *2½ minutes.*

3. Category D and E – *3 minutes.*

4. Category F – *4 minutes.*

5. Category and G – *3½ minutes.*

b. Behind Category B aircraft:

1. Category B – *1½ minutes.*

2. Category C, D, and E – *2 minutes*.

3. Category F – *3 minutes.*

4. Category G – *3½ minutes.*

c. Behind Category C aircraft:

1. Category D and E – *2 minutes.*

2. Category F – *3 minutes.*

3. Category G – *3½ minutes.*

d. Behind Category D aircraft:

1. Category F – *2 minutes.*

2. Category G – *3½ minutes.*

e. Category G aircraft behind Category E and F – *3½ minutes.*

f. All aircraft behind Category G – *3½ minutes.*

FIG 6-1-1
Adjacent Airport Operation -- Arrival

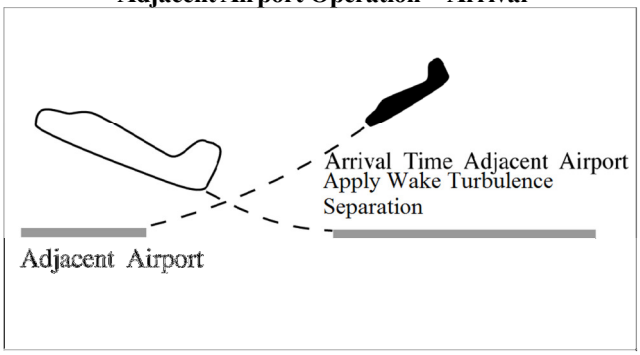
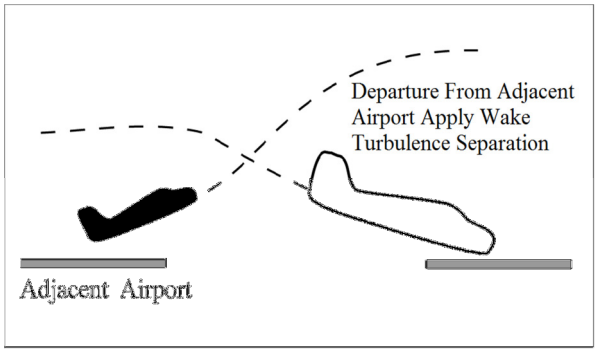


FIG 6-1-2
Adjacent Airport Operation – Departure



6-1-5. ARRIVAL MINIMA

TERMINAL

WAKE TURBULENCE APPLICATION

Separate IFR aircraft landing behind other arriving aircraft to the same runway, a parallel runway separated by less than 2,500 feet, or a crossing runway if projected flight paths will cross:

a. Behind Category A aircraft:

1. Category B – *2 minutes*.

2. Category C – *2½ minutes.*

3. Category D and E – *3 minutes.*

4. Category F – *4 minutes.*

5. Category G – *3½ minutes.*

b. Behind Category B aircraft:

1. Category B – *1½ minutes.*

2. Category C, D, and E – *2 minutes*.

3. Category F – *3 minutes*

4. Category G – *3½ minutes.*

c. Behind Category C aircraft:

1. Category D and E – *2 minutes.*

2. Category F – *3 minutes.*

3. Category G – *3½ minutes.*

d. Behind Category D aircraft:

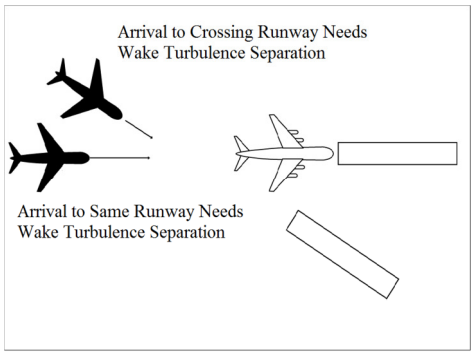
1. Category F – *2 minutes.*

2. Category G – *3½ minutes.*

e. Category G aircraft behind Category E and F – *3½ minutes.*

f. All aircraft behind Category G – *3½ minutes.*

FIG 6-1-3
Arrival Minima



6-7-5. INTERVAL MINIMA

Use the following time or radar interval as the minimum interval between successive approaches:

a. Minutes or miles in trail:

1. Behind Category A aircraft:

(a) Category B – *2 minutes* or *4.5 miles*.

(b) Category C – *2½ minutes* or *6 miles.*

(c) Category D and E – *3 minutes* or *7 miles.*

(d) Category F – *4 minutes* or *8 miles.*

(e) Category G – *3½ minutes* or *7 miles.*

2. Behind Category B aircraft:

(a) Category B – *1½ minutes* or *3 miles.*

(b) Category C – *2 minutes* or *4 miles.*

(c) Category D and E – *2 minutes* or *5 miles.*

(d) Category F – *3 minutes* or *6 miles.*

(e) Category G – *3½ minutes* or *7 miles*

3. Behind Category C aircraft:

(a) Category D – *2 minutes* or *3.5 miles.*

(b) Category E – *2 minutes* or *5 miles.*

(c) Category F – *3 minutes* or *6 miles.*

(d) Category G – *3½ minutes* or *7 miles.*

4. Behind Category D aircraft:

(a) Category F – *2 minutes* or *4 miles.*

(b) Category G – *3½ minutes* or *7 miles.*

5. Category G aircraft behind Category E and F – *3½ minutes* or *7 miles.*

6. All aircraft behind Category G – *3½ minutes* or *7 miles.*

b. Further increase of the interval may be necessary, considering the following:

1. Relative speeds of the aircraft concerned.

2. Existing weather conditions.

3. Distance between the approach fix and the airport

4. Type of approach being made.

NOTE –
Increased separation is required for smaller aircraft behind larger/heavier aircraft due to the possible effects of wake turbulence.

REFERENCE –
FAAO JO 7110.65, Para 5-9-5, Approach Separation responsibility
FAAO JO 7110.65, Para 6-7-1, Application
FAAO JO 7110.65, Para 6-7-2, Approach Sequence

7-2-1. VISUAL SEPARATION

Visual separation may be applied when other approved separation is assured before and after the application of visual separation. To ensure that other separation will exist, consider aircraft performance, wake turbulence, closure rate, routes of flight, known weather conditions, and aircraft position. Weather conditions must allow the aircraft to remain within sight until other separation exists. Visual separation is not authorized behind Category A aircraft or when *NOWGT* or *NOTPA* is displayed in the lead aircraft data block.

No further changes to paragraph

7-4-3. CLEARANCE FOR VISUAL APPROACH

Title through c3, no change

4. Do not apply visual separation when the lead aircraft is a category A or *NOWGT/NOTPA* is displayed in the lead aircraft data block.

REFERENCE –
FAAO JO 7110.65, Para 7-2-1, Visual Separation.

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

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–
FAAO JO 7110.65, Para.2–4–21, Description of Aircraft Types.
FAAO 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 apply visual separation when the lead aircraft is a category A or *NOWGT/NOTPA* is displayed in the lead aircraft data block. Do not permit an aircraft to overtake another aircraft if wake turbulence separation is required.

REFERENCE -
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraphs g and h.
FAAO JO 7110.65, para 7-2-1 Visual Separation..

No further changes to paragraph.

7-6-7. SEQUENCING

Title through c1, 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 -
FAAO JO 7110.65, Para 5-5-4, Minima, Subparagraph g.