NATIONAL TRANSPORTATION SAFETY BOARD
Investigative Hearing
Alaska Airlines Flight 1282
Boeing 737-9, N704AL
Left Mid Exit Door Plug Separation in Portland, OR
January 5, 2024

Docket No.	SA-543
EXHIBIT	
11-O	

Excerpts from Boeing Process Instruction BPI-1581

(14 Pages)

BPI-1581
Issue Date
January 27, 2023

Perform Part or Assembly Removal

Purpose

This BPI implements configuration status accounting according to [redacted] and fulfills the requirements specified in [redacted] and [redacted].

Removal records are documentation that:

1. Ensure the product is restored according to all released engineering requirements.

2. Make certain there is a production record within a Manufacturing Execution System (MES) for previously accepted parts, assemblies, or installations that have been subsequently disturbed.

3. Safeguard prior part, assembly, or installation acceptances from legal liability due to subsequent tampering of an accepted part, assembly, or installation.

4. Confirm configuration accountability through completed records of all activity occurring on aircraft parts, assemblies, and installations.

Use of the Authority Reference for this writing has been approved.

Superseded Date

November 9, 2022

Applies To

Function	Business Unit / Operating Group	Program	Location
Engineering	Boeing Commercial Airplanes	All BCA Programs	All Locations
Manufacturing	Boeing Commercial Airplanes	All BCA Programs	All Locations
Manufacturing	Boeing Test & Evaluation	All BCA Programs	Puget Sound Region

A. Scope

This BPI applies to BCA and BT&E when performing work on components, parts, assemblies, and installations that are within BCA under the Production Certificate 700 (PC700). See [redacted] for the BT&E removal process, when performing work on airplanes in the BT&E inventory.

This BPI includes some system-specific instructions. The complete system-specific instructions are contained in the supplemental process instructions listed in process step 1.

In this BPI, the term "acceptance stamp" is used synonymously with "authority media" according to [redacted].

Input (Product/Service): Requirement to remove a previously accepted part/assembly	Output (Product/Service): Part/assembly installed and accepted
From (Supplier): Engineering, Manufacturing, Quality	To (Customer): Engineering, Manufacturing, Quality

B. Introduction

Removing, partially removing, loosening, or disassembling a previously installed and accepted component, part, assembly, or standard requires removal documentation. There are exceptions to this rule which are explained within this document. This process performs physical configuration conformance to meet [redacted] requirements.

To transfer non-unitized assemblies between airplanes to support the factory/field and Flightline for critical shortages, utilize [redacted] for process requirements and [redacted] for process instructions. When the required part is unitized, process the reallocation according to [redacted].

To determine whether removal documentation is or is not required (N/R), use the following and Exhibit A (this flow chart is not all encompassing but used as an aid):

1. Removal documentation is required for all of the following:
   - All parts/assemblies including the items listed below; unless they are listed in sub-section 2.
   - Standards unless noted on a nonconformance record form type. A quantity greater than one fastener type on a Pickup item requires a

removal record. Standards common to parts noted on a removal record are excluded.

- Fasteners that penetrate through the fuel cell, after pressure testing has been completed.
- Opening a previously Quality accepted and paper sealed Power Panel requires removal documentation
- Production parts, assemblies, and connectors removed to perform troubleshooting during production functional testing, this includes all testing of racks, panels, shelves, and wire bundles.
- Stand-alone electrical connectors removed during an out of sequence functional test (line replaceable unit [LRU] and System test) unless there is an accompanying work instruction that covers installation bond and ground and high intensity radio fields (HIRF) requirements for the connector when applicable. This is not applicable for the in-sequence functional tests ran the first time in production.
- Parts/assemblies, and wire bundles that penetrate through the fuselage or the fuel cell, after pressure testing has been completed. See sub-section 2 of this section B for exceptions.
- Disturbed sealant common to the pressure or fuel side of the pressure cavity or fuel cell, after the final pressure testing has been completed.
    - Trimming sealant to meet dimensional requirements is acceptable without creating a removal record as long as there is documentation that accounts for this action.
    - Adding sealant to an existing sealant installation does not require a removal record as long as there is documentation that accounts for this action.
- A part/assembly removed as a result of a flight test work sheet (FTWS), even when the steps to remove and replace are included in the FTWS. This includes red label software changes as a result of a red label FTWS.
- Parts/assemblies that are noted within out of sequence work instructions that state for example, to adjust, re-rig or reposition a Power Control Unit (PCU) input control rod, control cable turn barrel, tie rod, and serrated plate without details on which fasteners or jam/clamp nut to loosen and tighten. This includes work instructions to adjust or reposition a part according to disposition or according to a particular Engineering drawing or specification without the specific parts (fasteners, jam/clamp nuts or vernier adjustment sleeve) being called out.

2. A removal record/emergent removal is not required when considering all of the following:
   - Parts and assemblies are identified in Exhibit D. Exceptions are noted within the specific panels or areas within Exhibit D. These exceptions are for inspections, access, or maintenance only. Rework in the area voids this exception. When the noted part is listed on Exhibit D, then the criteria noted below is not applicable.
   - There are other active work instructions (examples are nonconformance orders [NCO], out-of-sequence installation plans [OSIP], nonconformance [NC] shop order instance [SOI]), created by ME, Material Review Board Designee (MRBD) or Quality Planning, that includes the following information related to product removal:

     a. Part or assembly removed is identified by part number on the work instructions.

     b. An inspection before re-installation is documented (e.g., “Ok to Install”). Exception: This is not applicable for functional test work instructions.

     c. When applicable, required previous FAA conformities are accounted for.

     d. When applicable, document prior customer requirements have been re-checked.

     e. When applicable, any required retests are documented on the work instructions.

     f. An operation for making an entry into the Disturbed Systems Report, when applicable (for the flightline airplanes only after release for B1 flight), regardless of a factory organization performing the rework, this operation must be considered when it is applicable.

     When any of the above items a through f are missing, a removal record/emergent removal is required.

     It is permissible for ME Personnel to author work instructions containing removal requirements contained in this document.
   - Parts received that have not been installed yet that need rework, can use other work instructions to fulfill the requirements of this BPI. For these types of parts, the requirement for having FAA and Customer reviews and disturbed system record (DSR) entries can be omitted.

- An out of sequence production functional test requires the removal of a part, component, or an LRU, and a step to reinstall the same part or component by nomenclature and identification, and the part number is also included in the test or a follow-on test. This does not include electrical connectors (refer to section B.1). A generic step stating to “Restore aircraft systems to normal” is not acceptable to account for all of the parts that were disturbed during the test. Refer to [redacted], which is the System Functional Test Writer's Guide for manual System Functional tests.
- Disconnecting system connections (e.g., electrical connectors, ducts, and hydraulic tubes) from the part/assembly entered in the removal documentation. One side of the connection must remain attached to the airplane. This means no additional removal records are required for disconnecting electrical connectors from the part (such as a disconnect panel that is mounted to the airplane) that is noted on the removal record. This also means when a disconnect panel has a receptacle that needs replacing, only one removal record entry would be required (for the receptacle) even when the electrical connector (the plug side) has been disconnected from the receptacle.
- Disconnecting tie rods or torque tubes from a part or an assembly (e.g., Lavatories, stow bins, and galleys) that is documented on a removal record or entry is not required as long as one end remains connected to the airplane.
- Performing an interior pre-certification and compliance inspection. This only applies to the Authorized Representative (AR) and required personnel. The parts/assemblies must be reinstalled immediately following the pre-certification and compliance inspection. This does not include parts/assemblies that require employee certifications or retest.
- Removing Flight Test instrumentation parts/assemblies, which do not affect a production configuration or invalidate a production functional test.
- Fasteners, Standards, sealant, finishes, and corrosion prevention materials that are common to the part or assembly already documented on a removal, additional removal documentation is not required for these sealants, finishes, corrosion prevention materials and standards (e.g., panduits, string ties, clamps, fillers, shims, fasteners, nuts, washers, cotter pins, lockwire, bushings, bearing assembly, and bond jumpers); these items are considered part of the original part/assembly removal.

- When an Inspection Pickup (rework type pickup) or a Pickup SOI is created according to the applicable BPI, it is adequate documentation to record easily accessible discrepant items in the discrepancy text in lieu of creating a removal record. These items include any of the following:
    - Replacement/rework of sealant.
    - Finishes.
    - Standards: (consumables such as: panduits, string ties, filler rods, clamps, standoffs, nutplates, and bond jumpers).
    - Fasteners not greater than a quantity of one type per pickup item. Fasteners through the fuselage can be changed using a pickup.
    - Electrical pins, contacts, and lugs may be replaced or repositioned within an electrical connector that is disconnected and is documented by an existing removal record and a nonconformance record form type, or for a connector that has not initially been permanently installed with a nonconformance record (NCR) within an approved MES (e.g., Common Manufacturing Execution System [CMES], Velocity). All in-process inspections will still need to be recorded to account for the work performed by Manufacturing and inspected by Quality.

  These conditions are documented according to [redacted] (787). The pickup has to be correctly created according to the applicable BPI before using this exemption.

3. Complex Reinstallation Scenarios:

   ME Personnel are able to create out of sequence work instructions to help Manufacturing systematically reinstall the removed parts according to engineering requirements. This option is available upon request. Manufacturing will use the 'Complex Reinstallation' removal template for this option when creating a removal record.

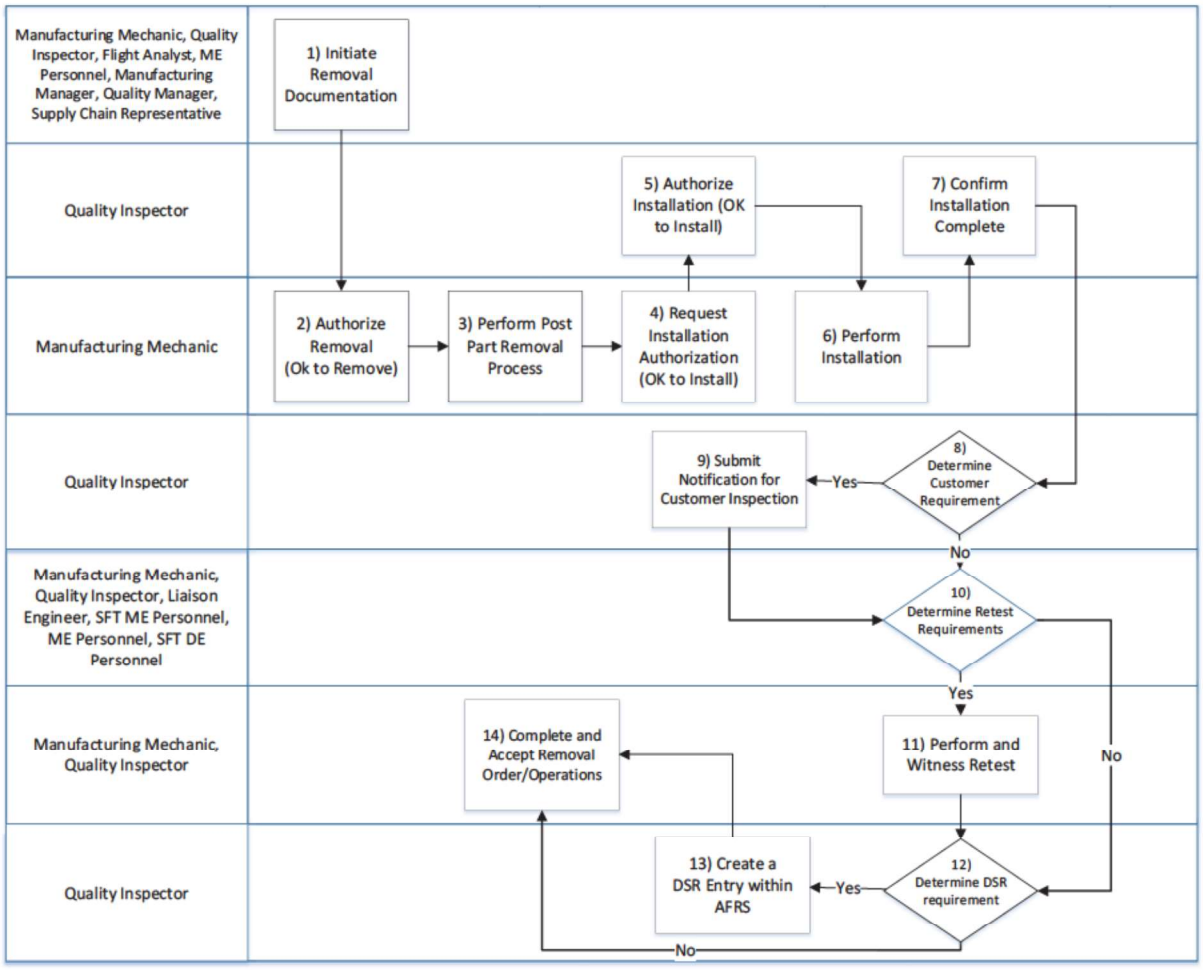
   Manufacturing should, but is not required to, request ME assistance for the reinstallation of parts deemed complex using one or more of the following criteria:

   a. The initial installation required multiple work instructions (e.g., installation plans [IP], SOI).

   b. When the reinstallation of parts involves several distinct or critical commodities/installation modules or is deemed difficult to reinstall

due to numerous engineering requirements, special or unique installation requirements, and in-process inspections.

C. Process Flow



[redacted]

Exhibit A – Removal Decision Tree
(Use with Criteria in Section B.1 and 2 to be used as an aid)
(Page 1 of 3)

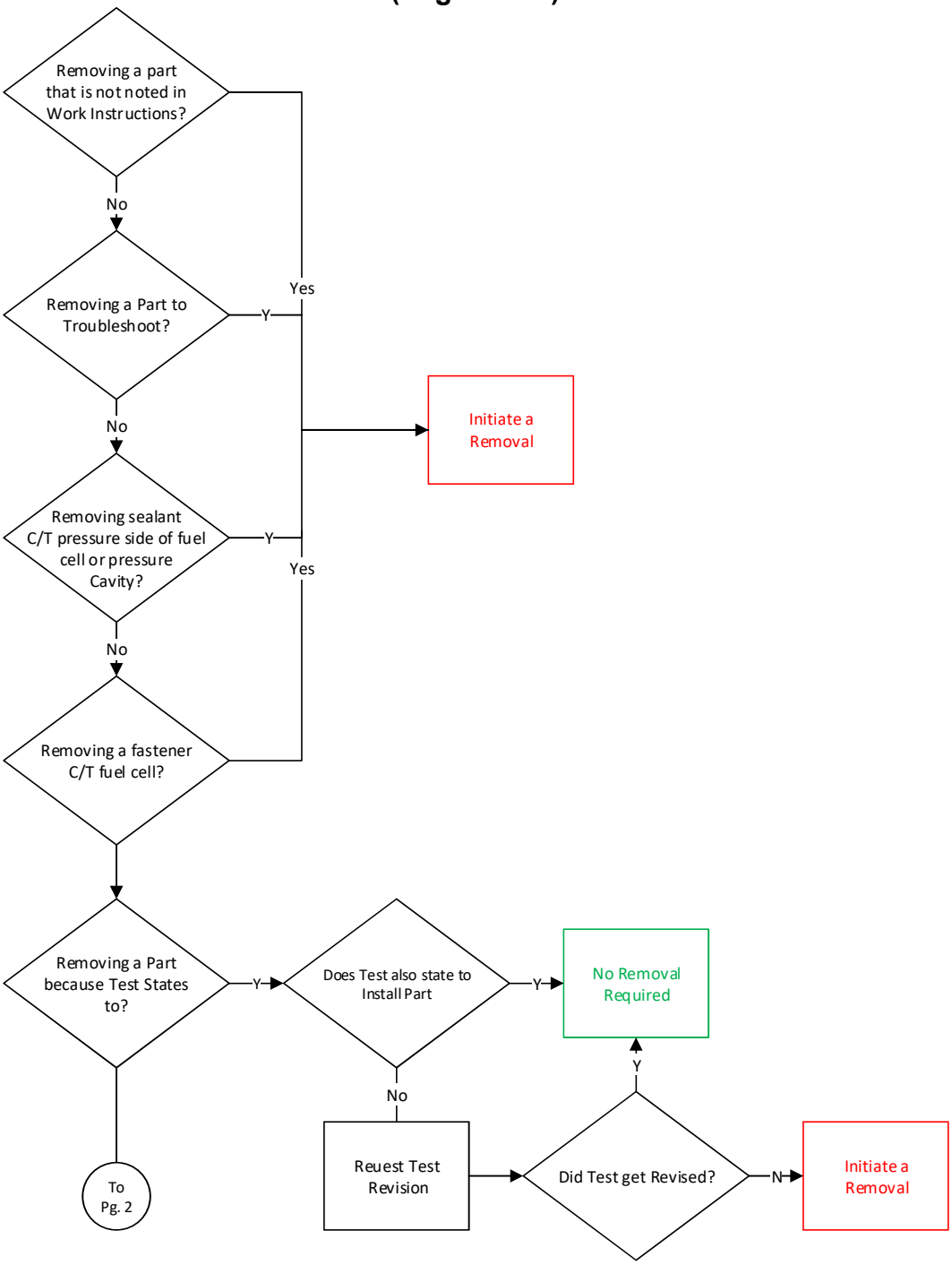


Exhibit A – Removal Decision Tree
(Page 2 of 3)

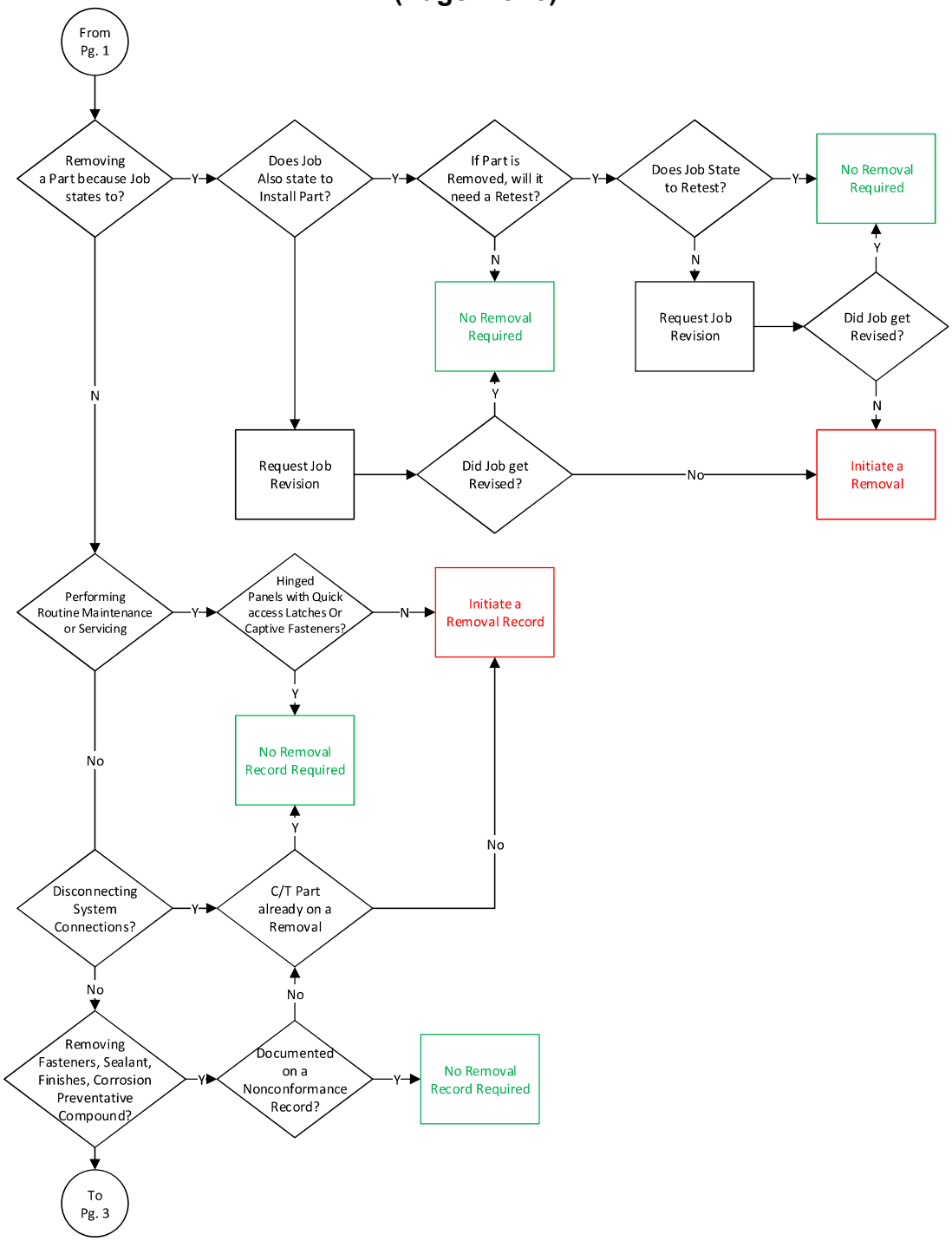


Exhibit A – Removal Decision Tree
(Page 3 of 3)

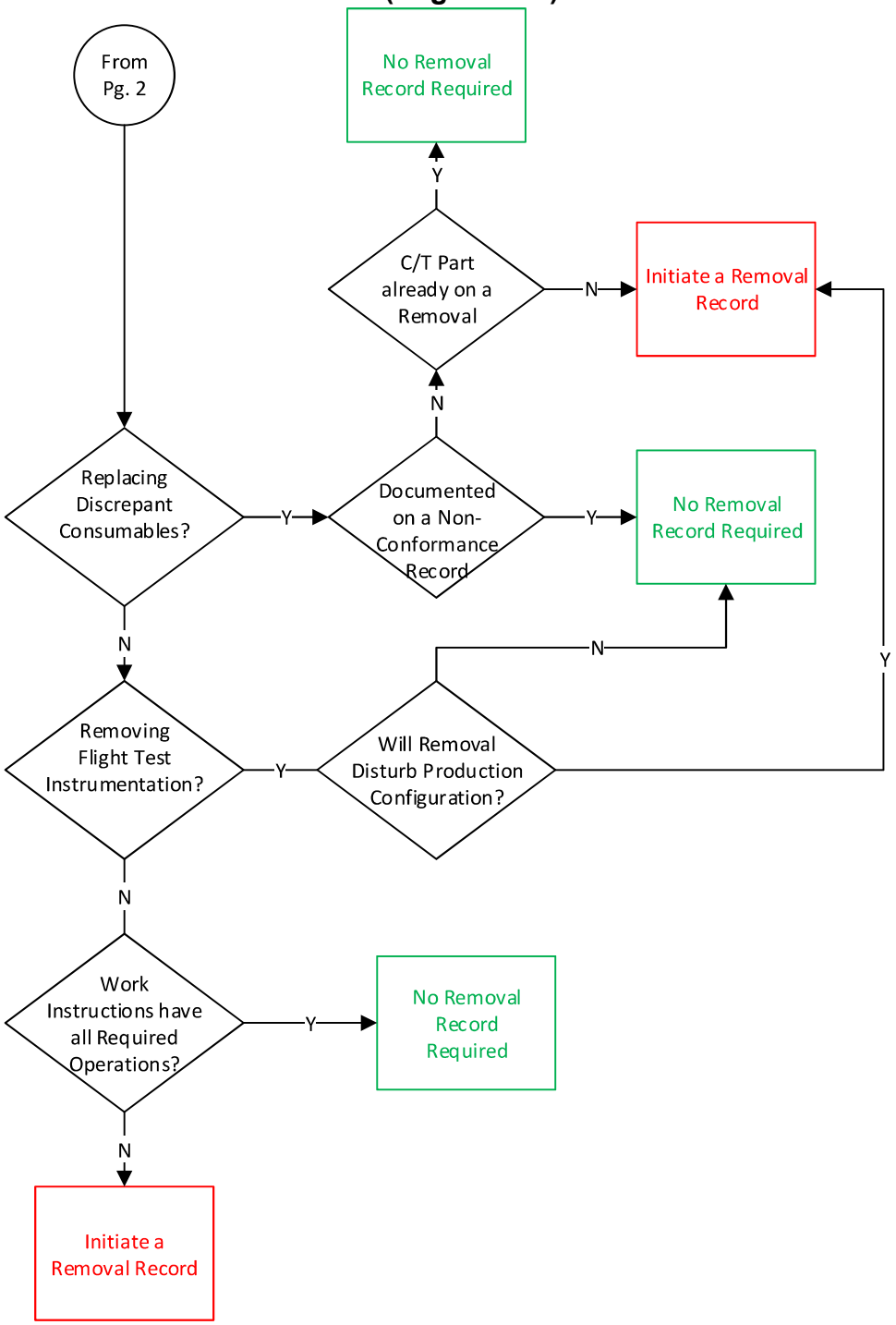


Exhibit D
Removal Exception List

To add parts/assemblies to this list, see [redacted]

The opening and closing of maintenance or access doors or panels, specifically designed for that purpose:
48 section access door/hatch
Aft 48 section quick access panels for 737
Lavatory service access panel
Main landing gear door – ground release access door
Center sump drain access panel
Air conditioning bay access doors
Exterior aft electrical/electronic bay door
Auxiliary power unit (APU) doors
Ground power service panel access door
Power Panels (P-Panels) that are not paper sealed
Opening of engine thrust reversers and fan cowls
Engine Strut Fairing access panel doors
Engine thrust reversers and fan cowls
Cargo sidewall liners or panels with ¼ turn fasteners, zippers or snaps that are not taped down. These panels do not need to be hinged. Any rework performed in the area will require a removal record entry for access.
Cargo handling control panel access door
Vertical Fin quick access hinged panels
Interior adjustments and access (provided there is work instructions or a pickup describing the noted condition)**:**
Passenger cabin stow bin doors; for adjustment only
Seat cushions; for adjustment and to confirm seat assembly serial numbers only
Head rests; for adjustment only
747/767/777/787 passenger door bustle liner
Galley coffee pots
Water boilers and coffee makers; for access to galley water filters only
Galley water filter access panel
Interior cabin hinged panels and ceiling panels (lanyards and electrical connectors must stay connected). Disconnecting the lanyard or electrical connectors or complete removal or performing any rework in that area requires a Removal Record.
Main Galley Hinged Ceiling Panel (any rework in the ceiling area or disconnecting electrical connectors common to the ceiling panel will require a Removal Record)

Interior blankets may be lifted partially without disturbing clips, washers, or buttons to perform cleaning or ensure cleanliness (FOD) or configuration. Opening a Velcro seam on a blanket secured by Velcro is acceptable. Any rework performed in the area will require a removal record entry for access. Replacement requirements are noted below.
Interior Seat Row Marker Assy. for 737 Max may be adjusted to meet installation requirements.
Access to confirm part/serial numbers or data needed for the aircraft readiness log:
Galley carts; to confirm part/serial numbers only
Life vest access panels; to confirm part/serial numbers only
Passenger service units; to confirm part/serial numbers only; lanyards, oxygen hoses and electrical connectors must stay connected
Ceiling panel to access flight deck voice recorder or flight data recorder; to confirm part/serial numbers and expiration dates only
Emergency equipment to confirm part and serial numbers and expiration dates: Portable fire extinguishers, megaphones, emergency locator transmitters, first aid kits, portable oxygen bottles, and smoke hoods
Equipment removed by the E-UM during interior pre-certification and compliance inspections to confirm part and serial numbers, expiration dates and to validate clearance, placement and retrievability:
Seat cushions, headrests, seat belts, seat belt extenders, demonstration kits, seat track covers, galley coffee makers and pots, hot cups, water bottles, galley containers and carts, portable fire extinguishers, smoke hoods, fire gloves, portable oxygen bottles, first aid kits, life vests, flashlights, megaphones, and emergency locator transmitters
Parts listed below that may be removed/replaced without a Removal Record provided the part (Qty 1) is documented on a nonconformance record (RGEN or PU SOI) item. The Removal and replacement process must be completed within a single work shift otherwise a removal record must be created.
Interior Blankets: Blankets that are damaged may be replaced without a removal record provided there is no rework being performed in the area. The reinstalling drawing/module will be noted on the nonconformance record (e.g., a pickup). This exception is not applicable on the KC-46 program.

Light Bulbs and Light Assemblies, including the lens and retainer ring but not including the Nose or Wing Exterior Landing Lights for the purpose of replacing burnt out bulbs or is inoperative. This exception does not include any surrounding panel for access when required. This exception is not applicable when the discrepancy is on a Flight Squawk. All the applicable data such as resistance readings, torques, and seal data will be noted on the nonconformance record (e.g., a pickup) along with the installing drawing/module number and the functional test document number. The Disturbed System Report entry will also be required when applicable after the first flight release.
Interior Seat Row Marker Assy. for 737 Max. The reinstalling drawing/module must be noted on the nonconformance record (e.g., a pickup).
Interior and Exterior Decals and Markers. When rework is performed by Exterior Painters due to extensive rework, the one shift requirement is not applicable.