

## AIRWORTHINESS LIMITATIONS (AWLS) AND CERTIFICATION MAINTENANCE REQUIREMENTS (CMRS)

**AMP Reference:** IAL/777/T Revision 00 Initial

### A. SCOPE

The scheduled maintenance requirements described in this document result from Model 777 airplane certification activities with the U.S. Federal Aviation Administration (FAA). Accordingly, this FAA approved Airworthiness Limitations and Certification Maintenance Requirements document is cross-referenced in the Model 777 Type Certificate Data Sheet. These maintenance actions are mandatory.

These Airworthiness Limitations sections are FAA approved and specifies maintenance required under Title 14 Code of Federal Regulations (CFR) § 43.16 and § 91.403 unless an alternative program has been FAA Oversight Office approved. The Airworthiness Limitations document must be used in its entirety at a specific revision level. Maintenance requirements and limitations from different revision levels shall not be combined.

Where used in this document, the term “FAA Oversight Office” is defined as the FAA office that currently has oversight responsibility for the type certificate of the Boeing model 777. At the time of publication, the FAA office with oversight responsibility for the type certificate of the 777 is the FAA Boeing Aviation Safety Oversight Office (BASOO).

For aircraft delivered after July 15, 2019, information regarding the effective revision of the MPD Section 9 document and the 777-200/200LR/300/300ER/ 777F DTR Document (D622W001-DTR) at the time each aircraft line number was issued its Original Standard Airworthiness Certificate can be found in MPD Section 9 and DTR Revision Effectivity Report letter MPE-RER-777-LNXXXX.

### AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations may only be revised with the approval of the FAA Oversight Office.

If the inspections cannot be accomplished due to repairs and/or modifications, an alternate inspection approved by the FAA Oversight Office must be used.

### CERTIFICATION MAINTENANCE REQUIREMENTS (CMRs)

These scheduled maintenance tasks may only be revised by the FAA Oversight Office. Principal Maintenance Inspectors (local regulatory authority) may not change these requirements, or the intervals associated with these requirements.

## B. AIRWORTHINESS LIMITATIONS – STRUCTURAL INSPECTIONS

### INTRODUCTION

The Structural Inspection Program approved in Section 3 of the 777 Maintenance Review Board (MRB) Report and contained in Section 2 of this MPD describes an initial baseline structural maintenance program for all Structural Significant Items (SSIs). This program was developed in accordance with the guidelines of MSG-3 and partially satisfies the requirements of Title 14 CFR § 25.571 by providing accidental and environmental damage detection opportunity for all SSIs, and in some cases, fatigue damage detection opportunity until the supplemental inspection threshold is reached. The supplemental structural inspections listed in this Section 9 "Airworthiness Limitations" are for those SSIs that do not receive adequate fatigue damage detection opportunity from the initial baseline structural program that is listed in Section 2 and in Appendix L. The inspections shown in this section and Appendix L are to be accomplished in conjunction with and not as a substitute for the existing structural maintenance program found in Section 2.

The supplemental structural inspection program uses the Damage Tolerance Rating (DTR) system to determine the inspections (and repeat intervals) necessary to provide adequate fatigue damage detection. The DTR system defines a required DTR (a numerical value) that must be achieved for each SSI. DTR Check Forms which define the inspection options and the required DTR are contained in Document D622W001-DTR.

The Airworthiness Limitations may only be revised with the approval of the FAA Oversight Office. If the inspections cannot be accomplished due to repairs and/or modifications, an alternate inspection approved by the FAA Oversight Office must be used.

### THRESHOLD (777-200/200LR/300/300ER Airplanes)

NOTE: In this section, "777-200" includes airplanes sometimes referred to as 777-200ER or 777-200IGW because those airplanes are certified as 777-200 airplanes per the applicable FAA Type Certificate.

The fatigue inspection requirements apply after accumulation of a certain number of flights (threshold). The initial fatigue inspections must be accomplished within one repeat interval of the threshold for 777-200/200LR/300/300ER and must never exceed 44,000 flight cycles. "FLS" Group 1 items must be within one inspection interval of the threshold and must never exceed the Group 2 limit in Figure 1. "FLS" Group 2 items must never exceed the Group 2 limit in Figure 1. The threshold for each of the 777-200/200LR/300/300ER aircraft fatigue inspections is defined in the Structural Inspections Table.

When reaching a threshold of 40,000 flight cycles, all MPD 4,000 flight cycle (or higher) structural inspection repeat intervals must be no greater than those shown in the MPD Section 2. This means that any operator, who has escalated the structures program by changing task intervals, must reduce the repeat frequencies back to the MPD baseline structures program intervals before accumulating 40,000 flight cycles. The reason for this is that the Title 14 CFR § 25.571 damage tolerance evaluation takes credit for the baseline structures program. The Airworthiness Limitations listed in Section 9 cover structure for which the required DTR is not met by the baseline structural inspections of Section 2. Any

continued escalation beyond the MPD baseline structures program may result in additional structure not meeting the required DTR which was the basis of certification.

In addition to the thresholds described above, a calendar threshold of 20 years applies unless an initial inspection of an FAA approved Corrosion Prevention and Control Program (CPCP) has occurred, constituting CPCP implementation. The Corrosion Prevention and Control program identified within the Structural Maintenance Program of the 777 Maintenance Review Board Report (D622W001-MRBR) is FAA approved and complies with this requirement if it has been fully incorporated into the operator's maintenance program.

Additionally, some structures and zonal MPD items have been escalated by the Industry Steering Committee beyond the initial repeat interval considered at certification. The intervals listed in Appendix L correspond to the original task intervals used in determining the DTR which satisfies Title 14 CFR § 25.571. As a result, at 40,000 flight cycles, the items listed in Appendix L are required to be returned to the interval in that appendix, rather than what is listed in Sections 2 and 3. This is to be in compliance with the damage tolerance certification requirements.

The Structural Inspections Table defines the Inspection Implementation Threshold for the 777-200/200LR/300/300ER. Some items are sensitive to flight length and are identified by FLS in the Threshold column of the Structural Inspections Table (See Figure 1). Flight Length Sensitive (FLS) Items require both flight hours and flight cycles to determine the Implementation Threshold. Refer to Figure 1 to determine the threshold for FLS Items.

For the 777-200/200LR/300/300ER, SSIs are also categorized as Group (1) or Group (2). Group 1 SSI Inspection Thresholds are limited to a maximum of 30,000 flight cycles and Group 2 SSI Inspection Thresholds are limited to a maximum of 40,000 flight cycles.

For those items which are not flight length sensitive, the lowest threshold shown in the Structural Inspections Table is 30,000 flights. Exceptions to this requirement are SSI 54-51-I02R, which has a threshold of 28,600 flights for the 777-200LR/300ER, and SSIs 28-00-I01A and 28-00-I01B have a threshold of 11,250 flights for the 777-200LR airplanes that have the optional auxiliary fuel tank installations. All other 777-200LR/300ER items which are not flight length sensitive have either a 30,000-flight threshold or 40,000 flight threshold depending upon whether the item is identified as Group 1 or Group 2. The minimum threshold for those items which are identified as flight length sensitive must be determined from Figure 1, based upon the actual airplane utilization.

Initial inspection (threshold) and intervals are measured in flight cycles or flight hours that a particular SSI detail has accumulated regardless of what the airframe as a whole has accumulated. Most SSI details have never been replaced and therefore have accumulated the same flight cycles and flight hours as the airframe. Some SSI details are replaced, such as when installing Removable Structural Components (repairable/rotatable/expendables) or installing used structural parts as a repair. In these cases, the SSI details have accumulated flight cycles and flight hours that may be different than the airframe.

The operator must account for this in determining when inspections must be done.

Although intended for repairs, FAA AC 120-93 Appendix 7, provides a method for determining the age of a Removable Structural Component, which may be applied to the baseline structure.

Inspection thresholds for fastener locations where the terminating action has been accomplished per AD 2000-11-11 or AD 2005-10-17 can start from the time when the terminating action was accomplished.

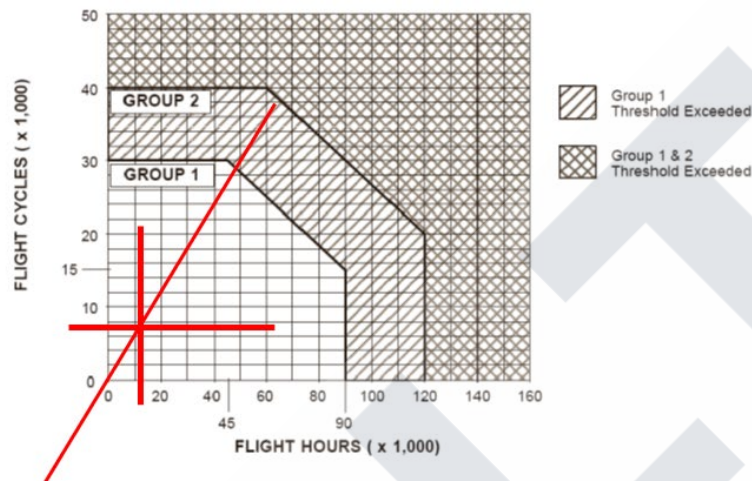


FIGURE 1. FLIGHT LENGTH SENSITIVE (FLS) THRESHOLD CURVE (777-200/200LR/300/300ER ONLY)

NOTE: In Figure 1 and the discussion of flight length sensitive threshold that immediately follows this note, "777-200" includes airplanes sometimes referred to as 777-200ER or 777-200IGW since those airplanes are certified as 777-200 airplanes per the applicable FAA Type Certificate.

#### FIGURE 1. FLIGHT LENGTH SENSITIVE (FLS) THRESHOLD CURVE (777-200 / 200LR / 300 / 300ER ONLY)

NOTE: In Figure 1 and the discussion of flight length sensitive threshold that immediately follows this note, "777-200" includes airplanes sometimes referred to as 777-200ER or 777-200IGW since those airplanes are certified as 777-200 airplanes per the applicable FAA Type Certificate.

MSN 12345 is a Group 1 aircraft and the FLS limitation is:

Flight Cycles: 34000

Flight Hours: 48000

## USE OF FLIGHT LENGTH SENSITIVE THRESHOLD CURVE (777-200/200LR/300/300ER ONLY)

(For FLS Items only; all non-FLS SSIs have thresholds as listed in the Airworthiness Limitations Table)

1. Determine the FLS status and Group of the SSI (777-200/200LR/300/300ER) from the Airworthiness Limitations Table.
2. Determine the total number of flight cycles and flight hours experienced by the detail.
3. If the detail is FLS, locate the intersection of Flight Hours and Cycles on the graph.
4. If the point determined by Step 3 lies below the Threshold Curve for the group from Step 1, the detail has not reached the Inspection Threshold. If the point is on the Threshold Curve for the specified group, then the Inspection Threshold has been reached. If the point is above or to the right of the Threshold Curve for the specified group, then the Inspection Threshold has been exceeded.

## THRESHOLD (777F Airplanes)

The fatigue inspection requirements apply after accumulation of a certain number of flights (threshold). The initial fatigue inspections must be accomplished at the threshold defined in the Structural Inspections Table, or within an interval not to exceed 2,500 flight cycles beyond the threshold.

“FLS” Group 1 items must be within one inspection interval of the threshold and must never exceed the Group 2 limit in Figure 2. “FLS” Group 2 items must never exceed the Group 2 limit in Figure 2. The threshold for 777F aircraft fatigue inspections is defined in the Structural Inspections Table.

When reaching a threshold of 25,000 flight cycles, all MPD 4,000 flight cycle (or higher) structural inspection repeat intervals must be no greater than those shown in the MPD Section 2. This means that any operator, who has escalated the structures program by changing task intervals, must reduce the repeat frequencies back to the MPD baseline structures program intervals before accumulating 25,000 flight cycles. The reason for this is that the Title 14 CFR § 25.571 damage tolerance evaluation takes credit for the baseline structures program. The Airworthiness Limitations listed in Section 9 cover structure for which the required DTR is not met by the baseline structural inspections of Section 2. Any continued escalation beyond the MPD baseline structures program may result in additional structure not meeting the required DTR which was the basis of certification.

In addition to the thresholds described above, a calendar threshold of 20 years applies unless an initial inspection of an FAA approved Corrosion Prevention and Control Program (CPCP) has occurred, constituting CPCP implementation. The CPCP identified within the Structural Maintenance Program of the 777 Maintenance Review Board Report (D622W001-MRBR) is FAA approved and complies with this requirement if it has been fully incorporated into the operator’s maintenance program.



Additionally, some structures and zonal MPD items have been escalated by the Industry Steering Committee beyond the initial repeat interval considered at certification. The intervals listed in Appendix L correspond to the original task intervals used in determining the DTR which satisfies Title 14 CFR § 25.571. As a result, at 25,000 flight cycles, the items listed in Appendix L are required to be returned to the interval in that appendix, rather than what is listed in Sections 2 and 3. This is to be in compliance with the damage tolerance certification requirements.

The Structural Inspections Table defines the Inspection Implementation Threshold for the 777F. Some items are sensitive to flight length and are identified by FLS in the Threshold column of the Structural Inspections Table (See Figure 2). Flight Length Sensitive (FLS) Items require both flight hours and flight cycles to determine the Implementation Threshold. Refer to Figure 2 to determine the threshold for FLS Items.

For the 777F, SSIs are also categorized as Group 1 or Group 2. Group 1 SSI Inspection Thresholds are limited to a maximum of 18,750 flight cycles and Group 2 SSI Inspection Thresholds are limited to a maximum of 25,000 flight cycles.

For those items which are not flight length sensitive, the lowest threshold shown in the Structural Inspections Table is 18,750 flights. All other 777F items which are not flight length sensitive have either a 18,750 flight threshold or 25,000 flight threshold depending upon whether the item is identified as Group 1 or Group 2. The minimum threshold for those items which are identified as flight length sensitive must be determined from Figure 2, based upon the actual airplane utilization.

Initial inspection (threshold) and intervals are measured in flight cycles or flight hours that a particular SSI detail has accumulated regardless of what the airframe as a whole has accumulated. Most SSI details have never been replaced and therefore have accumulated the same flight cycles and flight hours as the airframe. Some SSI details are replaced, such as when installing Removable Structural Components (repairable/rotatable/expendables) or installing used structural parts as a repair. In these cases the SSI details have accumulated flight cycles and flight hours that may be different than the airframe.

The operator must account for this in determining when inspections must be done.

Although intended for repairs, FAA AC 120-93 Appendix 7, provides a method for determining the age of a Removable Structural Component, which may be applied to the baseline structure.

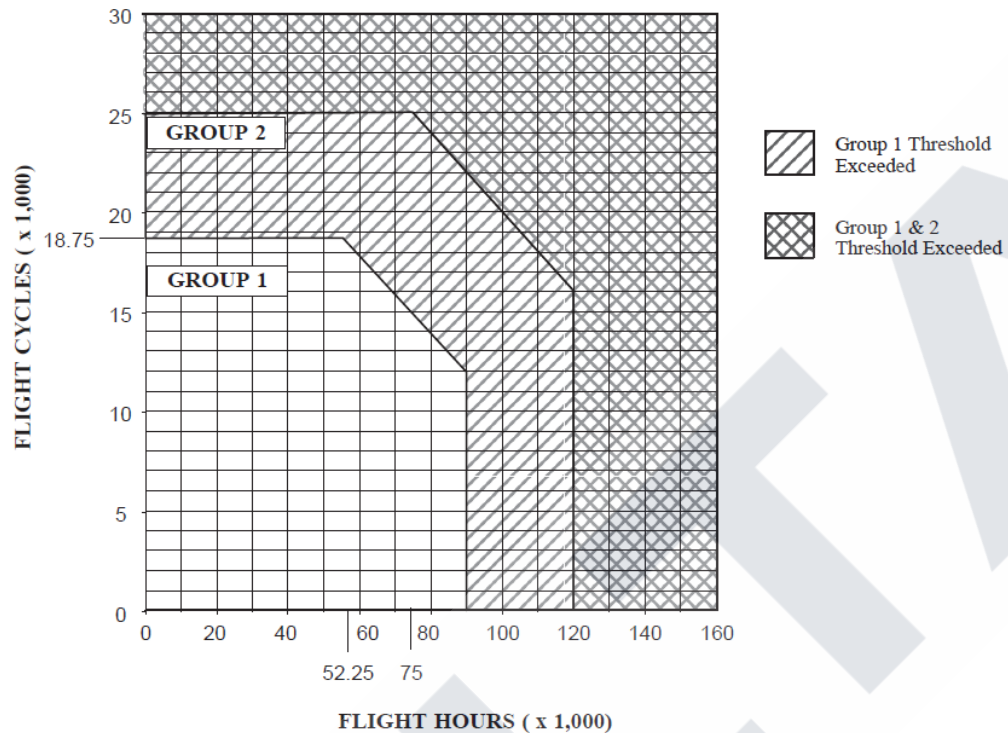


FIGURE 2. FLIGHT LENGTH SENSITIVE (FLS) THRESHOLD CURVE (777F ONLY)

FIGURE 2. FLIGHT LENGTH SENSITIVE (FLS) THRESHOLD CURVE (777F ONLY)

#### USE OF FLIGHT LENGTH SENSITIVE THRESHOLD CURVE (777F ONLY)

(For FLS Items only; all non-FLS SSIs have thresholds as listed in the Airworthiness Limitations Table)

1. Determine the FLS status and Group of the SSI (777F) from the Airworthiness Limitations Table.
2. Determine the total number of flight cycles and flight hours experienced by the detail.
3. If the detail is FLS, locate the intersection of Flight Hours and Cycles on the graph.
4. If the point determined by Step 3 lies below the Threshold Curve for the group from Step 1, the detail has not reached the Inspection Threshold. If the point is on the Threshold Curve for the specified group, then the Inspection Threshold has been reached. If the point is above or to the right of the Threshold Curve for the specified group, then the Inspection Threshold has been exceeded.

## C. AIRWORTHINESS LIMITATIONS – STRUCTURAL SAFE-LIFE LIMITS

NOTE: In this section, airplanes identified as "777-200IGW" are 777-200 airplanes that have been certified for a structural capability of MTW>547,000 lbs.

This includes airplanes sometimes called "777-200ER" airplanes. All of these airplanes were certified as 777-200 series airplanes per the applicable FAA Type Certificate. The airplanes identified as 777-200IGW airplanes in this section consist of all airplanes identified by Customer Variable Numbers (Manufacturer Block Numbers) WB001 through WB500 and WC001 through WC999. If needed, refer to the 777 Structural Repair Manual front matter Effective Aircraft "Manufacturer Block Number" to determine the associated Manufacturer Serial Numbers. 777-200LR airplanes are not included in the group of airplanes identified as 777-200 or 777-200IGW.

### STRUCTURAL SAFE-LIFE PARTS

LANDING GEAR: See Note	LANDING GEAR LIFE LIMIT:*	
	FAA	EASA
777-200/-200IGW/-300 Nose Landing Gear	77,500	46,500
Except: Inner Cylinder	73,300	44,000
777-200/-200IGW/-300 Main Landing Gear,	86,200	51,700
Except: Outer Cylinder, 161W1110-3 S/N 5JHW and 161W1110-4 S/N 1JHW	12,857	7,714
Outer Cylinder, 161W1110-3 S/N 4JAW and 161W1110-4 S/N 6JAN	15,090	9,054
Outer Cylinder, 161W1110-3 S/N 1JJW and 161W1110-4 S/N 3JRW	15,677	9,406
Outer Cylinder, 161W1110-3, -4, -9, -10	16,666	10,000
Outer Cylinder, Other Part Numbers	66,600	40,000
Lower Drag Strut, 161W4003 and 161W4103	76,300	45,700
Upper Side Strut Spindle, 161W0100	83,300	50,000
Lower Actuator Attach Pin, 161W1020	83,300	50,000
Spacer Tube, 161W1159	83,300	50,000
Aft Trunnion Pin, 161W1301	83,300	50,000
Lower Side Strut Spindle, 161W1310	83,300	50,000
777-200/-200IGW/-300 Main Landing Gear Support Structure	86,200	51,700
Except: Load Distribution Plate – Outboard Gear Beam Support 112W1725-1, -3, -4, -19, -21, -22	44,000	26,400
112W1725-7, -8, -9, -10	99,600	59,500
112W1725-13, -14, -15, -16	74,200	44,500
Pin – Fuse, Outboard Gear Beam Support, 112W1728-3, -9	29,400	17,600
112W1728-4, -5	99,600	59,500
112W1728-7	74,200	44,500
Pin – Fuse Retract Actuator, 112W1769	28,181	16,908
Hanger Pin Details (Fwd & Aft), 115W1510	83,300	50,000
Pin – Stabilizer Brace, MLG Beam, 115W1671	83,300	50,000
* Shown in number of landings.		
LANDING GEAR:	LANDING GEAR LIFE LIMIT:	
	FAA	EASA
777-200LR/300ER/777F Main Landing Gear	Figure 5 (FAA & EASA)	
777-200LR/300ER/777F Main Landing Gear Support Structure	Figure 6 (FAA & EASA)	
777-200LR/300ER/777F Nose Landing Gear	Figure 7 (FAA & EASA)	

NOTE: Component Interchangeability Lists 161W0003 (Main Landing Gear) and 162W0002 (Nose Landing Gear) provide complete listings of 777-200/200IGW/200LR/300/300ER/777F landing gear related components subject to life limitations.



## LIFE-LIMITED PARTS

NOTE: Component Interchangeability Lists 161W0003 (Main Landing Gear) and 162W0002 (Nose Landing Gear) provides a complete list of 777-200/200IGW/200LR/300/300ER/777F landing gear related components subject to life limitations.

COMPONENT:	LIFE LIMIT:
777-200 Actuator Assembly – Door Main Landing Gear  NOTE: Life Limitation applies only to P/N 293W3702-5 actuators installed on 777-200 airplane Line Numbers 2-13, 15-17 and 19-29. Incorporation of SB 777-32-0028 (reference Service Letters 777-SL-32-006 and 777-SL-001-E) removes the life limit and re-identifies it as a -7 Actuator.	10,000 Landings
777-200/-200 IGW/-300 Flight Deck Side Stowage Compartment Latch – Captain & First Officer (if compartment is installed). NOTE: Life Limitation is not Applicable Production Line Nos. 282 and on or following incorporation of SB 777-25-0140.	365 Days Time In-Service
777-200LR Optional Auxiliary Body Fuel Tanks  NOTE: This limit is based on fatigue test cycles completed to date and this limit will be increased or removed after additional test cycles are completed.	15,000 Cycles
777-300ER Semi Lever Gear Hydraulic Strut (P/N 293W4201-2).	2,000 Landings
777-200LR/300ER/777F Main Landing Gear Outer Cylinder  NOTE: Life Limitation applies to P/N 161W2110-13 (LH) and 161W2110-14 (RH) Outer Cylinders with Serial Numbers:  161W2110-13: S/N WHM5001, WHM5002, WHM5003, WHM5007, WHM5017, WHM5021, WHM5023, WHM5033, WHM5039, WHM5041, WHM5045, WHM5047, WHM5053.  161W2110-14: S/N WHM5002, WHM5003, WHM5008, WHM5010, WHM5012, WHM5014, WHM5020, WHM5032, WHM5036, WHM5040, WHM5046, WHM5048, WHM5052.	Figure 5

### Instructions for using Safe-Life Charts:

1. For each safe life component, determine the accumulated flight cycles and flight hours.
2. Enter the Safe-Life Limit Curve at the appropriate flight cycles and flight hours and locate the intersection.
3. If the point determined in Step 2 lies below the Safe-Life Limit Curve, the component has not reached the Safe-Life Limit. If the point is on, above, or to the right of the Safe-Life Curve, then the Safe-Life Limit has been reached.

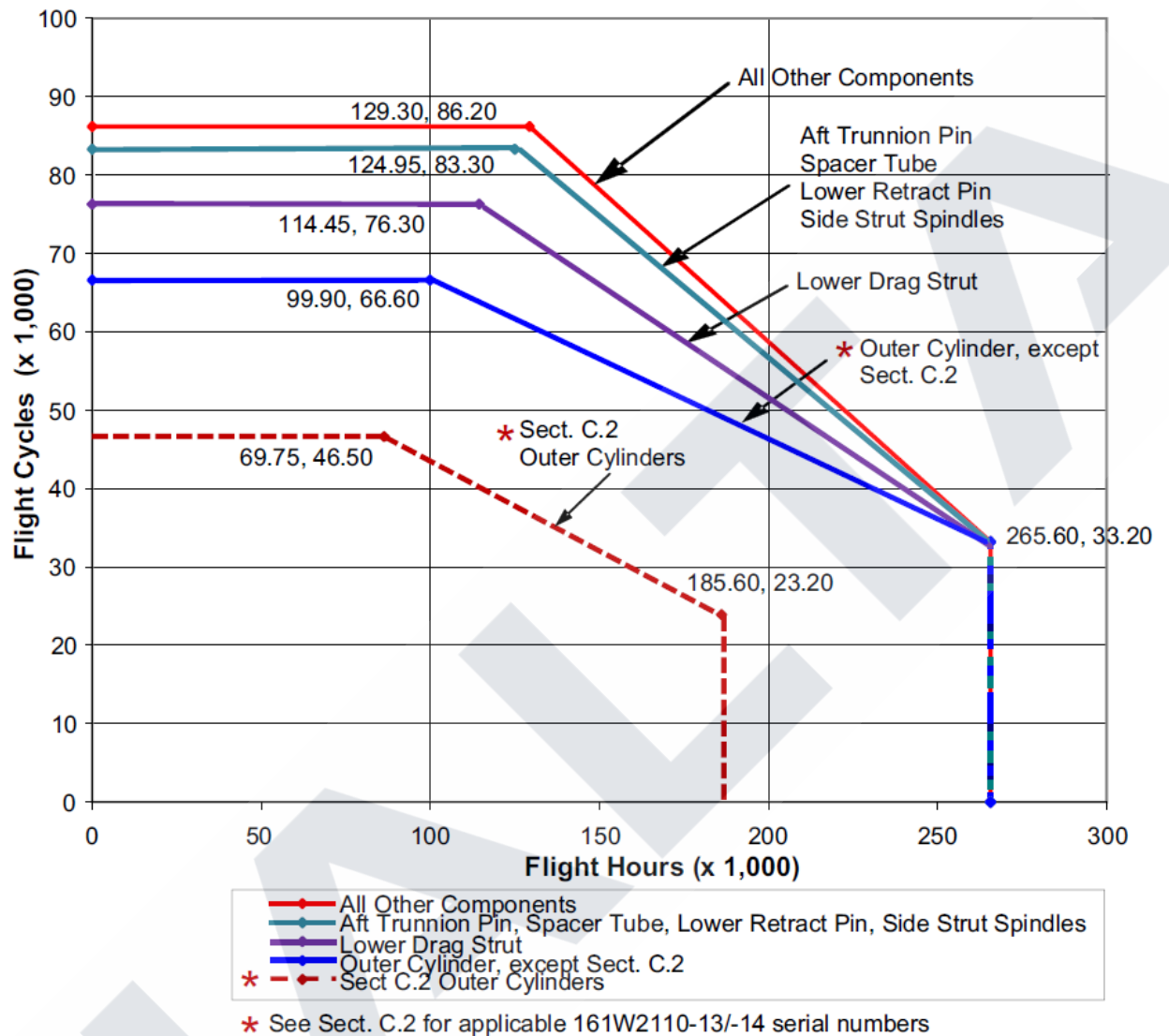


FIGURE 5. 777-200LR/300ER/777F MAIN LANDING GEAR SAFE-LIFE LIMITS

### Main Landing Gear Support Fittings Safe-Life Limits

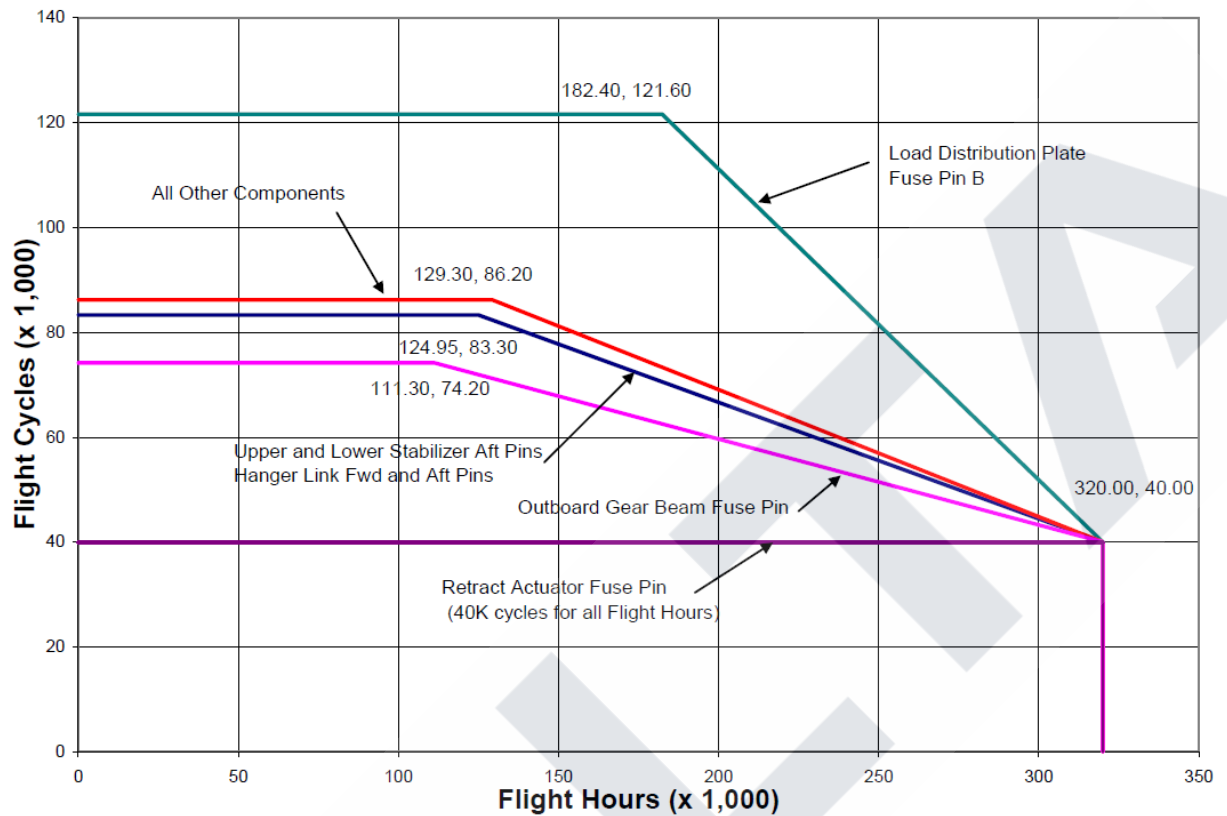


FIGURE 6. 777-200LR/300ER/777F MAIN LANDING GEAR SUPPORT FITTINGS SAFE-LIFE LIMITS

### Nose Landing Gear Safe-Life Limits

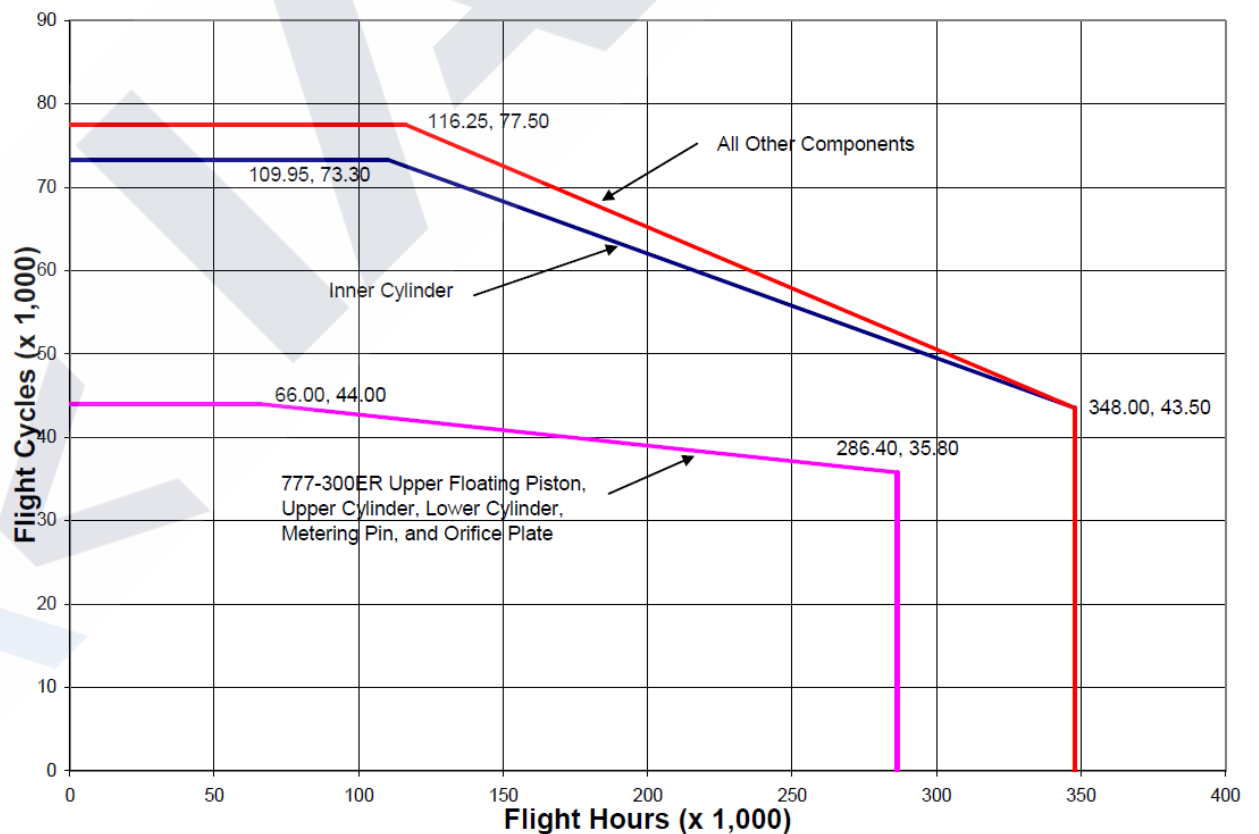


FIGURE 7. 777-200LR/300ER/777F NOSE LANDING GEAR SAFE-LIFE LIMITS  
IALTA Continued Airworthiness Management CAME

## D AIRWORTHINESS LIMITATIONS – SYSTEMS

### INTRODUCTION

The airplane systems maintenance requirements described in this AWL document result from various 777 airplane certification activities with the FAA. This Airworthiness Limitations section is FAA-approved and specifies maintenance required under Title 14 CFR § 43.16 and § 91.403 of the Federal Aviation Regulations, unless an alternative program has been FAA Oversight Office approved. The AWLs may only be revised with the approval of the FAA Oversight Office. If the maintenance requirements cannot be accomplished due to repairs and/or modifications, an alternate inspection, acceptable to the FAA Oversight Office, must be used.

An AWL may be an Airworthiness Limitation Instruction (ALI) or a Critical Design Configuration Control Limitation (CDCCL).

CDCCLs are a means of identifying certain design configuration features intended to preclude a fuel tank ignition source for the operational life of the airplane as required under Special Federal Aviation Regulation No. 88 (SFAR 88) - Fuel Tank System Fault Tolerance Evaluation Requirements and Title

14 CFR § 25.981 - Fuel Tank Ignition Prevention. CDCCLs are mandatory and cannot be changed or deleted without the approval of the FAA Oversight Office. A critical fuel tank ignition source prevention feature may exist in the fuel system and its related installation or in systems that, if a failure condition were to develop, could interact with the fuel system in such a way that an unsafe condition would develop without this limitation. Strict adherence to configuration, methods, techniques, and practices as prescribed is required to ensure compliance with the CDCCL. Any use of parts, methods, techniques or practices not contained in the applicable CDCCL must be approved by the FAA Oversight Office. For each CDCCL, the word "maintenance" includes maintaining any installation during alterations; therefore, adherence to the CDCCL is required during maintenance or alterations.

ALIs identify inspection tasks that must be done to maintain the design level of safety for the operational life of the airplane to prevent an unsafe condition.

ALIs are mandatory and cannot be changed or deleted without the approval of the FAA Oversight Office. Strict adherence to methods, techniques and practices as prescribed is required to ensure the ALI is complied with. Any use of methods, techniques or practices not contained in these ALIs must be approved by the FAA Oversight Office.

### REGULATORY AGENCY APPROVAL

Any deviations from the published AWL instructions included in this document require approval from the FAA Oversight Office. This applies to operators under the U.S. FAA jurisdiction only and to airplanes registered in the U.S. Operators who are not under the U.S. FAA jurisdiction should obtain approval from their own local regulatory agency for any deviations from the listed AWL instructions.

### AWL REVISION PROCESS

In the event that an AWL is revised, Boeing will prepare a revision to this document that will be approved by the FAA Oversight Office. This revision will then be forwarded to all 777 operators and the FAA Oversight Office.

## ACCOMPLISHMENT INSTRUCTIONS – GENERAL INFORMATION

The listed AWLs may make reference to Instructions for Continued Airworthiness which are included in other Boeing documents.

- When a document is cited using the words "in accordance with" in an airworthiness limitation, the cited document (or document section) must be followed to ensure that the critical design feature is maintained. Any deviation from the cited document requires FAA Oversight Office approval.
- When a document is cited using the words "refer to" in an airworthiness limitation, the cited document (or document section) represents one method of complying with the airworthiness limitation. An alternative procedure may be developed by an operator in accordance with its procedures in its maintenance program/manual.

For electrical bonding and grounding requirements, refer to the Boeing Standard Wiring Practices Manual (SWPM) 20-20.

## USE OF ALTERNATE OR EQUIVALENT TOOLS, TEST EQUIPMENT OR MATERIALS

For AWLs which require use of certain tools, test equipment or material, the use of alternate or equivalent tools, test equipment or materials requires prior approval from the FAA Oversight Office.

The Component Maintenance Manuals (CMMs) listed in the AWLs as "in accordance with" and not "refer to" are currently FAA Oversight Office approved.

If the CMM allows the use of alternate or equivalent tools, test equipment or materials, use of an alternate or equivalent tool, test equipment or material does not require further approval by the FAA Oversight Office.

## EXCEPTIONAL SHORT-TERM EXTENSIONS

Since AWL intervals are based on estimations of the probability of an event, an exceptional short-term extension for each system AWL listed in this document may be made without jeopardizing safety. The local regulatory authority or a Principal Maintenance Inspector must concur with any exceptional short-term extensions before they take place using procedures established with the local regulatory authority in the operators' manuals. The "exceptional short-term extension" process is applicable to AWL intervals. It should not be confused with the operators "short-term escalation" program for normal maintenance tasks described in the operators' manuals and in the Flight Standards Handbook 8900.1 FSIMS.

The FAA Oversight Office have accepted that these exceptional short-term extensions may be granted without consultation with that office:

1. The term "exceptional short-term extension" is defined as an increase in a system AWL interval that may be needed to cover an uncontrollable or unexpected situation. All AWLs listed in this section have been approved with an exceptional short-term extension of 30 days.
2. Repeated use of extensions, either on the same airplane or on similar airplanes in an operator's fleet, should not be used as a substitute for good management practices. Exceptional short-term extensions must not be used for fleet AWL extensions.
3. After a system AWL has experienced an exceptional short-term extension, the AWL interval will revert back to its interval listed in this document. The FAA Oversight Office must approve, prior to its use, any desired extension not explicitly listed above.



NOTE: This exceptional short-term extension listed above applies to airlines that fall under the U.S. FAA jurisdiction only. Operators who are not under the U.S. FAA jurisdiction should obtain interval extension approvals from the local regulatory agency.

## DEFINITIONS

**Removed and Reinstalled or Replaced:** Defined as removal and reinstalling or replacement of a component, including partial removals.

**Disturbed:** Defined as interference, movement or change to the arrangement or order of the referenced component.

**New wiring:** Defined as any alteration that installs wiring that is added to the airplane after initial Airplane Airworthiness Certificate issuance or after the date that the MPD Section 9, D622W001-9, was first incorporated into an operator's maintenance program, whichever is later.

**Sealant:** Defined as sealant type BMS 5-45 or equivalent in accordance with SRM 51-20-05 for inside of fuel tank and sealant type BMS 5-95, or equivalent, in accordance with SRM 51-20-05 for outside of the fuel tank.

**FAA Oversight Office:** Defined as the FAA office that currently has oversight responsibility for the type certificate of the Boeing Model 777 aircraft. At the time of publication, the FAA Oversight Office is the FAA BASOO.

**Maintenance:** Defined as inspection, overhaul, repair, preservation, and the replacement of parts, but excludes preventive maintenance.

**Fay Surface Bond:** Defined as the mechanical joining of two conductive surfaces to provide an electrically conductive joint without sealing (Category 1 Electrical Fay Surface Bond, refer to Boeing SWPM 20-20-00).

**Fay Sealed Fay Surface Bond:** Defined as the mechanical joining of two conductive surfaces to provide an electrically conductive joint, with a layer of sealant to one of the mating surfaces (Category 2 Electrical Fay Surface Bond, refer to Boeing SWPM 20-20-00).

**Fillet Sealed Fay Surface Bond:** Defined as the mechanical joining of two conductive surfaces to provide an electrically conductive joint, with a continuous bead of sealant along the edges of the joint (Category 6 Electrical Fay Surface Bond, refer to Boeing SWPM 20-20-00).

**Cushion Clamp:** Defined as a clamp that has an electrical insulating cushion on the metal band which isolates the wire bundle from the conductive metal part of the clamp when the clamp is closed.

## SUPPORTING DOCUMENTATION

Strict adherence to methods, techniques and practices as prescribed is required to ensure the ALI or CDCCL is complied with. Airlines must follow the manufacturer's maintenance procedures when performing maintenance that has an effect on an ALI or CDCCL. If operators do not obey the procedures, it can increase the risk of an unsafe condition. Any use of methods, techniques or practices not contained in these ALIs or CDCCLs must be approved by the FAA Oversight Office.

## PAGE FORMAT: SYSTEMS AIRWORTHINESS LIMITATIONS

COLUMN	EXPLANATION
AWL NUMBER	Each task is given a unique AWL Item Number. The first and second digits are the ATA Chapter Number.
TASK ALI	Airworthiness Limitation Instruction. These tasks are inspections that should be performed at the listed intervals.
CDCCL	Critical Design Configuration Control Limitation
INTERVAL	Task frequencies are specified in terms of a usage parameter such as flight hours, cycles, or calendar time.
APPLICABILITY	Airplane model applicability.
DESCRIPTION	Description of the task to be performed or critical design configurations aspects that cannot be changed without violating the intent of the design.

## FUEL SYSTEMS IGNITION PREVENTION

This section contains an FAA-approved program of scheduled inspections and design limitations for operators to incorporate into their maintenance program for this type design to meet the standards and assumptions introduced by Title 14 CFR § 25.981 and Special Federal Aviation Regulation No. 88 (SFAR 88). SFAR 88 – Fuel Tank System Fault Tolerance Evaluation Requirements and Title 14 CFR § 25.981 – Fuel Tank Ignition Prevention require maintenance instructions and control limitations for certain fuel tank critical design configurations.

NOTE: The auxiliary fuel tank installation has been shown to comply with Title 14 CFR § 25.981 at Amendment 25-102.

Paragraph 2(a) of SFAR 88 and Paragraph (b) of the standard introduced by Title 14 CFR § 25.981 (Amendment 25-102) requires certain design approval holders of Type Certificates (TCs) and Supplemental Type Certificates (STCs) of large transport airplanes to conduct a safety review of the fuel tank systems. The purpose of the safety review is to identify design features that may result in development of ignition sources in the fuel tank. Fuel system AWLs are mandatory maintenance actions required to ensure that unsafe conditions identified by the SFAR 88 safety review do not occur or are not introduced into the fuel tank system as a result of configuration changes, repairs, alterations, or deficiencies in the maintenance program throughout the operational life of the airplane.

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION	Applicable MSN 12345
28-AWL-01	ALI	16,000 FC/ 3,000 DY NOTE	ALL	<p>External Wires Over Center Fuel Tank</p> <p>Concern: Potential for wire chafing and arcing to Center Fuel Tank Upper Panel.</p> <p>Perform a detailed inspection of the wire bundles routed over the center fuel tank and under the main deck floor boards to detect damaged wire bundles, damaged clamps, damaged sleeving (if installed), wire chafing, and that the wire bundle is not in contact with surface of the center fuel tank (refer to Boeing AMM 28-11-00).</p> <p>NOTE: The Boeing Standard Wiring Practice Manual (SWPM) contains accepted practices for repair or replacement of existing wiring:</p> <p>For assembly and installation, refer to Boeing SWPM 20-10-11. For repair procedures, refer to Boeing SWPM 20-10-13.</p> <p>For seal fittings, refer to Boeing SWPM 20-10-22.</p> <p>INTERVAL NOTE: Whichever comes first.</p>	Y
28-AWL-02	CDCCL	N/A	ALL	<p>External Wires Over Center Fuel Tank</p> <p>Concern: Potential for wire chafing and arcing to Center Fuel Tank Upper Panel.</p> <p>If any maintenance, preventative maintenance, or alteration is performed in the area under the main deck floor boards and over the Center Fuel Tank, verify the following (refer to Boeing AMM 28-11-00) in the affected areas where maintenance was performed:</p> <ol style="list-style-type: none"> <li>1. Maintain existing (or newly approved) wire bundle routing, clamping and sleeving.</li> <li>2. Wire bundles, clamps, and sleeving are not damaged.</li> <li>3. Wires are not chafed.</li> <li>4. Wire bundles are not in contact with the surface of the Center Fuel Tank. NOTE: Boeing AMM 53-01-01 contains access information to these areas.</li> </ol> <p>The Boeing Standard Wiring Practice Manual (SWPM) contains accepted practices for repair or replacement of existing wiring:</p> <p>For assembly and installation, refer to Boeing SWPM 20-10-11. For repair procedures, refer to Boeing SWPM 20-10-13.</p> <p>For seal fittings, refer to Boeing SWPM 20-10-22.</p>	Y

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-03	ALI	16,000 FC/ 3,000 DY NOTE	ALL	<p>Fuel Quantity Indicating System (FQIS) – Out of Tank Wiring Lightning Shield to Ground Termination Concern: Potential for lightning-induced voltages on the FQIS wiring to enter the fuel tank.</p> <p>Using a Loop Resistance Tester, BAE Systems Dallas Service Center (3X2T2), P/N 906-10246-2 or 906-10246-3, perform the following inspection to ensure the functional integrity of the FQIS wiring shield to ground termination (refer to Boeing AMM 05-55-54):</p> <ol style="list-style-type: none"> <li>1. Measure the joint resistance of the FQIS receptacle to structure (spar) and verify resistance is 0.0030 ohm (3.0 milliohms) or less.</li> <li>2. Measure and verify the resistance of the shield to ground termination for the following items:               <ol style="list-style-type: none"> <li>a. The loop resistance is 0.040 ohm (40 milliohms) or less for Connector D28103P (Left Inboard Main Tank Rear Spar) Wire Bundle W8073.</li> <li>b. The loop resistance is 0.053 ohm (53 milliohms) or less for Connector D28102P (Left Outboard Main Tank Rear Spar) Wire Bundle W8072.</li> <li>c. The loop resistance is 0.040 ohm (40 milliohms) or less for Connector D28101P (Left Center Tank Front Spar) Wire Bundle W8010.</li> <li>d. The loop resistance is 0.040 ohm (40 milliohms) or less for Connector D28201P (Right Center Tank Front Spar) Wire Bundle W8020.</li> <li>e. The loop resistance is 0.053 ohm (53 milliohms) or less for Connector D28202P (Right Outboard Main Tank Rear Spar) Wire Bundle W8077.</li> <li>f. The loop resistance is 0.040 ohm (40 milliohms) or less for Connector D28203P (Right Inboard Main Tank Rear Spar) Wire Bundle W8078.</li> </ol> </li> </ol> <p>INTERVAL NOTE: Whichever comes first.</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-04	CDCCL	N/A	ALL	<p>FQIS – Out Tank Wiring Lightning Shield to Ground Termination</p> <p>Concern: Potential for lightning-induced voltages on the FQIS wiring to enter the fuel tank.</p> <p>1. If maintenance, preventative maintenance, or alteration is performed that disconnects the in-tank receptacle from the spar or opens an FQIS wire bundle shield to ground path, then perform the bond check for the type of ground path opened as listed below:</p> <p>a. For the electrical joint between the plug's backshell and structure (spar) at the wing rear spar connectors D28102P, D28103P, D28202P and D28203P and the wing front spar connectors D28101P and D28201P, the following design features must be verified (applicable to all airplanes) (refer to Boeing AMM 28-41-05):</p> <p>I. For the FQIS in-tank wiring spar receptacle:</p> <p>A. A bonding jumper is installed between the FQIS spar receptacle's mounting bolt and a stiffener on the spar with the red end of the jumper attached to the spar stiffener.</p> <p>B. After installation of the bonding jumper, the electrical bonding resistance between the FQIS in-tank wiring spar receptacle and the spar is 0.0030 ohm (3.0 milliohms) or less.</p> <p>C. A cap seal is applied over both ends of the jumper terminal lugs.</p> <p>II. For the out tank wire bundle plug to the FQIS in-tank wiring spar receptacle:</p> <p>A. For the electrical joint between the out tank plug's backshell and in-tank wiring spar receptacle, the electrical bonding resistance is 0.0030 ohm (3.0 milliohms) or less.</p> <p>b. Based on the installation, only one of the following configurations is applicable (refer to Boeing AMM 05-55-54):</p> <p>I. Configuration 1 (airplanes with out of tank wire bundle with P connectors within the wheel well):</p> <p>A. For the electrical joint between the connector backshell and primary structure within the wheel well for connectors D28113P, D28112P, D28212P and D28213P, and within the forward cargo for connectors D28211P and D28111P, the following design feature must be verified:</p> <p>(1) The electrical bonding resistance between the connector backshell and primary structure is 0.0025 ohm (2.5 milliohms) or less.</p> <p>(Continued on next page)</p>



**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-04, Continued	CDCCL	N/A	ALL	<p>FQIS – Out Tank Wiring Lightning Shield to Ground Termination, Continued</p> <p>II. Configuration 2 (airplanes with out of tank wire bundle with J connectors within the wheel well):</p> <p>A. For the electrical joint between the connector backshell and primary structure within the wheel well for connectors D28113J, D28112J, D28212J and D28213J, and within the forward cargo for connectors D28211P and D28111P, the following design features must be verified:</p> <p>(1) The electrical bonding resistance between the connector backshell and primary structure at the wheel well is 0.0020 ohm (2.0 milliohms) or less.</p> <p>(2) The electrical bonding resistance between the connector backshell and primary structure at the forward cargo is 0.0025 ohm (2.5 milliohms) or less.</p> <p>2. If any FQIS out-tank wire bundle is replaced or the FQIS wire bundle's shield is spliced, repaired, or reconnected to the connector backshell (except as noted in Steps 1.a and 1.b above), then that particular wire bundle must be inspected as specified in AWL 28-AWL-03.</p> <p>NOTE: The Boeing Standard Wiring Practice Manual (SWPM) contains accepted practices for the bonding of the jumper and the receptacle to bracket at the end of the wire bundle (refer to Boeing SWPM 20-20-00).</p>
28-AWL-05	CDCCL	N/A	ALL	<p>Lightning Protection – Engine Fuel Feed Line Fuel Tank Penetration Bonding to Spar</p> <p>Concern: Potential for arcing or sparking inside the tank at the interface between the bulkhead fitting and the spar during a lightning strike event.</p> <p>The following design features must be verified (refer to Boeing AMM 28-22-15) if the bulkhead fitting or attached tubing is removed and reinstalled or replaced:</p> <ol style="list-style-type: none"> <li>1. A fay sealed fay surface bond is installed between the bulkhead fitting and the front spar inside the tank.</li> <li>2. The electrical bonding resistance across the fay surface between the bulkhead fitting and the front spar inside the tank is 0.0010 ohm (1.0 milliohm) or less.</li> <li>3. A bonding jumper is installed between the first fuel tube mating with the bulkhead fitting and structure inside the tank.</li> <li>4. If the tube bonding jumper was removed and reinstalled or replaced, the electrical bonding resistance between the structure and the first fuel tube mating with the bulkhead fitting inside the tank is 0.0100 ohm (10.0 milliohms) or less.</li> </ol>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-06	CDCCL	N/A	ALL	<p>Lightning Protection – Hydraulic Line Fuel Tank Penetration Bonding Paths</p> <p>Concern: Potential for arcing or sparking inside the tank at the interface between the bulkhead fitting and the rear spar, the hydraulic bulkhead fitting and the heat exchanger, or any two tubes connected by a swaged sleeve during a lightning strike event.</p> <ol style="list-style-type: none"> <li>1. If the bulkhead fitting is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMM 29-11-55):               <ol style="list-style-type: none"> <li>a. Fillet seals are applied at the fitting to the tank wall interface outside the fuel tank.</li> <li>b. The electrical bonding resistance between the bulkhead fitting and the rear spar is 0.0010 ohm (1.0 milliohm) or less.</li> <li>c. The electrical bonding resistance between the hydraulic tube in the fuel tank and bulkhead fitting in the fuel tank is 0.0040 ohm (4.0 milliohms) or less.</li> </ol> </li> <li>2. If the hydraulic heat exchanger is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMM 29-11-60):               <ol style="list-style-type: none"> <li>a. A bonding jumper is installed from the hydraulic heat exchanger to structure inside the tank.</li> <li>b. The electrical bonding resistance across the bonding jumper between the heat exchanger and structure is 0.0025 ohm (2.5 milliohms) or less.</li> <li>c. The electrical bonding resistance between the heat exchanger and each hydraulic tube is 0.0040 ohm (4.0 milliohms) or less.</li> </ol> </li> <li>3. If a non-heat exchanger hydraulic tube in the Main Fuel Tank is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMM 20-10-09):               <ol style="list-style-type: none"> <li>a. The electrical bonding resistance across the in-line fittings (tube-to-tube):                   <ol style="list-style-type: none"> <li>I. If Aluminum, tubing sizes 3/8 inch to 1/2 inch (10 mm to 13 mm), the maximum resistance is 0.0015 ohm (1.5 milliohms).</li> <li>II. If Aluminum, tubing sizes 5/8 inch to 1-1/4 inch (16 mm to 32 mm), the maximum resistance is 0.0010 ohm (1.0 milliohm).</li> <li>III. If Titanium, tubing sizes 3/8 inch to 1/2 inch (10 mm to 13 mm), the maximum resistance is 0.0080 ohm (8.0 milliohms).</li> <li>IV. If Titanium, tubing sizes 5/8 inch to 1-1/4 inch (16 mm to 32 mm), the maximum resistance is 0.0030 ohm (3.0 milliohms).</li> </ol> </li> </ol> </li> </ol>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-07	CDCCL	N/A	ALL	<p>AC and DC Fuel Pump Electrical/Mechanical Design            Concern: Potential for maintenance error that could compromise ignition source prevention features. Maintenance of Fuel Pumps must be done with the applicable CMM as follows:</p> <ol style="list-style-type: none"> <li>1. Maintenance of the Main Tank Boost Pump and the Auxiliary Tank (Cell) Boost Pumps, if installed, must be in accordance with Eaton (VK2523) CMM 28-20-42 Revision 9, CMM 28-20-47 Revision 5, or later revisions of (or deviations from, or temporary revisions to, or Supplier Service Bulletin to) these CMMs that have been approved by the FAA Oversight Office.</li> <li>2. Maintenance of the Center Wing Tank Override-Jettison Pump and Main Tank Jettison Pump must be in accordance with Eaton (VK2523) CMM 28-20-44 Revision 6, or later revisions of (or deviations from, or temporary revisions to, or Supplier Service Bulletin to) this CMM that have been approved by the FAA Oversight Office.</li> <li>3. Maintenance of the APU Supply Fuel Pump must be in accordance with Eaton (VK2523) CMM 28-20- 45 Revision 5 or later revisions of (or deviations from, or temporary revisions to, or Supplier Service Bulletin to) this CMM that have been approved by the FAA Oversight Office.</li> </ol> <p>NOTE: Some CMM's have specific portions of the procedures tagged as a CDCCL or ALI, to identify them as items that must be followed precisely. If a CMM does not have specific items tagged as a CDCCL or ALI, then the entire CMM must be followed precisely.</p>
28-AWL-08	CDCCL	N/A	777-200	<p>Center Wing Tank Sump Drain Valve            Concern: Potential for arcing or sparking inside the tank at the interface between the sump drain valve and the lower skin in the center wing tank during a lightning strike event.            If the center wing tank sump drain valve is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMM 28-11-06):</p> <ol style="list-style-type: none"> <li>1. The presence of an insulating washer at the sump drain valve inside the tank.</li> <li>2. A fillet seal is applied at the interface between the jam nut and airplane structure inside the tank.</li> </ol>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-09	CDCCL	N/A	ALL	<p>Lightning, Fault Current, or Hot Short Protection – Fuel Tank Penetrations (All Fuel Tanks)</p> <p>Concern: Potential for arcing or sparking inside the tank at a conductive metal-to-ground structure interface as a result of electrical fault currents or lightning strike events due to insufficient bonding within the ground electrical path.</p> <p>Any repair or alteration involving new or altered penetrations to the fuel tanks (such as a repair with fasteners, adding a bracket, bulkhead fitting or equipment, etc.) or change to the design features of the existing equipment penetrations (such as fuel measuring sticks, sump drain valves, fueling manifold, fuel temperature sensor, and motor operated fuel shutoff valve adapter plate) requires approval from the FAA Oversight Office. However, no additional FAA Oversight Office approval is required if the repair or alteration is accomplished in accordance with:</p> <ol style="list-style-type: none"> <li>1. Boeing Structural Repair Manual (SRM) procedures, and/or</li> <li>2. Boeing Service Bulletins, and/or</li> <li>3. Boeing Organization Designation Authorization (ODA) approved repair/alteration instructions;</li> </ol> <p>where all the required procedures that relate to the new or altered fuel tank penetration include the statement, "These data have been reviewed by the Boeing ODA for fuel tank ignition prevention requirements, and no further approval from the FAA Oversight Office is required to satisfy the requirements of CDCCL 28-AWL-09 provided the repair or alteration is accomplished in accordance with these instructions."</p> <p>NOTE: Electrical bonding of fittings and brackets and/or cap sealing of fasteners and/or fillet sealing of component interface to structure inside and/or outside the fuel tank will be required.</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-10	CDCCL	N/A	ALL	<p>AC and DC Fuel Pump Fault Current Bonding Jumper Installation, Main and Center Tank</p> <p>Concern: Potential for fault current path through the pump housing to structure inside the tank. Electrical faults internal to the fuel pump motor-impeller are, by design, routed through the motor-impeller assembly to the bonding jumper on the front face of the motor-impeller assembly to structure outside the tank. The bonding jumper ensures that fault currents are conducted to structure outside the tank until the circuit breaker and/or Ground Fault Interrupter (GFI) and/or Ground Fault Protector (GFP) has had time to remove power from the pump. If the pump is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMMs 28-22-05, 28-22-06, 28-25-03, and 28-31-01):</p> <ol style="list-style-type: none"> <li>1. A bonding jumper is installed between the pump motor-impeller and structure.</li> <li>2. The bonding jumper is installed with a fay sealed fay surface bond between the pump motor-impeller and bonding jumper and a fay sealed fay surface bond between the bonding jumper and structure.</li> <li>3. For AC pump, the electrical bonding resistance between the pump motor-impeller and the structure is 0.00025 ohm (0.25 milliohm) or less.</li> <li>4. For DC pump, the electrical bonding resistance between the pump motor-impeller and the structure is 0.0005 ohm (0.5 milliohm) or less.</li> </ol>
28-AWL-11	CDCCL	N/A	ALL	<p>Fuel Quantity Indicating System (FQIS) and Auxiliary Fuel Tank (Cell) Electronic Fuel Level Indication System (EFLI) – Out Tank Wiring Installation Separation Requirement</p> <p>Concern: Potential for hot shorts and Electromagnetic Effects (EME)-induced voltages on the FQIS wiring or Auxiliary Fuel Tank (Cell) EFLI wiring to enter the tank.</p> <p>Tank circuit wiring is identified as the FQIS or Auxiliary Fuel Tank (Cell) EFLI wiring from an LRU (shown to be an ignition source protection device - such as a Fuel Quantity Processor Unit (FQPU) or EFLI Processor Unit, qualified up to airplane 28VDC or 115VAC electrical power source) to the fuel tank structural penetration, typically at the spar connector. Airplane interface circuit wiring is identified as the wiring terminating at the LRU (such as a FQPU or EFLI Processor Unit) and not considered tank circuit wiring.</p> <p>New wiring is defined as any new alteration that installs wiring after initial Airplane Airworthiness Certificate issuance or after the date 28-AWL-11 was first incorporated into an operator's maintenance program, whichever is later. Repair or replacement of existing wiring is not considered new wiring.</p> <p>(Continued on next page)</p>



**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-11, Continued				<p>FQIS and Auxiliary Fuel Tank (Cell) EFLI – Out Tank Wiring Installation Separation Requirement, Continued</p> <ol style="list-style-type: none"> <li>1. Repair or replacement of existing tank circuit or airplane interface circuit wiring must maintain its existing wire routing.</li> <li>2. Routing and installation of any new wiring within 6.5 inches (165 mm) of the tank circuit or airplane interface circuit wiring must meet EITHER of the following requirements:               <ol style="list-style-type: none"> <li>a. The new wiring installation has been found by the FAA to be compliant with Title 14 CFR Part 25, Section 25.981(a)(3) at Amendment 25-102 or later.</li> <li>OR</li> <li>b. The new wiring must meet the following wire separation criteria:                   <ol style="list-style-type: none"> <li>I. For new wiring carrying data signals such as Coaxial, USB, or Ethernet wiring, the installation and separation requirements of the airplane Standard Wiring Practices Manual (SWPM) apply.</li> <li>II. For airplanes with FQPU P/N 0320KPU01 that have new airplane interface circuit wiring up to airplane 28VDC electrical power source, the installation and separation requirements of the airplane SWPM apply.</li> <li>III. For airplanes that do not have FQPU P/N 0320KPU01 and have new airplane interface circuit wiring up to airplane 115VAC electrical power source, the installation and separation requirements of the SWPM apply.</li> <li>IV. For all other new wiring, use wire types BMS 13-48, BMS 13-60 or BMS 13-58 and a minimum separation of 2.0 inches (51 mm) or greater is required except as noted below:                       <ol style="list-style-type: none"> <li>A. For new wiring meeting any of the following criteria, the separation from tank circuit or airplane interface circuit wiring must meet the requirements from 2.b.IV.B to 2.b.IV.G.                           <ol style="list-style-type: none"> <li>(1) New wiring near tank circuit wiring.</li> <li>(2) New wiring near airplane interface circuit wiring carrying greater than airplane 115VAC electrical power source.</li> <li>(3) On airplanes with an FQPU processor with P/N 0320KPU01, new wiring near airplane interface circuit wiring carrying greater than airplane 28VDC electrical power source.</li> </ol> </li> </ol> </li> </ol> </li> </ol> <p>(Continued on next page)</p> </li></ol>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-11, Continued				<p>FQIS and Auxiliary Fuel Tank (Cell) EFLI – Out Tank Wiring Installation Separation Requirement, Continued</p> <p>B. For new wiring installed with a separation between 2.0 inches (51 mm) and 0.5 inch (13 mm) from the tank circuit or airplane interface circuit wiring, and neither the tank circuit or airplane interface circuit wiring nor new wiring is EME shielded, the length of new wiring that is routed within the 2.0 inches (51 mm) from the tank circuit or airplane interface circuit wiring should not exceed 2.0 feet (0.6 m), either in the sum of the portions or total length.</p> <p>C. For new wiring installed with a separation between 2.0 inches (51 mm) and 0.5 inch (13 mm) from the tank circuit or airplane interface circuit wiring, and either the tank circuit or airplane interface circuit wiring or new wiring is EME shielded, the length of new wiring that is routed within the 2.0 inches (51 mm) from the tank circuit or airplane interface circuit wiring should not exceed 34 feet (10.4 m), either in the sum of the portions or total length.</p> <p>D. For new wiring installed in parallel to the tank circuit or airplane interface circuit wiring with a separation between 2.0 inches (51 mm) and 0.5 inch (13 mm), the following requirements also apply:</p> <p>(1) Sleeve either the new wiring or the tank circuit or airplane interface circuit wire bundle with TFE-2X Standard wall (manufactured in accordance with MIL-I-23053). The sleeving must extend a minimum of 1.0 inch (25 mm) beyond the point where the separation is less than 2.0 inches (51 mm).</p> <p>(2) Maintain a separation of no less than 0.5 inch (13 mm) from the tank circuit or airplane interface circuit wiring under any single failure of a support point.</p> <p>E. For new wiring that crosses the tank circuit or airplane interface circuit wiring with a separation less than 2.0 inches (51 mm) and greater than 0.5 inch (13 mm) from the tank circuit or airplane interface circuit wiring, the following requirements also apply:</p> <p>(1) Sleeve either the new wiring or the tank circuit or airplane interface circuit wire bundle with TFE-2X Standard wall (manufactured in accordance with MIL-I-23053). The sleeving must extend a minimum of 6.0 inches (152 mm) on either side of crossing point.</p> <p>(2) Maintain a separation of no less than 0.5 inch (13 mm) from the tank circuit or airplane interface circuit wiring under any single failure of a support point.</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-11, Continued				<p>FQIS and Auxiliary Fuel Tank (Cell) EFLI – Out Tank Wiring Installation Separation Requirement, Continued</p> <p>F. For new wiring that crosses the tank circuit or airplane interface circuit wiring with a separation less than 0.5 inch (13 mm) from the tank circuit or airplane interface circuit wiring, the following requirements also apply:</p> <p>(1) Sleeve both the new wiring and the tank circuit or airplane interface circuit wire bundle with TFE-2X Standard wall (manufactured in accordance with MIL-I-23053). The sleeving must extend a minimum of 6.0 inches (152 mm) on either side of the crossing point.</p> <p>(2) Maintain a separation of no less than 0.25 inch (6 mm) from the tank circuit or airplane interface circuit wiring.</p> <p>G. For new wiring routed within power panels in proximity of the tank circuit or airplane interface circuit wiring, the following requirements only apply:</p> <p>(1) Sleeve and EME shield only the new wiring with TFE-2X Standard wall (manufactured in accordance with MIL-I-23053). New wiring can be routed together with the tank circuit or airplane interface circuit wiring. Do not route the new wiring via the same connector as the tank circuit or airplane interface circuit wiring.</p> <p>3. Repair or replacement of existing wiring that is installed within 6.5 inches (165 mm) of the tank circuit or airplane interface circuit wiring must maintain its existing wire routing.</p> <p>NOTE: Refer to the Boeing Wire Diagrams to identify FQIS wiring or Auxiliary Fuel Tank (Cell) EFLI wiring bundles.</p> <p>NOTE: The following are accepted practices for repair or replacement of existing wiring: For wire type substitutes, refer to Boeing SWPM 20-00-14.</p> <p>For wire assembly and installation, refer to Boeing SWPM 20-10-11.</p> <p>For repair procedures, refer to Boeing SWPM 20-10-13.</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-12	CDCCL	N/A	ALL	<p>Center Wing Tank (CWT) Refuel Valve and Auxiliary Fuel Tank (Cell) Refuel Valve – Fault Current Bond Concern: Potential for arcing inside the CWT following refuel valve maintenance.</p> <ol style="list-style-type: none"> <li>1. If the CWT refuel valve is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMM 28-21-02):               <ol style="list-style-type: none"> <li>a. A fay surface bond is installed between the valve body and gasket and between the gasket and the rear spar inside the tank.</li> <li>b. The electrical bonding resistance between the valve body and the rear spar inside the tank is 0.0025 ohm (2.5 milliohms) or less.</li> <li>c. A fillet seal is applied around the entire perimeter of the valve body and gasket on the rear spar inside the tank.</li> </ol> </li> <li>2. For airplanes with Auxiliary Fuel Tank (Cell) installed, if the Auxiliary Fuel Tank (Cell) Refuel Valve (Solenoid Actuator located on CWT Rear Spar) is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMM 28-21-21):               <ol style="list-style-type: none"> <li>a. A fay surface bond is installed between the valve body and gasket and between the gasket and the rear spar inside the tank.</li> <li>b. The electrical bonding resistance between the valve body and the rear spar inside the tank is 0.0025 ohm (2.5 milliohms) or less.</li> <li>c. A fillet seal is applied around the entire perimeter of the valve body and gasket on the rear spar inside the tank.</li> </ol> </li> </ol>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-13	CDCCL	N/A	ALL	<p>FQIS – Fuel Quantity Processor Unit (FQPU) Repair and Auxiliary Fuel Tank (Cell) EFLI – Processor Display Unit (PDU) Repair</p> <p>Concern: Potential for maintenance error during FQPU or Auxiliary Fuel Tank (Cell) EFLI PDU repair. The FQPU and Auxiliary Fuel Tank (Cell) EFLI is designed to limit the levels of energy, voltage, current, and power allowed within the FQIS / EFLI circuit to intrinsically safe levels in order to preclude the potential of an ignition source within any fuel tank.</p> <ol style="list-style-type: none"> <li>1. Maintenance of the FQPU must be in accordance with one of the following CMMs.               <ol style="list-style-type: none"> <li>a. GE Aviation [identified as Smiths or GE Aviation in the respective CMM] (VK5294) CMM 28-47- 69 Volume 1 Revision 5 and CMM 28-47-69 Volume 2 (IPC) Revision 2, CMM 28-47-65 Volume 1 Revision 5, and CMM 28-47-65 Volume 2 (IPC) Revision 4, or later revisions of (or deviation from, or temporary revisions to, or Supplier Service Bulletin to) these CMMs that have been approved by the FAA Oversight Office.</li> <li>b. Ontic (VU0J60) CMM 28-47-69 Volume 1 Revision 9 and CMM 28-47-69 Volume 2 (IPC) Revision 4 or later revisions of (or deviation from, or temporary revisions to, or Supplier Service Bulletin to) these CMMs that have been approved by the FAA Oversight Office.</li> </ol> </li> <li>2. If auxiliary fuel tank (cell) is installed, maintenance of the EFLI PDU must be in accordance with Parker (V26055) CMM 28-41-81 Revision 1, or later revisions of (or deviation from, or temporary revisions to, or Supplier Service Bulletin to) this CMM that have been approved by the FAA Oversight Office.</li> </ol> <p>NOTE: Some CMM's have specific portions of the procedures tagged as CDCCL or ALI, to identify them as items that must be followed precisely. If a CMM does not have specific items tagged as a CDCCL or ALI, then the entire CMM must be followed precisely.</p>



**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-14	CDCCL	N/A	ALL	<p>FQIS and Auxiliary Fuel Tank (Cell) EFLI – In-Tank Hardware Design Features (FQIS Tank Units, Densitometers, Water Detector and Auxiliary Fuel Tank (Cell) EFLI Probes)</p> <p>Concern: Potential for maintenance error during repair of in-tank hardware (FQIS tank units, densitometers, water detectors, and auxiliary fuel Tank (cell) EFLI probes). Arc gaps may develop that could result in an ignition source inside the fuel tank.</p> <ol style="list-style-type: none"> <li>1. Maintenance of the FQIS Tank Units must be in accordance with GE Aviation [identified as Smiths or GE Aviation in the respective CMM] (VK5294)] CMM 28-47-58 Revision 8, CMM 28-47-71 Revision 5, or later revisions of (or deviations from, or temporary revisions to, or Supplier Service Bulletin to) these CMMs that have been approved by the FAA Oversight Office.</li> <li>2. Maintenance of the FQIS Water Detectors must be in accordance with GE Aviation [identified as Smiths or GE Aviation in the respective CMM] (VK5294)] CMM 28-47-60 Revision 6 or later revisions of (or deviations from, or temporary revisions to, or Supplier Service Bulletin to) this CMM that have been approved by the FAA Oversight Office.</li> <li>3. Maintenance of the FQIS Densitometers must be in accordance with GE Aviation [identified as Smiths in the respective CMM] (VK5294)] CMM 28-48-03 Revision 5 or later revisions of (or deviations from, or temporary revisions to, or Supplier Service Bulletin to) this CMM that have been approved by the FAA Oversight Office.</li> <li>4. If auxiliary fuel tank (cell) is installed, maintenance of the EFLI probe must be in accordance with Parker (V26055) CMM 28-41-70 Revision 1 or later revisions of (or deviations from, or temporary revisions to, or Supplier Service Bulletin to) this CMM that have been approved by the FAA Oversight Office.</li> </ol> <p>NOTE: Some CMM's have specific portions of the procedures tagged as CDCCL or ALI to identify them as items that must be followed precisely. If a CMM does not have specific items tagged as a CDCCL or ALI, then the entire CMM must be followed precisely.</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-15	CDCCL	N/A	ALL	<p>FQIS – In-Tank Wire Harness Protection Features – Wire Insulation and Separation from Tank Internal Structure            Concern: Potential for damage during repair or replacement of in-tank wire harness that may affect the design features for the wire insulation and the separation from tank structure. Arc gaps may develop that could result in an ignition source inside the fuel tank.</p> <ol style="list-style-type: none"> <li>1. If any maintenance, preventative maintenance, alteration, or installation is performed on the FQIS In-Tank Wire Harness inside the main or center tanks, verify the following (refer to Boeing AMM 28-41-05):               <ol style="list-style-type: none"> <li>a. Maintain existing (or newly approved) wire harness routing, clamping and sleeving.</li> <li>b. Wire harness, clamps, and sleeving are not damaged.</li> <li>c. Wires are not chafed.</li> <li>d. Wire harness clearance between wires and structure, accounting for slack in all directions, must be a minimum of 0.125 inch (3.2 mm).</li> </ol> </li> <li>2. Maintenance of the FQIS In-Tank Wire Harness must be in accordance with the following:               <ol style="list-style-type: none"> <li>a. Repair of the FQIS in-tank wire harness on aircraft must be approved by the FAA Oversight Office, OR</li> <li>b. GE Aviation [identified as Smiths in the respective CMM] (VK5294)] CMM 28-47-61 Revision 7 or later revisions of (or deviations from, or temporary revisions to, or Supplier Service Bulletin to) this CMM that has been approved by the FAA Oversight Office.</li> </ol> </li> </ol> <p>NOTE: Some CMM's have specific portions of the procedures tagged as CDCCL or ALI to identify them as items that must be followed precisely. If a CMM does not have specific items tagged as a CDCCL or ALI, then the entire CMM must be followed precisely.</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-15, Continued				<p>FQIS – In-Tank Wire Harness Protection Features – Wire Insulation and Separation from Tank Internal Structure, Continued</p> <p>3. For airplanes with Auxiliary Fuel Tank (Cell) installed, the following maintenance requirements are applicable:</p> <p>a. If any maintenance, preventative maintenance, alteration, or installation is performed on the FQIS In-Tank Wire Harness inside the auxiliary fuel tank (cell), verify the following (refer to Boeing AMM 28-41-05):</p> <p>I. Maintain existing (or newly approved) wire harness routing, clamping and sleeving.</p> <p>II. Wire harness, clamps, and sleeving are not damaged.</p> <p>III. Wires are not chafed.</p> <p>IV. Wire harness clearance between wires and structure, accounting for slack in all directions, must be a minimum of 0.125 inch (3.2 mm).</p> <p>b. If the auxiliary fuel tank (cell) is removed and replaced, verify the following (refer to Boeing AMM 28-14-01)) during installation of the auxiliary fuel tank (cell) (this step is not required for the installation of new auxiliary fuel tank (cell)):</p> <p>I. Wire harness, clamps, and sleeving are not damaged.</p> <p>II. Wires are not chafed.</p> <p>III. Wire harness clearance between wires and structure, accounting for slack in all directions, must be a minimum of 0.125 inch (3.2 mm).</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-16	CDCCL	N/A	ALL	<p>Fuel Tank Access Doors – Lightning Protection Electrical Design Features</p> <p>Concern: Potential for arcing or sparking inside the tank at the interface between the door and the tank structure as a result of a direct strike or conducting currents through the wing skin.</p> <p>The following design features must be verified during installation of fuel tank access doors located on the lower wing skin (refer to Boeing AMMs 28-11-01, 28-11-02, and 28-11-03):</p> <p>NOTE: There are three types of doors: Standard, Impact-Resistant, and Machined Impact-Resistant, that have specific locations and other design features.</p> <ol style="list-style-type: none"> <li>1. A phenolic strip is positioned around the outermost periphery of all doors that mate with the wing skin inside the tank, except for the impact-resistant door positions listed below:               <ol style="list-style-type: none"> <li>a. 777-200/300: Door Positions 531AB, 631AB, 531BB, 631BB, 531CB, 631CB, 533AB, 633AB, 533BB, 633BB, 533CB, 633CB, 533DB, 633DB, 533EB, 633EB, 533FB, 633FB, 533GB, 633GB, 541AB, 641AB.</li> <li>b. 777-200LR/300ER/F: Door Positions 533FB, 633FB, 533GB, 633GB, 541AB, 641AB.</li> </ol> </li> <li>2. No visible corrosion on the access door, clamp ring, and lower wing skin electrical faying surfaces.</li> <li>3. A new knitted aluminum mesh gasket is installed. If a new gasket is not available, a used gasket meeting the following criteria may be installed:               <ol style="list-style-type: none"> <li>a. No fastener holes are torn.</li> <li>b. The gasket is not elongated or out of shape.</li> <li>c. The gasket rubber seals around the inner and outer periphery must be a minimum of 0.015 inch (0.4 mm) thick.</li> <li>d. No more than 10% of strands in all three layers are broken through in any one area.</li> </ol> </li> </ol> <p>NOTE: A gasket that meets Item 3d but does not meet Items 3.a through 3.c criteria may be used for a maximum duration of 30 days and then must be replaced with a gasket that meets all the criteria listed above.</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-16, Continued				<p>Fuel Tank Access Doors – Lightning Protection Electrical Design Features, Continued</p> <p>4. Approved grease or anti-corrosion compound (listed in 4.a., 4.b. and 4.c.) is applied as necessary to ensure both sides of the knitted aluminum mesh gasket are filled. Do not mix grease or anti-corrosion compound types in the gasket and installation of the door (a thin layer of the same grease or anti-corrosion compound is applied to the wing skin surface common to the gasket prior to door installation).</p> <p>a. Aeroshell 14 (applicable to all doors except for machined impact resistant doors on 777-300ER/ 200LR/F), or</p> <p>b. Mobilgrease 33 (applicable to all doors except for machined impact resistant doors on 777-300ER/200LR/F), or</p> <p>c. CorBan 27L (applicable to all doors including machined impact resistant doors on 777-300ER/ 200LR/F).</p> <p>NOTE: If the new knitted aluminum mesh gasket is greater than five years old from manufacturing date, vapor degrease and re-impregnate with 0.5-1 ounce (15 - 30 milliliters) of the approved grease or anti-corrosion compound to ensure both sides of the knitted aluminum mesh gasket are filled before installation.</p> <p>5. A torque of 35 ±5 in-lb (4 ±1 N-m) is applied on the fasteners for all doors except for 777-300ER/ 200LR/F machined impact-resistant doors listed below:</p> <p>a. 777-300ER/200LR/F: Machined Impact-Resistant Door Positions: 531AB, 631AB, 531BB, 631BB, 531CB, 631CB, 533AB, 633AB, 533BB, 633BB, 533CB, 633CB, 533DB, 633DB, 533EB, 633EB, a torque of 65 ± 5 in-lb (7 ±1 N-m) is applied on these fasteners.</p> <p>6. If the pressure relief valve on the surge tank access door is removed and reinstalled or replaced, verify the following (refer to Boeing AMM 28-13-03).</p> <p>a. A fillet sealed fay surface bond is installed between the valve body mounting flange and the door.</p> <p>b. The electrical bonding resistance between the valve and the door is 0.0100 ohm (10.0 milliohms) or less.</p> <p>c. A fillet seal is installed between the valve body mounting flange and the door.</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-17	CDCCL	N/A	ALL	<p>Over-current and Arcing Protection Electrical Design Features – Fuel Pump Circuit Breakers or Electrical Load Control Unit (ELCU) and Ground Fault Interrupters (GFI)/Ground Fault Protector (GFP) (If Installed)</p> <p>Concern: Potential for high current heating, arcing or sparking inside the tank between fuel pumps and fuel pump housings and outside the tank between pump wiring and structure in flammable leakage zones.</p> <p>Before resetting the circuit breaker(s), ELCU(s), or GFIs/GFPs, determine the fault(s) that resulted in circuit breaker, ELCU, or GFI/GFP tripping and the fault(s) are isolated and corrected prior to reset.</p> <p>If no fault is found, then prior to resetting the circuit breaker, ELCU, or GFI/GFP, perform the following insulation resistance test between each power circuit and chassis/airplane ground using a megohmmeter that has 10 VDC and 500 VDC voltage supply options with a maximum short circuit current of 5 milliamperes (refer to Boeing AMM 28-22-00 for AC Fuel Pump and Boeing AMM 28-25-00 for DC Fuel Pump).</p> <ol style="list-style-type: none"> <li>1. AC Fuel Pump:               <ol style="list-style-type: none"> <li>a. Verify on the pump electrical connector that the resistance is 1 megohm or greater between each phase connector contact (three total) and ground contact with the megohmmeter set to 10 VDC.</li> <li>b. Verify on the pump electrical connector that the resistance is 5 megohms or greater between each phase connector contact (three total) and ground contact with the megohmmeter set to 500 VDC.</li> </ol> </li> <li>2. DC Fuel Pump:               <ol style="list-style-type: none"> <li>a. Verify on the pump electrical connector that the resistance is 1 megohm or greater between the power contact and ground contact with megohmmeter set to 10 VDC.</li> <li>b. Verify on the pump electrical connector that the resistance is 1 megohm or greater between the power contact and ground contact with megohmmeter set to 500 VDC.</li> </ol> </li> </ol> <p>NOTE: The Boeing Fault Isolation Manual (FIM), contains accepted practices for troubleshooting airplane systems: For AC Fuel Pump circuit breaker, ELCU and GFI/GFP troubleshooting, refer to Boeing FIM 28-22 and 28-31. For DC Fuel Pump circuit breaker troubleshooting, refer to Boeing FIM 28-25. For Aux Fuel Tank Fuel Pump GFI troubleshooting, refer to Boeing FIM 28-14.</p>



**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-18	ALI	375 DY	ALL NOTE	<p>Over-Current and Arcing Protection Electrical Design Features Operation – AC Fuel Pump GFI and GFP Concern: Potential for pump housing burn-through, either internal or external to the fuel tank, as a result of major arcing due to electrical failure (i.e., damaged electrical connector, stator windings or leadwire to housing/end cap shorting).</p> <p>The GFI/GFP is designed to detect electrical faults and open the circuit prior to pump housing burn-through. The following action is required in order to ensure continued functionality of each fuel pump GFI/GFP circuit (refer to Boeing AMM 28-22-00 for main, center and jettison or Boeing AMM 28-14-05 for auxiliary):</p> <ol style="list-style-type: none"> <li>1. The Main Tank Fuel Boost Pump Ground Fault Interrupter – Operational Test (APPLICABILITY NOTE: (iii) and (iv)):               <ol style="list-style-type: none"> <li>a. Verify that the pump does not operate when the white band on the RESET button is visible on the following relays:                   <ol style="list-style-type: none"> <li>I. L FWD GFI Control Relay K28121</li> <li>II. L AFT GFI Control Relay K28123</li> <li>III. R FWD GFI Control Relay K28241</li> <li>IV. R AFT GFI Control Relay K28242</li> </ol> </li> </ol> </li> <li>2. The following tests are applicable to ELMS 1 Configuration airplanes (APPLICABILITY NOTE: (ii) only):               <ol style="list-style-type: none"> <li>a. The Center Fuel Tank Override/Jettison Pump Ground Fault Interrupter – Operational Test:                   <ol style="list-style-type: none"> <li>I. Verify that the amber PRESS light for the FUEL CENTER PUMPS L switch-light is on when the white band on the relay RESET button is visible for Left Override Pump GFI Control Relay K28253.</li> <li>II. Verify that the amber PRESS light for the FUEL CENTER PUMPS R switch-light is on when the white band on the relay RESET button is visible for Right Override Pump GFI Control Relay K28254.</li> </ol> </li> </ol> </li> </ol> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-18, Continued				<p>Over-Current and Arcing Protection Electrical Design Features Operation – AC Fuel Pump GFI and GFP, Continued</p> <p>b. The Fuel Jettison Pump Ground Fault Interrupter – Operational Test:</p> <p>I. Verify on the Fuel Management Maintenance Page that the COMMAND and STATUS indication for the L MAIN JET PUMP show as ON and NO PRESS respectively when the white band on the relay RESET button is visible for Left Override Pump GFI Control Relay K28247.</p> <p>II. Verify on the Fuel Management Maintenance Page that the COMMAND and STATUS indication for the R MAIN JET PUMP show as ON and NO PRESS respectively when the white band on the relay RESET button is visible for Right Override Pump GFI Control Relay K28248.</p> <p>3. The following tests are applicable to ELMS 2 Configuration airplanes (APPLICABILITY NOTE: (i) only):</p> <p>a. The Center Fuel Tank Override/Jettison Pump Ground Fault Protection – Operational Test:</p> <p>I. Verify that the center left override pump does not operate during the center left override pump test where the GFCI Tester, P/N J24014-24, has been used to insert the FAULT position, and the EICAS status message FUEL PUMP CENTER L shows on the EICAS display with the correlated maintenance message 28-11055 showing on the MAT.</p> <p>II. Verify that the center right override pump does not operate during the center right override pump test where the GFCI Tester, P/N J24014-24, has been used to insert the FAULT position, and the EICAS status message FUEL PUMP CENTER R shows on the EICAS display with the correlated maintenance message 28-12039 showing on the MAT.</p> <p>b. The Fuel Jettison Pump Ground Fault Protection – Operational Test:</p> <p>I. Verify that the center left jettison pump does not operate during the center left jettison pump test where the GFCI Tester, P/N J24014-24, has been used to insert the FAULT position, and the EICAS status message FUEL JETT PUMP L and EICAS advisory message FUEL JETT MAIN show on the EICAS display with the correlated maintenance message 28-11056 showing on the MAT.</p> <p>II. Verify that the center right jettison pump does not operate during the center right jettison pump test where the GFCI Tester, P/N J24014-24, has been used to insert the FAULT position, and the EICAS status message FUEL JETT PUMP R and EICAS advisory message FUEL JETT MAIN show on the EICAS display with the correlated maintenance message 28-12047 showing on the MAT.</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-18, Continued				<p>Over-Current and Arcing Protection Electrical Design Features Operation – AC Fuel Pump GFI and GFP, Continued</p> <p>4. The Auxiliary Fuel Tank (Cell) Pump Ground Fault Interrupter – Operational Test (APPLICABILITY NOTE: (v)):</p> <p>a. Verify that the auxiliary fuel tank (cell) pump does not operate when the white band on the K28070 relay RESET button is visible.</p> <p>APPLICABILITY NOTE:</p> <p>i. (ELMS2) Center Tank Override/Jettison Pumps and Main Tank Jettison Pumps on airplanes with Line Number 423, 429, 454 and on.</p> <p>ii. (ELMS1) Center Tank Override/Jettison Pumps and Main Tank Jettison Pumps on airplanes prior to Line Number 454, except 423 and 429, that have incorporated Service Bulletin 777-28A0037.</p> <p>iii. All Main Tank Boost Pumps on airplanes with Line Number 662 and on.</p> <p>iv. All Main Tank Boost Pumps on airplanes prior to Line Number 662 that have incorporated Service Bulletin 777-28A0038.</p> <p>v. Auxiliary Fuel Tank (Cell) Pumps on 777-200LRs only if equipped with Auxiliary Fuel Tank (Cell).</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-19	CDCCL	N/A	Airplane Line Position 552 and on. Airplanes that have incorporated Service Bulletin 777-28A0034.	<p>Motor Operated Valve (MOV) Actuator – Lightning and Fault Current Protection Electrical Bond Concern: Potential for arcing or sparking inside the fuel tank at a conductive metal-to-ground structure interface as a result of electrical fault.</p> <ol style="list-style-type: none"> <li>1. For MOV Actuators that are mounted with an adapter plate, if the adapter plate is removed and reinstalled or replaced, the following design features must be verified (refer to the following Boeing AMMs: 28-14-12 (Auxiliary Tank Isolation Valve), 28-14-22 (Auxiliary Tank Refuel/Transfer Valve), 28-14-25 (Auxiliary Tank Fuel Transfer Valve), 28-14-44 (Auxiliary Tank Vent Valve), 28-21-24 (Auxiliary Tank No. 2 Refuel Isolation Valve), 28-22-01 (Fuel Spar Valve), 28-22-03 (Cross Feed Valve), 28-26-01 (Defuel Valve), 28-31-02 (Fuel Jettison Nozzle Valve for 777-300ER, -200LR, and 777F), 28-31-04 (Fuel Jettison Isolation Valve)).               <ol style="list-style-type: none"> <li>a. A fillet sealed fay surface bond is installed between the adapter plate and the structure.</li> <li>b. Prior to installing the actuator, the electrical bonding resistance between the valve adapter plate and the structure outside the tank is 0.0005 ohm (0.5 milliohm) or less.</li> <li>c. A fillet seal is installed between the adapter plate and structure.</li> <li>d. A cap seal is applied to each of the four adapter plate attach bolts inside the tank.</li> </ol> </li> <li>2. For MOV Actuators mounted without an adapter plate and using mounting bolts, if the valve is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMMs 28-25-01 and 28-25-02 (APU Fuel Shutoff Valve), 28-25-04 and 28-25-05 (APU Fuel Isolation Valve)):               <ol style="list-style-type: none"> <li>a. A fillet sealed fay surface bond is installed between the valve body mounting bolts and structure.</li> <li>b. A fillet seal is installed between the valve body mounting bolts and structure outside the tank.</li> <li>c. A fay sealed fay surface bond is installed between the actuator mounting feet and valve body mounting bolts.</li> <li>d. Prior to attaching the bonding jumper to the actuator and with the electrical connector disconnected, the electrical bonding resistance between the actuator mounting feet and the spar is 0.0050 ohm (5.0 milliohms) or less.</li> </ol> </li> </ol> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-19, Continued				<p>Motor Operated Valve (MOV) Actuator – Lightning and Fault Current Protection, Continued</p> <p>3. For 777-200/-300 airplane MOV Actuators that are mounted without adapter plate and is directly attached to the valve, if the valve is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMMs 28-31-02 and 28-31-03 (Fuel Jettison Nozzle Valve):</p> <ul style="list-style-type: none"> <li>a. A fillet sealed fay surface bond is installed between the valve body mounting flange and structure.</li> <li>b. Prior to installing the actuator, the electrical bonding resistance between the valve and the structure is 0.0025 ohm (2.5 milliohms) or less.</li> <li>c. A fillet seal is installed between the valve body mounting flange and structure.</li> <li>d. A fay sealed fay surface bond is installed between the actuator mounting feet and the valve body.</li> <li>e. Prior to attaching the bonding jumper to the actuator and with the electrical connector disconnected, the electrical bonding resistance between the actuator mounting feet and the structure is 0.0050 ohm (5.0 milliohms) or less.</li> </ul> <p>4. For airplanes with auxiliary fuel tank (cell) installed, if the auxiliary fuel tank (cell) is removed and replaced, the following design features must be verified (refer to Boeing AMM 28-14-01) for the MOV Actuators (Auxiliary Tank Isolation Valve and the Auxiliary Tank Refuel/Transfer Valve) that are mounted on the auxiliary fuel tank (cell):</p> <ul style="list-style-type: none"> <li>a. The MOV Actuator is installed on the auxiliary fuel tank (cell).</li> <li>b. A bonding jumper is installed between the actuator and structure.</li> <li>c. With the electrical connector disconnected, the electrical bonding resistance between the upper actuator housing and the structure is 0.0025 ohm (2.5 milliohms) or less.</li> </ul> <p>NOTE: Not applicable to the Air Transfer Valve/Actuator(s); Item Numbers V28010, V28011.</p> <p>The 777-200 covers the 777-200ER.</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-20	CDCCL	N/A	ALL NOTE	<p>MOV Actuator – Electrical Design Features</p> <p>Concern: Potential for arcing or sparking inside the fuel tank at a conductive metal-to-ground structure interface as a result of lightning or electrical fault current event.</p> <p>To verify the integrity of the electrical isolation feature, conduct the following bench test prior to reinstallation on the aircraft, if the actuator was removed for bench testing or repair (refer to ITT (V73760) CMM 28-20-21 or CMM 28-20-25):</p> <ol style="list-style-type: none"> <li>1. This test is a bench test only and must not be performed on the aircraft:               <ol style="list-style-type: none"> <li>a. A Dielectric Strength test on the completed actuator assembly must be performed by applying 3000 VAC RMS, 60 Hz for one (1) minute between any mounting foot of the actuator and the output shaft spline.</li> <li>b. Verify that there is no evidence of disruptive discharge in the form of leakage current in excess of 1.0 milliamp.</li> </ol> </li> </ol> <p>APPLICABILITY NOTE: This AWL applies to ITT Actuators, Part Numbers MA20A2027, MA30A1001, and MA30A1017.</p>
28-AWL-21	ALI	16,000 FC/ 3,000 DY NOTE	777-200LR with Auxiliary Fuel Tank	<p>External Wires Over Auxiliary Fuel Tank (Cell)</p> <p>Concern: Potential for wire chafing and arcing to Auxiliary Fuel Tank (Cell).</p> <p>Perform a detailed inspection of the wire bundles routed over the Auxiliary Fuel Tank (Cell) and under the main deck floor boards to detect damaged wire bundles, damaged clamps, damaged sleeving (if installed), wire chafing, and that the wire bundle is not in contact with the surface of the Auxiliary Fuel Tank (Cell) (refer to Boeing AMM 28-11-00).</p> <p>NOTE: The Boeing Standard Wiring Practice Manual (SWPM) contains accepted practices for repair or replacement of existing wiring:</p> <p>For assembly and installation, refer to Boeing SWPM 20-10-11. For repair procedures, refer to Boeing SWPM 20-10-13.</p> <p>INTERVAL NOTE: Whichever comes first.</p>



**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-22	CDCCL	N/A	777-200LR with Auxiliary Fuel Tank	<p>External Wires Over Auxiliary Fuel Tank (Cell)            Concern: Potential for wire chafing or arcing to Auxiliary Fuel Tank (Cell).            If any maintenance, preventative maintenance, or alteration is performed in the area under the main deck floor boards and over the Auxiliary Fuel Tank (Cell), verify the following (refer to Boeing AMM 28-11-00) in the affected areas where maintenance was performed:</p> <ol style="list-style-type: none"> <li>1. Maintain existing (or newly approved) wire bundle routing, clamping and sleeving.</li> <li>2. Wire bundles, clamps, and sleeving (if installed) are not damaged.</li> <li>3. Wires are not chafed.</li> <li>4. Wire bundles are not in contact with the surface of the Auxiliary Fuel Tank (Cell). NOTE: Boeing AMM 53-01-01 contains access information to this area.</li> </ol> <p>The Boeing Standard Wiring Practice Manual (SWPM) contains accepted practices for repair or replacement of existing wiring.            For assembly and installation, refer to Boeing SWPM 20-10-11. For repair procedures, refer to Boeing SWPM 20-10-13.</p>
28-AWL-23	CDCCL	N/A	777-200LR with Auxiliary Fuel Tank	<p>Auxiliary Fuel Tank (Cell) AC Fuel Pump Fault Current Bonding Path            Concern: Potential for fault current path through the motor-impeller assembly to the structure inside the tank (cell). Electrical faults internal to the fuel pump motor-impeller are, by design, routed through the motor-impeller assembly to the bonding jumpers on the front face of the motor-impeller assembly to the tank (cell) structure. The bonding jumpers ensure that fault currents are conducted to structure outside the tank (cell) until the circuit breaker and/or GFI has had time to remove power from the pump.            During auxiliary fuel tank (cell) pump replacement or auxiliary fuel tank (cell) installation (this AWL is not required for the installation of new auxiliary fuel tank (cell)), the following design features must be verified (refer to Boeing AMM 28-14-15 or 28-14-01):</p> <ol style="list-style-type: none"> <li>1. A bonding jumper is installed between the pump motor-impeller and tank (cell) structure.</li> <li>2. The bonding jumper is installed with a fay sealed fay surface bond between the pump motor-impeller and bonding jumper and a fay sealed fay surface bond between the bonding jumper and tank (cell) structure.</li> <li>3. The electrical bonding resistance between the fuel pump motor-impeller and the tank (cell) structure is 0.0006 ohm (0.6 milliohm) or less.</li> </ol>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-24	CDCCL	N/A	777-200LR with Auxiliary Fuel Tank	<p>Auxiliary Fuel Tank (Cell) Thermal Protection Design Features</p> <p>Concern: Potential for heating of the auxiliary tank (cell) structure as a result of a cargo fire event.</p> <p>If any maintenance, preventative maintenance, or alteration is performed on or around the auxiliary tank (cell), the following must be verified (refer to Boeing AMM 28-14-00):</p> <ol style="list-style-type: none"> <li>1. An Impact Barrier is installed on the aftmost auxiliary fuel tank (cell).</li> <li>2. The Thermal Insulation Blanket is installed against the impact barrier.</li> <li>3. Cargo Liners which separate the cargo compartment from the auxiliary fuel tank (cell) and cover the thermal blanket are installed.</li> </ol>
28-AWL-25	CDCCL	N/A	777-200LR with Auxiliary Fuel Tank	<p>Auxiliary Fuel Tank (Cell) Lightning Protection Design Features</p> <p>Concern: Potential for arcing or sparking inside the tank (cell) at a conductive metal-to-ground structure interface as a result of lightning strike events to auxiliary fuel tank (cell) drains.</p> <p>If any maintenance, preventative maintenance, or alteration is performed on or around the auxiliary fuel tank (cell) drain system, the following must be verified:</p> <ol style="list-style-type: none"> <li>1. Low Pressure Teflon Lightning Safe Hoses are installed on the auxiliary fuel tank (cell) drain lines (Electrical Sump Drain Valve - Installation) (refer to Boeing AMM 28-14-52).</li> <li>2. Forward and Aft Flame Arrestors are installed in auxiliary fuel tank (cell) drains (refer to Boeing AMM 28-14-54).</li> <li>3. A fay sealed fay surface bond is installed between the drain bulkhead union and the structure (refer to Boeing AMM 28-14-52).</li> <li>4. The electrical bonding resistance between the drain bulkhead union and the structure is 0.0025 ohm (2.5 milliohms) or less (refer to Boeing AMM 28-14-52).</li> </ol>
28-AWL-26	ALI	375 DY	777-200LR with Auxiliary Fuel Tank	<p>Auxiliary Fuel Tank (Cell) AC Fuel Pump Uncommanded ON /Automatic Shutoff Circuit</p> <p>Concern: Potential for failure of fuel pump power control circuit in the energized state allowing dry running of fuel pump with a potential ignition threat due to pump overhear or sparking.</p> <p>The Pump Uncommanded ON/Automatic Shutoff Circuit provides redundant circuitry to remove power from the Auxiliary Fuel Tank (Cell) Pump if pump pressure is low for &gt;15 seconds.</p> <p>For installed Auxiliary Fuel Tank (Cell), operationally check the Auxiliary Fuel Tank (Cell) Pump Uncommanded ON/Automatic Shutoff Circuit (Bite Disable Relays) (refer to Boeing AMM 28-14-05) and verify the following:</p> <ol style="list-style-type: none"> <li>1. Apply 28V DC (power supply) to pin 3 of connector D30324J and verify the circuit changes state to open at 15 +/- 2 seconds at pin 1 of connector D30324J.</li> </ol>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-27	CDCCL	N/A	777-200LR with Auxiliary Fuel Tank	<p>Auxiliary Fuel Tank (Cell) Replacement or Installation Electrical Bonding</p> <p>Concern: Potential for fault current to the inside of the Auxiliary Fuel Tank (Cell). The tank (cell) contains bonding jumpers which provide a path from the tank (cell) to airplane structure. The bonding jumpers ensure that fault currents are conducted to structure outside the tank (cell).</p> <p>The following design features must be verified during auxiliary tank (cell) bonding jumper replacement or installation of the Auxiliary Fuel Cell (refer to Boeing AMM 28-14-01):</p> <ol style="list-style-type: none"> <li>1. The installation of a bonding jumper between the Auxiliary Fuel Tank (Cell) and the Stanchion.</li> <li>2. The following electrical bonding resistances are verified:               <ol style="list-style-type: none"> <li>a. On the right side of the tank (cell), the electrical bonding resistance between the auxiliary fuel tank (cell) and the stanchion is 0.0060 ohm (6.0 milliohms) or less.</li> <li>b. The electrical bonding resistance between the stanchions and the structure is 0.0060 ohm (6.0 milliohms) or less.</li> </ol> </li> </ol>
28-AWL-28	CDCCL	N/A	ALL	<p>Lightning, Fault Current or Hot Short Protection Features – Fuel Tank Sealant Requirements (All Fuel Tanks)</p> <p>Concern: Potential for arcing or sparking inside the tank at a conductive metal-to-ground structure interface as a result of electrical fault currents or lightning strike events due to insufficient bonding within the ground electrical path. Sealant damage or lack of proper adhesion could affect the fuel tank ignition prevention features.</p> <p>If any maintenance, preventative maintenance, or alteration is performed inside the fuel tanks, verify the following in the affected areas (including the touchpoints during transit to and from the tank access point) where work is performed (refer to Boeing AMM 28-11-00):</p> <ol style="list-style-type: none"> <li>1. Fillet seals around the periphery of the equipment interface with structure inside the tank are not damaged, such as peeling off or cracking.</li> <li>2. Cap seals installed on fasteners and fittings inside the tank are not damaged, such as peeling off or cracking.</li> </ol> <p>NOTE: Not all fasteners and fittings have cap seals. If fastener or fitting sealant is damaged, there will be residual evidence of a previously installed cap seal on fasteners and fittings in areas where installation is required.</p> <p>NOTE: All repairs and alterations that involve fuel tank penetrations require compliance with AWL 28-AWL-09.</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-29	CDCCL	N/A	ALL	<p>Static Dissipation Protection Design Features - In-Tank Material and Installation Changes (All Fuel Tanks)            Concern: Potential for electrostatic energy to be transferred to the tank during conditions such as airplane refueling. That electrostatic charge can accumulate on electrically isolated components or surfaces and then discharge to be a potential ignition source.</p> <p>Any alteration or repair (does not include removal and replacement of existing parts) involving new or altered static dissipation protection design features inside the fuel tanks (such as alterations or repair that add fasteners, a bracket, a clamp, feed through fittings inside tank, or added equipment) or change to the design features of the existing equipment (such as the plumbing, paint, placards, clamps, location of isolated fasteners, fuel line bond jumpers, fuel line couplings) requires approval by the FAA Oversight Office.</p> <p>However, no additional FAA Oversight Office approval is required if the alteration or repair is accomplished in accordance with:</p> <ol style="list-style-type: none"> <li>1. Boeing Structural Repair Manual (SRM) procedures, and/or</li> <li>2. Boeing Service Bulletins, and/or</li> <li>3. Boeing Organization Designation Authorization (ODA) approved repair/alteration instructions; where all the required procedures that relate to the new or altered static dissipation protection design features include the statement, "These data have been reviewed by the Boeing ODA for fuel tank ignition prevention requirements, and no further approval from the FAA Oversight Office is required to satisfy the requirements of CDCCL 28-AWL-29 provided the repair or alteration is accomplished in accordance with these instructions."</li> </ol>
28-AWL-30 DELETED	ALI	500 FH NOTE	NOTE	Over-Current and Arcing Protection Electrical Design Features - Fuel Pump Circuit Breakers or Ground Fault Interrupters (GFI)

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-31	CDCCL	N/A	All Airplanes Line Number 504 and on. Airplanes that have incorporated Service Bulletin 777-57A0050.	<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks</p> <p>Concern: Potential for hot short induced voltages on out-of-tank wire bundle(s) to enter the fuel tank due to chafing and shorting to metal electrical brackets.</p> <p>If maintenance, preventative maintenance, or alteration is performed on the following Out-of-Tank Wire Bundle(s) that are mounted directly on the fuel tanks at the locations listed in Step 1, the following design features in steps 2 to 4 must be verified for the affected wire bundles (refer to Boeing AMM 28-22-00) that maintenance was performed on.</p> <ol style="list-style-type: none"> <li>1. The following are the applicable wire bundles and cushion clamp locations. If a plastic clamp (all locations) or a plastic ring-post (Center Tank Front Spar Bulkhead only) is used in any of these locations, steps 2 and 3 do not apply.               <ol style="list-style-type: none"> <li>a. Left Wing Front Spar                   <ol style="list-style-type: none"> <li>I. Wire bundles W8100, W8101 located near Inboard Front Spar Stations (IFSS) 262 and 439</li> <li>II. Wire bundles W8102, W8104, W8203, W8310, W8503, W8810, W8811 located near IFSS 262</li> <li>III. Wire bundle W8850 located near IFSS 410</li> <li>IV. Wire bundles W8143, W8145, W8247 located near IFSS 411 and 439</li> <li>V. Wire bundles W8541, W8851 located near IFSS 411</li> <li>VI. Wire bundle W8111 located near IFSS 262, 409, and 436 and Outboard Front Spar Stations (OFSS) 553, 578, 605, 635, 658, 684, 710, 740, 766, 816, 845, 871, 897, 923, 949, 1002, 1028, 1054 and 1080</li> <li>VII. For 777-300ER, 777-200LR, and 777F airplanes, wire bundle W8111 located near OFSS 1106 and 1186</li> </ol> </li> <li>b. Right Wing Front Spar                   <ol style="list-style-type: none"> <li>I. Wire bundles W8200, W8201 located near Inboard Front Spar Stations (IFSS) 262 and 439</li> <li>II. Wire bundles W8103, W8202, W8204, W8320, W8603, W8820, W8821 located near IFSS 262</li> <li>III. Wire bundle W8860 located near IFSS 410</li> <li>IV. Wire bundles W8147, W8243, W8245 located near IFSS 411 and 439</li> </ol> </li> </ol> </li> </ol> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-31, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <p>V. Wire bundles W8641, W8861 located near IFSS 411</p> <p>VI. Wire bundle W8211 located near IFSS 262, 410, and 436 and OFSS 553, 578, 605, 635, 658, 684, 710, 740, 766, 816, 845, 871, 897, 923, 949, 1002, 1028, 1054 and 1080</p> <p>VII. For 777-300ER, 777-200LR, and 777F airplanes, wire bundle W8211 located near OFSS 1106 and 1186</p> <p>c. Left Wing Rear Spar</p> <p>I. Wire bundle W8171 located near Inboard Rear Spar Stations (IRSS) 268, 270, 272, 283, 293, 313, 422, 451, 522, 535</p> <p>II. Wire bundle W8471 located near IRSS 273, 283, 293, and 313</p> <p>III. Wire bundle W8271 located near IRSS 273, 283, 293, 313, and 396</p> <p>d. Right Wing Rear Spar</p> <p>I. Wire bundle W8272 located near IRSS 268, 270, 273, 283, 293, 313, 421, 451 (two brackets at this location), and 522</p> <p>II. Wire bundle W8172 located near IRSS 273, 283, 293, 313, and 396</p> <p>III. For 777-300 and 777-300ER airplanes, wire bundle W8164 located near IRSS 451</p> <p>e. Left ECS Bay - Wire bundle W7112 located near the following locations.</p> <p>I. Station (STA) 1209, Waterline (WL) 120, Left Buttock Line (LBL) 21</p> <p>II. STA 1217, WL 120, LBL 33</p> <p>III. STA 1217, WL 120, LBL 41</p> <p>IV. STA 1217, WL 120, LBL 49</p> <p>V. STA 1226, WL 120, LBL 56</p> <p>VI. STA 1226, WL 120, LBL 64</p> <p>VII. STA 1234, WL 122, LBL 68</p> <p>(Continued on next page)</p>



**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-31, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <p>f. Right ECS Bay - For airplanes Line Number (L/N) 1-1270, wire bundle W7112 located near the following locations. For airplanes L/N 1271 and on, wire bundle W7221 located near the following locations.</p> <p>I. STA 1043, WL 129, Right Buttock Line (RBL) 90</p> <p>II. STA 1049, WL 126, RBL 83, 74, 62, 53, 44, 36, 27, and 18</p> <p>III. STA 1217, WL 120, RBL 43</p> <p>IV. STA 1233, WL 122, RBL 67</p> <p>V. STA 1225, WL 121, RBL 64</p> <p>VI. STA 1226, WL 120, RBL 56</p> <p>VII. STA 1217, WL 120, RBL 51</p> <p>VIII. STA 1217, WL 120, RBL 33</p> <p>IX. STA 1209, WL 120, RBL 21</p> <p>g. Left Forward Wing-to-Body Fairing</p> <p>I. For airplanes without disconnect AW1031, wire bundles W8310, W8503, W8810, W8811 located near STA 1030, LBL 106, WL 135 and STA 1030, LBL 117, WL 141 and STA 1029, LBL 96, WL 130</p> <p>II. For airplanes with disconnect AW1031, wire bundles W8350, W8553, W8870, W8841 located near STA 1029, LBL 96, WL 130</p> <p>h. Right Forward Wing-to-Body Fairing</p> <p>I. For airplanes without disconnect AW1032, wire bundles W8320, W8603, W8820, W8821 located near STA 1031, RBL 107, WL134 and STA 1031, RBL 117, WL 139 and STA 1029, RBL 96, WL 130</p> <p>II. For airplanes with disconnect AW1032, wire bundles W8330, W8633, W8830, W8831 located near STA 1029, RBL 96, WL 130</p> <p>III. For airplanes L/N 1-1270, wire bundle W7112 located near STA 1031, RBL 91, WL 132</p> <p>IV. For airplanes L/N 1271 and on, wire bundle W7221 located near STA 1031, RBL 91, WL 132</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-31, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <ul style="list-style-type: none"> <li>i. Front Spar Bulkhead (Center Tank)</li> <li>I. For airplanes L/N 1 to 561               <ul style="list-style-type: none"> <li>a. Wire bundles W8200, W8201 located near STA 1033, RBL 103, WL 185</li> <li>b. Wire bundles W5444, W5460 located near STA 1030, RBL 85, WL 196</li> <li>c. Wire bundles W5144, W5162, W5240, W5279 located near STA 1030, RBL 83, WL 196</li> <li>d. Wire bundles W5232, W5256 located near STA 1030, RBL 79, WL 197</li> <li>e. Wire bundles W5058, W5060, W5445, W5532 located near STA 1030, RBL 76, WL 197</li> <li>f. For 777-300 and 777-300ER airplanes, wire bundle W5213 located near STA 1030, RBL 77, WL 196 and STA 1030, LBL 85, WL 196</li> <li>g. Wire bundles W5218, W5220, W5241, W5242, W5248, W5269 located near STA 1030, RBL 30, WL 194</li> <li>h. Wire bundles W5232, W5273 located near STA 1030, RBL 28, WL 194</li> <li>i. For 777-200, 777-300, and 777-300ER airplanes, wire bundle W5164 (if installed) located near STA 1030, LBL 15, WL 196</li> <li>j. Wire bundles W5443, W5461 located near STA 1030, LBL 76, WL 196</li> <li>k. Wire bundles W5140, W5149, W5172 located near STA 1030, LBL 78, WL 195</li> <li>l. Wire bundle W5141 located near STA 1030, LBL 83, WL 196</li> <li>m. Wire bundle W5167 located near STA 1030, LBL 21, WL 196</li> <li>n. Wire bundles W8100, W8101 located near STA 1033, LBL 103, WL 185</li> </ul> </li> <li>II. For 777-200, 777-200LR, 777-300, and 777-300ER airplanes, L/N 562 and on               <ul style="list-style-type: none"> <li>a. Wire bundles W8200, W8201 located near STA 1033, RBL 103, WL 185</li> <li>b. Wire bundle W5246 located near STA 1030, RBL 85, WL 196</li> <li>c. Wire bundles W5146, W5229 located near STA 1030, RBL 83, WL 196</li> <li>d. Wire bundles W5050, W5660 located near STA 1030, RBL 78, WL 197</li> <li>e. Wire bundles W5048, W5455 located near STA 1030, RBL 76, WL 197</li> <li>f. Wire bundle W4635 (if installed) located near STA 1030, RBL 29, WL 196 and STA 1030, LBL 29, WL 196</li> </ul> </li> </ul> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-31, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <p>g. Wire bundles W5228, W5244 (if installed), W5258 located near STA 1030, RBL 28, WL 196</p> <p>h. Wire bundle W5552 located near STA 1030, RBL 22, WL 196</p> <p>i. Wire bundles W5223, W5251 located near STA 1030, LBL 14, WL 196</p> <p>j. Wire bundle W5263 located near STA 1030, LBL 15, WL 196</p> <p>k. Wire bundle W5453 located near STA 1030, LBL 76, WL 196</p> <p>l. Wire bundles W5159, W5182 located near STA 1030, LBL 78, WL 196</p> <p>m. Wire bundle W5143 (if installed) located near STA 1030, LBL 83, WL 197</p> <p>n. Wire bundles W8100, W8101 located near STA 1033, LBL 103, WL 184</p> <p>III. For 777F airplanes, L/N 718 and on</p> <p>a. Wire bundles W8100, W8101 located near STA 1033, LBL 103, WL 185</p> <p>b. Wire bundle W5015 located near STA 1030, LBL 36, WL 195</p> <p>c. For airplanes L/N 718 and 732, wire bundle W8194 located near STA 1030, LBL 15, WL 195</p> <p>d. For airplanes L/N 752 and on, wire bundle W8194 located near STA 1030, LBL 21, WL 195</p> <p>e. Wire bundles W5027, W5037, W5251, W5263 located near STA 1030, LBL 15, WL 195</p> <p>f. Wire bundle W5453 located near STA 1030, LBL 78, WL 195</p> <p>g. Wire bundles W5159, W5182 located near STA 1030, LBL 70, WL 195</p> <p>h. Wire bundle W5016 located near STA 1030, RBL 37, WL 195</p> <p>i. Wire bundles W5028, W5552 located near STA 1030, RBL 21, WL 194</p> <p>j. Wire bundles W5228, W5244, W5258 located near STA 1030, RBL 14, WL 194</p> <p>k. Wire bundles W5048, W5050, W5146, W5229, W5455, W8218 located near STA 1030, RBL 79, WL 195</p> <p>l. Wire bundles W5246, W5660 located near STA 1030, RBL 71, WL 196</p> <p>m. Wire bundles W8200, W8201 located near STA 1033, RBL 103, WL 184</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-31, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <p>j. Rear Spar Bulkhead (Center Tank)</p> <p>I. Wire bundles W8171, W8173 located near STA 1244, LBL 104, WL 139</p> <p>II. Wire bundle W8272 located near STA 1244, RBL 104, WL 139</p> <p>2. Teflon, TFE-2X Standard Wall, sleeving is installed around the wire bundle and secured within the cushion clamp.</p> <p>3. Teflon sleeving is not damaged.</p> <p>4. Cushion clamp, plastic clamp, or plastic ring-post (as installed) is not damaged. For airplanes L/N 1671 and on, locations with an installed plastic clamp or plastic ring-post can only be replaced with a plastic clamp or a plastic ring-post, as applicable.</p> <p>NOTE: The Boeing Standard Wiring Practices Manual (SWPM) 20-10-11 and 20-10-12 contains accepted practices for the replacement of the cushion clamp, plastic clamp, plastic ring-post, and Teflon sleeving.</p> <p>NOTE: All repairs and alterations that involve fuel tank penetration require compliance with AWL 28-AWL-09.</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-32	ALI	3,750 DY	All Airplanes Line Number 504 and on. Airplanes that have incorporated Service Bulletin 777-57A0050	<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks</p> <p>Concern: Potential for hot short induced voltages on out-of-tank wire bundle(s) to enter the fuel tank due to chafing and shorting to metal electrical brackets.</p> <p>Perform a detailed inspection of the out of tank wire bundles listed in Step 1 and verify the design features listed in steps 2 to 4 (refer to Boeing AMM 28-22-00).</p> <p>1. The following are the applicable wire bundles and cushion clamp locations. If a plastic clamp (all locations) or a plastic ring-post (Center Tank Front Spar Bulkhead only) is used in any of these locations, steps 2 and 3 do not apply.</p> <p>a. Left Wing Front Spar</p> <p>I. Wire bundles W8100, W8101 located near Inboard Front Spar Stations (IFSS) 262 and 439</p> <p>II. Wire bundles W8102, W8104, W8203, W8310, W8503, W8810, W8811 located near IFSS 262</p> <p>III. Wire bundle W8850 located near IFSS 410</p> <p>IV. Wire bundles W8143, W8145, W8247 located near IFSS 411 and 439</p> <p>V. Wire bundles W8541, W8851 located near IFSS 411</p> <p>VI. Wire bundle W8111 located near IFSS 262, 409, and 436 and Outboard Front Spar Stations (OFSS) 553, 578, 605, 635, 658, 684, 710, 740, 766, 816, 845, 871, 897, 923, 949, 1002, 1028, 1054 and 1080</p> <p>VII. For 777-300ER, 777-200LR, and 777F airplanes, wire bundle W8111 located near OFSS 1106 and 1186</p> <p>b. Right Wing Front Spar</p> <p>I. Wire bundles W8200, W8201 located near Inboard Front Spar Stations (IFSS) 262 and 439</p> <p>II. Wire bundles W8103, W8202, W8204, W8320, W8603, W8820, W8821 located near IFSS 262</p> <p>III. Wire bundle W8860 located near IFSS 410</p> <p>IV. Wire bundles W8147, W8243, W8245 located near IFSS 411 and 439</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-32, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <p>V. Wire bundles W8641, W8861 located near IFSS 411</p> <p>VI. Wire bundle W8211 located near IFSS 262, 410, and 436 and OFSS 553, 578, 605, 635, 658, 684, 710, 740, 766, 816, 845, 871, 897, 923, 949, 1002, 1028, 1054 and 1080</p> <p>VII. For 777-300ER, 777-200LR, and 777F airplanes, wire bundle W8211 located near OFSS 1106 and 1186</p> <p>c. Left Wing Rear Spar</p> <p>I. Wire bundle W8171 located near Inboard Rear Spar Stations (IRSS) 268, 270, 272, 283, 293, 313, 422, 451, 522, 535</p> <p>II. Wire bundle W8471 located near IRSS 273, 283, 293, and 313</p> <p>III. Wire bundle W8271 located near IRSS 273, 283, 293, 313, and 396</p> <p>d. Right Wing Rear Spar</p> <p>I. Wire bundle W8272 located near IRSS 268, 270, 273, 283, 293, 313, 421, 451 (two brackets at this location), and 522</p> <p>II. Wire bundle W8172 located near IRSS 273, 283, 293, 313, and 396</p> <p>III. For 777-300 and 777-300ER airplanes, wire bundle W8164 located near IRSS 451</p> <p>e. Left ECS Bay - Wire bundle W7112 located near the following locations.</p> <p>I. Station (STA) 1209, Waterline (WL) 120, Left Buttock Line (LBL) 21</p> <p>II. STA 1217, WL 120, LBL 33</p> <p>III. STA 1217, WL 120, LBL 41</p> <p>IV. STA 1217, WL 120, LBL 49</p> <p>V. STA 1226, WL 120, LBL 56</p> <p>VI. STA 1226, WL 120, LBL 64</p> <p>VII. STA 1234, WL 122, LBL 68</p> <p>(Continued on next page)</p>



**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-32, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <p>f. Right ECS Bay - For airplanes Line Number (L/N) 1-1270, wire bundle W7112 located near the following locations. For airplanes L/N 1271 and on, wire bundle W7221 located near the following locations.</p> <p>I. STA 1043, WL 129, Right Buttock Line (RBL) 90</p> <p>II. STA 1049, WL 126, RBL 83, 74, 62, 53, 44, 36, 27, and 18</p> <p>III. STA 1217, WL 120, RBL 43</p> <p>IV. STA 1233, WL 122, RBL 67</p> <p>V. STA 1225, WL 121, RBL 64</p> <p>VI. STA 1226, WL 120, RBL 56</p> <p>VII. STA 1217, WL 120, RBL 51</p> <p>VIII. STA 1217, WL 120, RBL 33</p> <p>IX. STA 1209, WL 120, RBL 21</p> <p>g. Left Forward Wing-to-Body Fairing</p> <p>I. For airplanes without disconnect AW1031, wire bundles W8310, W8503, W8810, W8811 located near STA 1030, LBL 106, WL 135 and STA 1030, LBL 117, WL 141 and STA 1029, LBL 96, WL 130</p> <p>II. For airplanes with disconnect AW1031, wire bundles W8350, W8553, W8870, W8841 located near STA 1029, LBL 96, WL 130</p> <p>h. Right Forward Wing-to-Body Fairing</p> <p>I. For airplanes without disconnect AW1032, wire bundles W8320, W8603, W8820, W8821 located near STA 1031, RBL 107, WL134 and STA 1031, RBL 117, WL 139 and STA 1029, RBL 96, WL 130</p> <p>II. For airplanes with disconnect AW1032, wire bundles W8330, W8633, W8830, W8831 located near STA 1029, RBL 96, WL 130</p> <p>III. For airplanes L/N 1-1270, wire bundle W7112 located near STA 1031, RBL 91, WL 132</p> <p>IV. For airplanes L/N 1271 and on, wire bundle W7221 located near STA 1031, RBL 91, WL 132</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-32, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <ul style="list-style-type: none"> <li>i. Front Spar Bulkhead (Center Tank)</li> <li>I. For airplanes L/N 1 to 561               <ul style="list-style-type: none"> <li>a. Wire bundles W8200, W8201 located near STA 1033, RBL 103, WL 185</li> <li>b. Wire bundles W5444, W5460 located near STA 1030, RBL 85, WL 196</li> <li>c. Wire bundles W5144, W5162, W5240, W5279 located near STA 1030, RBL 83, WL 196</li> <li>d. Wire bundles W5232, W5256 located near STA 1030, RBL 79, WL 197</li> <li>e. Wire bundles W5058, W5060, W5445, W5532 located near STA 1030, RBL 76, WL 197</li> <li>f. For 777-300 and 777-300ER airplanes, wire bundle W5213 located near STA 1030, RBL 77, WL 196 and STA 1030, LBL 85, WL 196</li> <li>g. Wire bundles W5218, W5220, W5241, W5242, W5248, W5269 located near STA 1030, RBL 30, WL 194</li> <li>h. Wire bundles W5232, W5273 located near STA 1030, RBL 28, WL 194</li> <li>i. For 777-200, 777-300, and 777-300ER airplanes, wire bundle W5164 (if installed) located near STA 1030, LBL 15, WL 196</li> <li>j. Wire bundles W5443, W5461 located near STA 1030, LBL 76, WL 196</li> <li>k. Wire bundles W5140, W5149, W5172 located near STA 1030, LBL 78, WL 195</li> <li>l. Wire bundle W5141 located near STA 1030, LBL 83, WL 196</li> <li>m. Wire bundle W5167 located near STA 1030, LBL 21, WL 196</li> <li>n. Wire bundles W8100, W8101 located near STA 1033, LBL 103, WL 185</li> </ul> </li> <li>II. For 777-200, 777-200LR, 777-300, and 777-300ER airplanes, L/N 562 and on               <ul style="list-style-type: none"> <li>a. Wire bundles W8200, W8201 located near STA 1033, RBL 103, WL 185</li> <li>b. Wire bundle W5246 located near STA 1030, RBL 85, WL 196</li> <li>c. Wire bundles W5146, W5229 located near STA 1030, RBL 83, WL 196</li> <li>d. Wire bundles W5050, W5660 located near STA 1030, RBL 78, WL 197</li> <li>e. Wire bundles W5048, W5455 located near STA 1030, RBL 76, WL 197</li> <li>f. Wire bundle W4635 (if installed) located near STA 1030, RBL 29, WL 196 and STA 1030, LBL 29, WL 196</li> </ul> </li> </ul> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-32, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <p>g. Wire bundles W5228, W5244 (if installed), W5258 located near STA 1030, RBL 28, WL 196</p> <p>h. Wire bundle W5552 located near STA 1030, RBL 22, WL 196</p> <p>i. Wire bundles W5223, W5251 located near STA 1030, LBL 14, WL 196</p> <p>j. Wire bundle W5263 located near STA 1030, LBL 15, WL 196</p> <p>k. Wire bundle W5453 located near STA 1030, LBL 76, WL 196</p> <p>l. Wire bundles W5159, W5182 located near STA 1030, LBL 78, WL 196</p> <p>m. Wire bundle W5143 (if installed) located near STA 1030, LBL 83, WL 197</p> <p>n. Wire bundles W8100, W8101 located near STA 1033, LBL 103, WL 184</p> <p>III. For 777F airplanes, L/N 718 and on</p> <p>a. Wire bundles W8100, W8101 located near STA 1033, LBL 103, WL 185</p> <p>b. Wire bundle W5015 located near STA 1030, LBL 36, WL 195</p> <p>c. For airplanes L/N 718 and 732, wire bundle W8194 located near STA 1030, LBL 15, WL 195</p> <p>d. For airplanes L/N 752 and on, wire bundle W8194 located near STA 1030, LBL 21, WL 195</p> <p>e. Wire bundles W5027, W5037, W5251, W5263 located near STA 1030, LBL 15, WL 195</p> <p>f. Wire bundle W5453 located near STA 1030, LBL 78, WL 195</p> <p>g. Wire bundles W5159, W5182 located near STA 1030, LBL 70, WL 195</p> <p>h. Wire bundle W5016 located near STA 1030, RBL 37, WL 195</p> <p>i. Wire bundles W5028, W5552 located near STA 1030, RBL 21, WL 194</p> <p>j. Wire bundles W5228, W5244, W5258 located near STA 1030, RBL 14, WL 194</p> <p>k. Wire bundles W5048, W5050, W5146, W5229, W5455, W8218 located near STA 1030, RBL 79, WL 195</p> <p>l. Wire bundles W5246, W5660 located near STA 1030, RBL 71, WL 196</p> <p>m. Wire bundles W8200, W8201 located near STA 1033, RBL 103, WL 184</p> <p>(Continued on next page)</p>

**AWLs – FUEL TANK IGNITION PREVENTION**

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-32, Continued				<p>Cushion Clamps and Teflon Sleeving Installed on Out-of-Tank Wire Bundles Installed on Brackets that are Mounted Directly on the Fuel Tanks, Continued</p> <p>j. Rear Spar Bulkhead (Center Tank)</p> <p>I. Wire bundles W8171, W8173 located near STA 1244, LBL 104, WL 139</p> <p>II. Wire bundle W8272 located near STA 1244, RBL 104, WL 139</p> <p>2. Teflon, TFE-2X Standard Wall, sleeving is installed around the wire bundle and secured within the cushion clamp.</p> <p>3. Teflon sleeving is not damaged.</p> <p>4. Cushion clamp, plastic clamp, or plastic ring-post (as installed) is not damaged.</p> <p>NOTE: The Boeing Standard Wiring Practices Manual (SWPM) 20-10-11 and 20-10-12 contains accepted practices for the replacement of the cushion clamp, plastic clamp, plastic ring-post, and Teflon sleeving.</p> <p>NOTE: All repairs and alterations that involve fuel tank penetration require compliance with AWL 28-AWL-09.</p>

## ENGINE SUCTION FEED SYSTEM

This section contains an FAA approved program of scheduled inspections for operators to incorporate into their maintenance program for this type design to meet Title 14 CFR § 25.951.

The 777 Engine Fuel Feed System was type certificated as being compliant to Title 14 CFR § 25.951(b) when performing suction feed operations. The Engine Suction Feed System AWL results from service experience of loss of fuel system suction feed capability due to air leaks in the engine fuel feed system. The AWL is required maintenance needed to detect and correct failure of the engine fuel feed system to reduce the possibility of engine flameout resulting from air ingestion into the engine fuel feed system during low fuel level operation with boost pumps inoperative.

The Engine Suction Feed System AWL is mandatory maintenance to ensure that the system retains the performance of the Engine Suction Feed required by Title 14 CFR § 25.951(b) that arise due to air leaks in the engine fuel feed system do not result in flameout of both engines.

## AWLs – ENGINE SUCTION FEED SYSTEM

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
28-AWL-101	ALI	7,500 FH	ALL	<p>Engine Fuel Suction Feed Operational Test</p> <p>An Engine Fuel Suction Feed Operational Test must be accomplished successfully on each engine individually. This test is required in order to protect against engine flameout during suction feed operations, and must meet the following requirements (refer to Boeing AMM 28-22-00):</p> <ol style="list-style-type: none"> <li>1. Each engine (fuel system) to be tested must meet the following Fuel Tank Quantity and Test Procedural Limitations listed below: <ol style="list-style-type: none"> <li>a. Fuel Tank Quantity – Engine No. 1: <ol style="list-style-type: none"> <li>I. The Center Tank Fuel Quantity must not exceed 5,000 lbs (2,200 kg).</li> <li>II. The Main Tank No. 1 Fuel Quantity must be between 600 lbs – 800 lbs (200 kg – 300 kg).</li> </ol> <p>NOTE: Excess fuel can be transferred to Main Tank No. 2.</p> </li> <li>b. Fuel Tank Quantity – Engine No. 2: <ol style="list-style-type: none"> <li>I. The Center Tank Fuel Quantity must not exceed 5,000 lbs (2,200 kg).</li> <li>II. The Main Tank No. 2 Fuel Quantity must be between 600 lbs – 800 lbs (200 kg – 300 kg).</li> </ol> <p>NOTE: Excess fuel can be transferred to Main Tank No. 1.</p> </li> <li>c. Test Procedural Limitations: <ol style="list-style-type: none"> <li>I. The Fuel Cross-Feed Valve must be CLOSED.</li> <li>II. The APU Selector Switch must be OFF.</li> <li>III. Idle Engine Warm-up time of minimum two minutes with Boost Pump(s) ON.</li> <li>IV. Idle Engine Suction Feed (All Boost Pumps OFF for the associated tank) operation for a minimum of five minutes.</li> </ol> <p>NOTE: APU may be used to start the engines provided the Fuel Tank Quantity and Test Procedural Limitations are met.</p> </li> </ol> </li> <li>2. The test is considered a success if engine operation is maintained during the five-minute period and the following engine parameters do not decay relative to those observed with Boost Pump(s) ON. <ol style="list-style-type: none"> <li>a. Pratt &amp; Whitney and General Electric Engine: N1, N2, and Fuel Flow.</li> <li>b. Rolls Royce Engine: N1, N2, N3, and Fuel Flow.</li> </ol> </li> </ol>



## NITROGEN GENERATION SYSTEM (NGS)

**Note we can include this section OR a statement such as Nitrogen Generation Systems NGS is not installed on MSN 12345 is sufficient also.**

The following list of AWLs contains FAA approved scheduled inspections and design limitations for operators to incorporate into their maintenance program for this type design to meet the requirements for the introduction of the Nitrogen Generation System (NGS). The FAA Final Flammability Rule, E8-16084, requires maintenance instructions and control limitations for certain NGS critical design configurations. Title 14 CFR § 25.981(d) also requires AWLs to preclude ignition sources inside the fuel tank that may be introduced by the addition of NGS.

E8-16084, Final Flammability Rule, Paragraph III(F), Section 7, Identification of Airworthiness Limitations: Paragraph M25.4(a) requires that if Flammability Reduction Means (FRM) is used to comply with Paragraph M25.1, AWLs must be identified for all maintenance or inspection tasks required to identify failures of components within the FRM that are needed to meet Paragraph M25.1. NGS AWLs are mandatory maintenance actions that ensure that unsafe conditions that arise due to NGS failures do not occur or are not introduced into the airplane as a result of configuration changes, repairs, alterations, or deficiencies in the NGS Maintenance Program throughout the operational life of the airplane.

See Section D for the definition of an ALI or CDCCL.

### General Information

Three factors are required in order for a combustion event to occur; fuel vapors in the right concentration, oxygen in the right concentration, and an ignition source. Ignition sources are addressed in Section D.1. Fuel vapors are addressed by minimizing the heat transferred to the fuel tanks. NGS addresses the oxygen concentration. The NGS is designed to provide the proper level of nitrogen to the center wing tank in order to reduce the flammability exposure by reducing the oxygen content of the ullage. The flammability exposure is also affected by the temperature of the fuel.

The following are critical design features of the airplane that, if altered, can negatively affect the performance of the NGS which in turn may increase the center fuel tank flammability exposure beyond the limits of Title 14 CFR § 25.981 at Amendment 25-125, utilizing the equivalent level of safety finding described in FAA Memorandum PS05-0177-P-2. Any alteration to these critical design features will require FAA Oversight Office approval.

1. Fuel Tank Venting: Transferring additional air (20.9% oxygen standard atmosphere) to the center fuel tank will dilute the nitrogen rich atmosphere created by the NGS in the fuel tank. For example, some Auxiliary Fuel Tank installations transfer air to the center wing tank as part of venting and fuel transfer.
2. Bleed Air Pressure: NGS performance depends on bleed air pressure in the bleed air cross-over manifold supplied by the engines to reduce the flammability of the center fuel tank. Any alteration that lowers the bleed pressure in the Environmental Control System (ECS) bleed air manifold will reduce the effectiveness of the NGS. Examples include changes in engine bleed schedule, or installation of new systems that require bleed air to operate.
3. Fuel Tank Temperature: Certification of the NGS depends on the inherent flammability of the center fuel tank without NGS installed. Center tank flammability is a direct function of fuel tank temperature. Any additional heat sources around the tank, heat sources introduced into the tank (such as warm fuel or new heat exchangers), or changes that would cause heat to be retained (such as installation of blankets adjacent to tank walls) could affect fuel tank flammability in a negative manner.

NOTE: See Boeing AMM Chapter 28 for a description of the Fuel System. See Boeing AMM Chapter 47 for a description of the NGS.

## AWLs – NITROGEN GENERATION SYSTEM

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
47-AWL-01	CDCCL	N/A	All Airplanes Line Number 772 and on.	Lightning Protection – Nitrogen Generation System (NGS) Nitrogen Enriched Air (NEA) Distribution Line Fuel Tank Penetration Bonding Path Concern: Potential for arcing or sparking inside the tank at the interface between the bulkhead fitting/ flame arrestor and the spar during a lightning strike event.
			Airplanes that have incorporated Service Bulletin 777-47-0002.	If the bulkhead fitting/flame arrestor is removed and reinstalled or replaced, the following design features must be verified (refer to Boeing AMM 47-21-06): 1. The bulkhead fitting with an integral honeycomb flame arrestor is installed. 2. A fillet sealed fay surface bond is installed between the bulkhead fitting/flame arrestor flange and the structure inside the tank. 3. The electrical bonding resistance between the bulkhead fitting/flame arrestor and the structure inside the tank is 0.0005 ohm (0.5 milliohm) or less. 4. A fillet seal is applied between the bulkhead fitting/flame arrestor and the structure inside the tank.
47-AWL-02	CDCCL	N/A	All Airplanes Line Number 772 and on. Airplanes that have incorporated Service Bulletin 777-47-0002.	Lightning Protection – NGS NEA Distribution Line Dielectric Isolator Hose Concern: Potential for arcing, sparking of filament heating inside the tank during a lightning strike event. If the dielectric isolator hose or the dielectric isolator attached tubing is removed and reinstalled or replaced, the following design feature must be verified (refer to Boeing AMM 47-21-00): 1. The dielectric isolator hose is installed.

## AWLs – NITROGEN GENERATION SYSTEM

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
47-AWL-03	CDCCL	N/A	All Airplanes Line Number 772 and on.	NGS – Flammability Exposure and Performance Concern: Airplane alterations may impact the performance of the NGS and hence the flammability of the Center Wing Fuel Tank.
			Airplanes that have incorporated Service Bulletin 777-47-0002.	Any alteration that affects performance of the NGS system, such as the following items 1 to 3 below, requires approval from the FAA Oversight Office. 1. Alteration that affects the vent system by adding air to the center tank, or 2. Alteration that reduces the available bleed pressure in the cross-over manifold during any phase of flight or ground operations, or 3. Alteration that adds any heat to the center wing fuel tank or increases heat retention of the center wing fuel tank (it does not include alterations to airplane fuselage paint color, or interior carpet or cabin furnishings).
47-AWL-04	ALI	108,000 FH	All Airplanes Line Number 772 and on.	NGS – Thermal Switch Concern: Latent Failure of the Thermal Switch removes a layer of protection against fuel tank ignition by hot bleed air.
			Airplanes that have incorporated Service Bulletin 777-47-0002	Perform either of the following actions: 1. Replace with a new Thermal Switch (refer to Boeing AMM 47-42-04). OR 2. Verify that the following bench tests have passed to ensure the integrity of the switch (refer to Honeywell (V70210) CMM 47-43-02): NOTE: The following tests are bench test only and must not be performed on the aircraft: a. Proof Temperature and Response Time Test: I. Verify the time that thermal switch actuates is within 5 seconds when the thermal switch is immersed in an approximately 370° F (188° C) oil bath and there is no electrical cycling of the thermal switch. b. Operating Test: I. Verify that the thermal switch actuates within the range of 255° F and 275° F (124° C to 135° C) when the thermal switch is immersed in an oil bath.

## AWLs – NITROGEN GENERATION SYSTEM

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
47-AWL-05	ALI	10,682 FH	All Airplanes Line Number 772 and on.	NGS – Cross Vent Check Valve Concern: The cross vent check valve may fail open latently, allowing air to flow through the center tank, diluting the nitrogen rich environment created by the Nitrogen Generation System. Perform an operational test of the cross vent check valve (refer to Boeing AMM 47-21-05) to ensure the cross vent check valve closes to prevent ambient air from entering the center tank. 1. Open the flapper valve of the cross vent check valve and verify that the flapper closes and seats into the valve body.
			Airplanes that have incorporated Service Bulletin 777-47-0002.	
47-AWL-06	ALI	10,682 FH	All Airplanes Line Number 772 and on.	NGS – NEA Distribution Ducting Integrity Concern: The NEA Distribution System ducting outside the fuel tank may fail latently allowing NEA to leak without reaching the fuel tank, resulting in the fuel tank not reaching required inert levels. Perform a detailed visual inspection of the NEA distribution lines from the Air Separation Module (ASM) to the fuel tank front spar for damage and leaks (refer to Boeing AMM 47-21-00): 1. Verify that there are no loose clamps for the Nitrogen Enriched Air Distribution System (NEADS) couplings, drain line connection, or joints. 2. Verify that there are no disconnections for the NEADS couplings, drain line connection, or joints. 3. Verify that there are no damaged tubes from the ASM to the fuel tank front spar.
			Airplanes that have incorporated Service Bulletin 777-47-0002.	
47-AWL-07	CDCCL	N/A	All Airplanes Line Number 772 and on.	NGS Ongoing Compliance Based on Industry Descent Times – Required Service Instructions Concern: NGS performance is dependent on industry descent times. Industry efforts to reduce descent time may result in NGS performance that does not meet FAA requirements. Fleet Average flammability exposure for the fuel tanks with flammability reduction of this airplane type must be maintained in accordance with Title 14 CFR Part 25, Appendix M. Boeing will monitor U.S. descent statistics and, if necessary to maintain compliance, will publish service instructions. If Boeing publishes such service instructions noted to maintain compliance with this CDCCL, this CDCCL requires either that operators implement these FAA-approved design changes or that operators implement other design changes or operational procedural changes approved by the FAA Oversight Office, within the compliance time stated in the service instructions, to maintain compliance with Title 14 CFR Part 25, Appendix M.
			Airplanes that have incorporated Service Bulletin 777-47-0002.	

## PRATT AND WHITNEY FORWARD STRUT DRAIN LINE

Pratt & Whitney engines are not fitted to MSN 12345

**We will include the next section which is relevant to the Rolls Royce Engine that we have installed.**

## ROLLS ROYCE THRUST REVERSER THERMAL PROTECTION SYSTEM

This section contains an FAA approved program of Thrust Reverser (T/R) scheduled inspections. Operators should incorporate these inspections into their maintenance program to meet Title 14 CFR § 25.901(b)(2) for those T/R configurations that are identified as applicable.

In revenue service, excessive temperatures have contributed to the failures of the 777 Rolls Royce T/R inner wall. The T/R Thermal Protection System (TPS) limits the temperatures experienced by the inner wall minimizing new/additional thermal distress. The replacement of the inner wall together with other design improvements (see SB 777-78-0082) eliminates the potential for additional thermal distress.

The Rolls Royce Thrust Reverser Inner Wall AWL is mandatory maintenance to ensure safe operation of the T/R installation as required by Title 14 CFR § 25.901(b)(2). The T/R TPS inspection verifies the proper functionality of the TPS. The Color Chip inspection demonstrates the inner wall has not been exposed to excessive temperatures by checking for any discoloration of the engine side inner wall primer.



## AWLs – THRUST REVERSER TPS

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
78-AWL-01	ALI	1,125 DY/ 6000 FC NOTE	777 Airplanes with Trent 800 engines. NOTE	<p>Thrust Reverser Thermal Protection System</p> <p>Concern: Potential for latent failure of the thrust reverser inner wall thermal protection system that could result in thermal exposure which reduces the strength of the inner wall panel. Proper cooling and insulation protects against thermal damage.</p> <p>Inspect (Detailed) the Thrust Reverser Thermal Protection System on both engines for the following (refer to Boeing AMM 78-31-07).</p> <ol style="list-style-type: none"> <li>1. Prior to Insulation Blanket Removal:               <ol style="list-style-type: none"> <li>a. The 4 upper and 4 lower cooling holes/bushings are blockage free (fan duct access)</li> <li>b. The insulation blankets are undamaged, securely attached, and clickbond covers are in place</li> </ol> </li> <li>2. After Insulation Blanket Removal:               <ol style="list-style-type: none"> <li>a. The insulation blanket perimeter sealing foam is firmly attached and undamaged.</li> <li>b. For drag link fittings that have cooling tubes attached:                   <ol style="list-style-type: none"> <li>I. Air exit holes are blockage free.</li> <li>II. A fillet seal exists between the cooling tubes and the drag link fitting.</li> <li>III. For the left thrust reverser, a fillet seal exists around the base of the drag link fitting.</li> <li>IV. For the right thrust reverser, a fillet seal exists between the land fitting flange and the exposed flanges of the drag link fittings.</li> </ol> </li> <li>c. The clickbond studs are present and firmly attached.</li> </ol> </li> </ol> <p>INTERVAL NOTE: Whichever comes first. Interval to be applied to each thrust reverser half independently.</p> <p>APPLICABILITY NOTE:</p> <ol style="list-style-type: none"> <li>1. For individual thrust reverser halves that have incorporated Service Bulletin 777-78-0071, or</li> <li>2. For individual thrust reverser halves that have incorporated Service Bulletin 777-78-0082, or</li> <li>3. For individual thrust reverser halves that have incorporated Service Bulletin 777-78A0094, or</li> <li>4. For individual thrust reverser halves with thrust reverser, PN 315W5295-97/-98/-99/-100 and higher.</li> </ol>

## AWLs – THRUST REVERSER TPS

AWL NUMBER	TASK	INTERVAL	APPLICABILITY	DESCRIPTION
78-AWL-02	ALI	1,125 DY/ 6000 FC NOTE	777 Airplanes with Trent 800 engines. NOTE	<p>Thrust Reverser Inner Wall</p> <p>Concern: Thermal protective system failures can result in the inner wall panel of the thrust reverser being exposed to high temperatures which can reduce the strength of the inner wall structure and lead to thermally induced damage such as disbonds and delaminations on the inner wall. Thermally damaged inner walls can collapse in flight.</p> <p>Inspect (Detailed) the thrust reverser inner wall (refer to Boeing AMM 78-31-01), using the Color Chip Kit, P/N 315W5110-7, to ensure the inner wall has not been exposed to temperatures which could degrade its strength.</p> <ol style="list-style-type: none"> <li>1. Verify that the thrust reverser inner wall primer color is not darker than the color chip standard (P/N 315W5110-5) from the Color Chip Kit, P/N 315W5110-7.</li> <li>2. If the thrust reverser inner wall primer color appears darker than the color chip standard, perform a non-destructive test (refer to Boeing AMM 78-31-01) to ensure the composite inner wall structure has no disbonds or delaminations.</li> </ol> <p>INTERVAL NOTE: Whichever comes first. Interval to be applied to each thrust reverser half independently.</p> <p>APPLICABILITY NOTE:</p> <ol style="list-style-type: none"> <li>1. For individual thrust reverser halves that have incorporated Service Bulletin 777-78-0082 Work Package 1 or Work Package 2, or</li> <li>2. For individual thrust reverser halves that have incorporated Service Bulletin 777-78A0094 Work Package 3 or Work Package 4, or</li> <li>3. For individual thrust reverser halves with thrust reverser, PN 315W5295-97/-98/-99/-100 and higher.</li> </ol>

## E CERTIFICATION MAINTENANCE REQUIREMENTS (CMRs)

### SELECTION OF CMRs

In order to grant operators of the 777 airplane an opportunity to participate in the evaluation and selection of CMRs in an integrated process with MRB tasks and intervals, a Certification Maintenance Coordination Committee (CMCC) was convened to review all of the 777 CMRs. The CMRs listed in this document are the result of applying the CMCC process as described in AC 25-19.

### CMR DEFINITION

As defined by AC 25-19, a CMR is a required periodic task, established during the design certification of the airplane as an operating limitation of the type certificate. CMRs usually result from a formal, numerical analysis conducted to show compliance with catastrophic and hazardous failure conditions.

Additional notes concerning the definition of CMRs:

1. A CMR is intended to detect safety-significant latent (hidden) failures that would, in combination with one or more specific failures or events, result in a hazardous or catastrophic failure condition.
2. It is important to note that CMRs are derived from a fundamentally different analysis process than the maintenance tasks and intervals that result from the Maintenance Steering Group (MSG-3) Analysis associated with Maintenance Review Board (MRB) activities. MSG-3 Analysis activity produces maintenance tasks that are performed for safety, operational, or economic reasons, involving both preventative maintenance tasks, which are performed before failure occurs (and are intended to prevent failures), as well as failure-finding tasks. CMRs, on the other hand, are failure-finding tasks only, and exist solely to limit the exposure to otherwise hidden failures. Although CMR tasks are failure-finding tasks, use of potential failure-finding tasks, such as functional checks and inspections, may also be appropriate.
3. CMRs are designed to verify that a certain failure has or has not occurred, and do not provide any preventative maintenance function. CMRs “restart the failure clock to zero” for latent failures by verifying that the item has not failed, or cause repair if it has failed. Because the exposure time to a latent failure is a key element in the calculations used in a safety analysis performed to show compliance with Title 14 CFR § 25.1309, limiting the exposure time will have a significant effect on the resultant overall failure probability of the system. The CMR Task Interval should be designated in terms of flight hours, cycles, or calendar time, as appropriate.
4. The type certification process assumes that the airplane will be maintained in a condition of airworthiness at least equal to its certified or properly altered condition. The process described in AC 25-19 is not intended to establish normal maintenance tasks that should be defined through the MSG-3 Analysis process. Also, this process is not intended to establish CMRs for the purpose of providing supplemental margins of safety for concerns arising late in the type design approval process.
5. CMRs should not be confused with required structural inspection programs that are developed by the type certificate applicant to meet the inspection requirements for damage tolerance, as required by Title 14 CFR § 25.571 or § 25.1529, Appendix H25.4 (Airworthiness Limitations section). CMRs are to be developed and administered separately from any structural inspection programs.

## CMR TYPES

CMR Tasks are divided into two categories: One Star CMRs (\*) and Two Star CMRs (\*\*). They are defined as follows:

1. One Star CMRs (\*) – The tasks and intervals specified are mandatory and cannot be changed, escalated, or deleted without the concurrence of the FAA Oversight Office.
2. Two Star CMRs (\*\*) – Task intervals may be adjusted in accordance with each operator's approved escalation program or an approved reliability program in a like manner for any MRB Report task, but may not be deleted without prior FAA Oversight Office approval.

### ESCALATION OF TWO STAR CMRs (\*\*)

All Two Star CMRs (\*\*) can be managed and controlled the same as any MRB Report task; however, they can not be deleted from an operator's program without prior FAA Oversight Office approval. For operators with approved escalation practices or an approved reliability program, data collection and analytical techniques are used to make adjustments to an operator's maintenance program. It has been demonstrated that the management of a maintenance program does not give rise to undue escalations; consequently, the escalation of Two Star CMR (\*\*) intervals within an operator's maintenance program will be properly managed by the operator subject to local regulatory authority approval.

## EXCEPTIONAL SHORT-TERM EXTENSIONS

Since CMR intervals are based on statistical averages and reliability rates, an exceptional short-term extension of 10% for each CMR listed in this document may be made, except as noted in Item 1, without jeopardizing safety. The local regulatory authority or a Principle Maintenance Inspector must concur with any exceptional short-term extensions before they take place using procedures established with the local regulatory authority in the operators' manuals. The "exceptional short-term extension" process is applicable to CMR intervals. It should not be confused with the operator's short-term escalation" program for normal maintenance tasks described in the operators' manuals and in the Flight Standards Handbook 8900.1 FSIMS.

The FAA Oversight Office has accepted that these exceptional short-term extensions may be granted without consultation with that office:

1. The term "exceptional short-term extension" is defined as an increase in a CMR interval that may be needed to cover an uncontrollable or unexpected situation. All CMRs listed in this section have been approved for an exceptional short-term extension of 10%, except as noted below:
  - CMR 52-CMR-01, which has been approved for a short-term extension, is restricted to a maximum of 90 days.
2. Repeated use of extensions, either on the same airplane or on similar airplanes in an operator's fleet, should not be used as a substitute for good management practices. Exceptional short-term extensions must not be used for fleet CMR extensions.
3. After a CMR has experienced an exceptional short-term extension, the CMR interval will revert back to its interval listed in this document. The FAA Oversight Office must approve, prior to its use, any desired extension not explicitly listed above.

NOTE: This exceptional short-term extension listed above applies to airlines that fall under the U.S. FAA jurisdiction only. Operators who are not under the U.S. FAA jurisdiction should obtain interval extension approvals from their local regulatory agency.

## POST-CERTIFICATION CHANGES TO CMRs

Any post-certification changes to CMRs should be reviewed by the 777 CMCC and approved by the FAA Oversight Office:

1. Since the purpose of a CMR is to limit the exposure time to a given significant latent failure as part of an engineering analysis of overall system reliability, instances of a CMR task repeatedly finding that no failure has occurred may not be sufficient justification for deleting the task or increasing the time between repetitive performances of the CMR task. In general, \* CMRs are not good candidates for escalation under an operator's reliability program.

A \* CMR task change or interval escalation can only be made if world fleet service experience indicates that certain assumptions regarding component failure rates made early during the engineering analysis were overly conservative, and a re-calculation of system reliability with revised failure rates of certain components reveals that the \* CMR task or interval may be changed.

2. The introduction of a new CMR or any change to an existing CMR should be reviewed by the same process used during initial certification. It is important that operators be afforded the same opportunity to participate that they received during the original certification of the airplane, in order to allow the operators to manage their own maintenance programs.

3. In the event that later data provide sufficient basis for relaxation of a CMR (less restrictive actions to be required), the change may be documented by an FAA Oversight Office approved change to this CMR document.

4. If the requirements of an existing CMR must be increased (more restrictive actions to be performed), it will be implemented by a change to this CMR document and enforced by an FAA Airworthiness Directive (AD).

5. After initial aircraft certification, the only basis for adding a new CMR is in association with the certification of design changes.

6. A new CMR created as part of a design change should be part of the approved data for that change and added to this CMR document.

In the event that a CMR is revised, Boeing will document it by preparing a revision to this document that will be approved by the FAA Oversight Office.

This revision will then be forwarded to all 777 operators and the FAA Oversight Office.

<div>BOEING 777</div> CERTIFICATION MAINTENANCE REQUIREMENTS							
CMR ITEM NUMBER	T Y P E	RELATED MRB ITEM NUMBER	T A S K	CMR INTERVAL	APPLICABILITY		TASK DESCRIPTION
					APL	ENG	
EXAMPLE							
EXAMPLE ILLUSTRATING FORMAT							
29-CMR-02	*	29-130	OP	12000 HRS	ALL	ALL	Operationally check CENTER HYDRAULIC ISOLATION SYSTEM.

FIGURE 8. PAGE FORMAT CERTIFICATION MAINTENANCE REQUIREMENTS



**PAGE FORMAT – CMRs**

COLUMN	EXPLANATION
CMR ITEM NUMBER	Each task is given a unique CMR item number. The first character, if applicable, is the engine prefix: G = General Electric, N = Pratt & Whitney, and R = Rolls Royce The second and third digits are the ATA chapter number.
TYPE	CMR TYPE  CMRs are categorized into one or two star CMRs based on whether or not they can be escalated by the operator without prior FAA Oversight Office approval.  * Cannot be escalated or deleted without prior FAA Oversight Office approval.  ** Can be escalated based on the operator's approved program for continued airworthiness based on continuous analysis and surveillance; however, these tasks cannot be deleted without prior FAA Oversight Office approval.
RELATED MRB ITEM NUMBER	This column is for the related MRB Item Number, if there is an applicable MRB Item Number. Not all CMRs have a one to one relationship to a MRB Item Number.
TASK	MSG-3 TASK CATEGORIES  OP = OPERATIONAL CHECK  A failure finding task to determine if an item is fulfilling its intended purposes. Does not require quantitative tolerances.
CMR INTERVAL	Task frequencies are specified in terms of a usage parameter such as flight hours, cycles or calendar time.
APPLICABILITY APL ENG	Applicable Airplane Model and Engine.  <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <b>AIRPLANE</b>             ALL = All Airplanes            300 = 777-300            777F = 777 Freighter         </div> <div style="width: 45%;"> <b>ENGINE</b>             ALL = All Engines            4000 = PW4074, PW4077, PW4084, PW4090, PW4098            GE90 = GE90 (75B/76B/85B/90B/94B/110B/115B)            TRENT = TRENT 800 (875-17, 877-17, 884-17, 890-17, 892, 892B, 895)         </div> </div>
TASK DESCRIPTION	Description of the task to be performed.

## CERTIFICATION MAINTENANCE REQUIREMENTS TASKS

CMR ITEM NUMBER	TYPE	RELATED MRB ITEM NUMBER	TASK	CMR INTERVAL	APPLICABILITY		777 CERTIFICATION MAINTENANCE REQUIREMENTS
					APL	ENG	TASK DESCRIPTION
21-CMR-01	**	21-33	OP	7500 Hrs	777F	ALL	Operationally check the manual and automatic activation of the Main Deck Alerting System.
25-CMR-01	*	25-056	OP	375 DY	ALL NOTE	ALL	Perform an operational check of the Inflatable Seat Restraint System. AIRPLANE NOTE: If installed. Applicable to AMSAFE NexGen inflatable seat restraint installations, EMA P/N 511959-XXX-XX.
26-CMR-01	*	---	IN	6000 Hrs or 18 Mos, whichever occurs first	ALL NOTE	ALL	Inspect Cargo Fire Bottles, supplier Part Numbers 473474-2, 473475-2, 473854-2, and 473876-2, for leaks using a Halide Leak Detector. Apply Corrosion Inhibitor Compound to burst disc (inside fill fitting). AIRPLANE NOTE: Applicable to airplanes with -2 bottles installed. (CMR is not applicable to -3 bottles).
27-CMR-01	*	27-140	OP	500 Hrs	ALL	ALL	Operationally check PRIMARY FLIGHT CONTROL ACTUATION. Use hydraulics-on actuation confidence tests.
27-CMR-02	*	27-160	OP	500 Hrs	ALL	ALL	Operationally check ACTUATOR CONTROL ELECTRONICS (ACE) MONITORING Functions of Flight Controls System (use ACE self-test).
27-CMR-04	*	27-360	OP	12000 Hrs	ALL	ALL	Operationally check LE SLAT SKEW/LOSS CABLE SYSTEM.
27-CMR-05	*		IN	5000 FC	777F	ALL	Conduct a visual inspection of the 24 Horizontal Stabilizer Trim Actuator (HSTA) Karon lined bushings and pins common to the Jackscrew Upper and Lower Gimbals, Section 48 and Section 82 Fittings. Inspect for Karon liner or pin wear/damage and liner delamination
27-CMR-06	*	12-002	LUB	5000 Hrs or 500 Dys whichever comes first	777F	ALL	Lubricate the Elevator Power Control Units (PCUs) and Elevator Hinges.
27-CMR-07	*	12-004	LUB	5000 Hrs or 500 Dys whichever comes first	777F	ALL	Lubricate the Rudder and Rudder Tab Hinge Bearings, Rudder Power Control Units (PCUs) Reaction Link Rod Ends and PCU Rod Ends.

## CERTIFICATION MAINTENANCE REQUIREMENTS TASKS

CMR ITEM NUMBER	TYPE	RELATED MRB ITEM NUMBER	TASK	CMR INTERVAL	APPLICABILITY		777 CERTIFICATION MAINTENANCE REQUIREMENTS
					APL	ENG	TASK DESCRIPTION
27-CMR-08	*	27-240	FC	12000 Hrs or 1125 Dys, whichever comes first	777F	ALL	Functionally Check Elevator Surface Freeplay.
27-CMR-09	*	27-430	FC	12000 Hrs or 1125 Dys, whichever comes first	777F	ALL	Functionally Check Rudder/Rudder Tab Surface Freeplay.
28-CMR-01	*	---	IN	6000 Hrs	300	ALL	Conduct a visual inspection of the center fuel tank FQIS wiring for damage or chafing.
29-CMR-01	*	29-030	FC	12000 Hrs	ALL	ALL	Functionally check the GROSS INTERNAL LEAKAGE of the Main (Center) Hydraulic System.
29-CMR-02	*	29-130	OP	12000 Hrs	ALL	ALL	Operationally check CENTER HYDRAULIC ISOLATION SYSTEM.
29-CMR-03	*	29-150	OP	7500 Hrs	ALL	ALL	Operationally check RAT System (using RAT checkout module) and check RAT Auto and Manual Deployment Systems.
31-CMR-01	*	31-100	OP	24 Hrs NOTE	ALL	ALL	Operationally check FIRE WARNING SYSTEM using the Fire/Overheat Test switch (if not checked by crew). INTERVAL NOTE: Under exceptional operational circumstances the interval may be extended beyond 24 hours (elapsed clock hours) but not exceed 48 hours (clock time).
32-CMR-01	*	12-081	LUB	50 FC or 25 DYS, whichever occurs later	NOTE	ALL	Lubricate the left and right Main Landing Gear truck beam and inner cylinder pivot joints. AIRPLANE NOTE: Applicable to airplanes production line number 915 and on, or airplanes that have incorporated Service Bulletin 777-32-0085.
52-CMR-01	*	---	DS	3375 Dys	NOTE	ALL	Discard the Flight Deck Door Strike Assembly. AIRPLANE NOTE: Applicable to non-freighter airplanes from line number 427 and on, or airplanes that have incorporated Service Bulletin 777-25-0216.

## CERTIFICATION MAINTENANCE REQUIREMENTS TASKS

CMR ITEM NUMBER	TYPE	RELATED MRB ITEM NUMBER	TASK	CMR INTERVAL	APPLICABILITY		777 CERTIFICATION MAINTENANCE REQUIREMENTS
					APL	ENG	TASK DESCRIPTION
72-CMR-01 DELETED	*	---	IN	24 Hrs NOTE	NOTE	TRENT NOTE	Inspect (Detailed) STEP-ASIDE-GEARBOX (SAGB) HOUSING and EXTERNAL GEARBOX LOWER BEVEL BOX (LBB) HOUSING for evidence of oil leakage and cracking per RR Non-Modification Service Bulletin 72-C129, Issue 3. AD 97-06-13. INTERVAL NOTE: Under exceptional operational circumstances the interval may be extended beyond 24 hours (clock time) but not to exceed 48 hours (clock time). AIRPLANE NOTE: Applicable to all Increased Gross Weight 777-200 airplanes and to any 777-200 with Rolls-Royce Trent engines capable of the 892-17 thrust rating. ENGINE NOTE: Applicable to all Rolls-Royce Trent engines capable of the 892-17 thrust rating and to all Trent engines installed on Increased Gross Weight 777-200's.
72-CMR-02 DELETED	*	---	IN	10 Cyc	NOTE	TRENT NOTE	Inspect (Special Detailed) STEP-ASIDE-GEARBOX (SAGB) HOUSING with fluorescent penetrant for evidence of cracking per RR Non-Modification Service Bulletin 72-C129, Issue 3. AD 97-06-13. AIRPLANE NOTE: Applicable to all Increased Gross Weight 777-200 airplanes and to any 777-200 with Rolls-Royce Trent engines capable of the 892-17 thrust rating. ENGINE NOTE: Applicable to all Rolls-Royce Trent engines capable of the 892-17 thrust rating and to all Trent engines installed on Increased Gross Weight 777-200's.
72-CMR-03	*	---	IN	1000 Cyc NOTE	300	TRENT	Inspect (Special Detailed) MAIN FAN BLADES with ultrasonic test for evidence of fan blade root cracking per Rolls-Royce Non-Modification Service Bulletin 72-C445, Rev. 1. INTERVAL NOTE: Repeat inspections at 500 cycles.
78-CMR-01	*	78-025 78-220 78-365	OP	5000 Hrs	ALL	ALL	Operationally check Thrust Reverser SYNC LOCK on left and right engine.
78-CMR-02 DELETED	*	78-035 78-040	-	NOTE	ALL	GE90	PRECOOLER INLET DUCT ASSEMBLY KISS SEAL INTERVAL NOTE: For Part Number S315W134-2 and -11 inspect per Service Bulletin 777-78-0010, Revision 2.
All CMRs on this list may have a 10% exceptional short-term extension of the task interval for a specific airplane. For further explanation, see Section 9.D.							

## G REPORTING UNCONTROLLABLE HIGH THRUST FAILURE CONDITIONS

Title 14 CFR § 121.703 and § 135.415 state that “each certificate holder shall report any failure, malfunction, or defect in an aircraft, system, component, or powerplant that occurs or is detected at any time if, in its opinion, that failure, malfunction, or defect has endangered or may endanger the safe operation of an aircraft”. Title 14 CFR § 125.409 also requires reporting of failures, malfunctions, or defects. In many cases a reportable failure or malfunction will be obvious, but there are some failure modes related to uncontrolled high thrust that are reportable but may not be obvious. The following information is provided, as required by FAA Exemption No. 7955, to assist the operators in identifying reportable malfunctions related to uncontrolled high thrust.

The FAA has concluded that the loss of capability to control thrust due to a failure of the engine thrust control system may endanger the aircraft. This includes any malfunctions having one or more of the following characteristics:

### 777-200 (777-200IGW or 777-200ER), 777-300

- Auto-acceleration or uncommanded thrust change to higher power
- Stuck thrust lever above idle power
- Inability to reduce thrust

### 777-300ER, 777-200LR, 777F

- Stuck thrust lever above idle power
- No response to thrust lever, with the cause being a mechanical failure in the thrust lever mechanism or resolver
- Although some or these incidents may not appear to be safety related, documenting the events is important to ensure the present level of safety is maintained and/or to identify failure conditions that must be corrected.

When filing a report of such an event with the FAA, the operator is requested to include in the description of the event one or more of the following phrases:

- “thrust control”
- “no response to thrust lever”
- “auto-acceleration”
- “uncontrolled high thrust”

In addition, the following information should be included in the report:

- Event description
- Flight Crew action
- Maintenance action
- List of affected or removed components

Reports should be submitted to the local representative of the FAA Administrator that handles the appropriate reporting responsibility for Title 14 CFR § 121.703, 125.409, and 135.415. In addition to filing reports with the FAA, it is recommended that a copy be sent to Boeing and to the engine manufacturer.

## H. AWLs - STRUCTURAL LIMIT OF VALIDITY (LOV)

This section provides the Limit of Validity (LOV) in accordance with the requirements of Title 14 CFR § 26.21 (Amendment 26-6). This regulation requires

the establishment of an airplane level limit of validity of the engineering data that supports the structural maintenance program that corresponds to the

period of time, stated as a number of total accumulated flight cycles or flight hours or both, during which it is demonstrated that widespread fatigue damage

will not occur in the airplane. The LOVs listed in the following table support operator compliance with Title 14 CFR Sections 121.1115 and 129.115.

LIMIT OF VALIDITY FOR THE 777-200/200LR/300/300ER/F		
MODEL	FLIGHT CYCLE LOV	FLIGHT HOUR LOV
777-200	60,000	180,000
777-200LR	60,000	180,000
777-300	60,000	180,000
777-300ER	60,000	180,000
777F	37,500	180,000
<b>Note:</b> Limit of Validity for the 777-200 applies to all 777-200 airplanes except the 777-200LR model. Limit of Validity for the 777-300 applies to all 777-300 airplanes except the 777-300ER model.		



## I. AWLs - SYSTEMS

These System Airworthiness Limitations are a result of Model 777 airplane certification activities with the U.S. FAA and are part of the Airworthiness Limitations section of the Instructions for Continued Airworthiness. These maintenance actions are mandatory. These Airworthiness Limitations may only be revised with the approval of the FAA Oversight Office.

### SYSTEM AIRWORTHINESS LIMITATION NO. 1 - MULTI-MODE RECEIVER (MMR) OPERATING LIMITATION - 777-200/200LR/300/300ER/777F AIRPLANES WITH COLLINS GLU-2100 MMR

Aircraft configured with Rockwell Collins Multi-Mode Receivers (MMRs) Model GLU-2100 (P/N 822-2532-100) with Operational Program Software (OPS) P/N COL4E-0087-0001 or COL4D-0087-0002 will fail on June 11 2023 00:00:00 UTC. Failure will result in complete loss of all enabled MMR functions including Global Positioning System (GPS) and Instrument Landing System (ILS). Airplanes with GLU-2100 MMR units with OPS P/N COL4E-0087-0001 or COL4D-0087-0002 cannot be operated past June 10 2023 00:00:00 UTC unless upgraded to new compliant software. Boeing will release service data to allow retrofit of a software update to the GLU-2100 MMR prior to that date.