MOONEY INTERNATIONAL CORPORATION

165 Al Mooney Road North
Kerrville, Texas 78028

SERVICE BULLETIN

SERVICE BULLETIN M20-345A
Date: December 13, 2022

THIS BULLETIN DOES NOT CHANGE AIRCRAFT TYPE DESIGN

SUBJECT: 430018-1 Hybrid Elevator Weights on Mooney Aircraft with Smooth Skin Elevators
[Chapter 27 - FLIGHT CONTROLS]

MODELS/ SN AFFECTED: M20C, M20D, M20E, M20F, M20G serial numbers 680170 or earlier.

TIME OF COMPLIANCE: **Before Next Flight and Annual Inspection until the 430018-1 weights are replaced.**

INTRODUCTION: There are specific M20F aircraft with smooth skin elevators 430000-503 (LH), 430000-504 (RH) identified with 9 rib lines, that utilized a hybrid material elevator balance weight. These weights (P/N 430018-1) are identified by the center plug made of chromoly tubing and lead running through the full width of the balance weight. During routine maintenance at an Authorized Mooney Service Center, the elevator balance weights were found to have developed galvanic corrosion, visible signs of the weight is cracked and displaced severely. There have been several instances of this anomaly reported only on M20F aircraft using this hybrid balance weight. Based on original service center discoveries and field reports from the initial released version of this service bulletin, Mooney engineering requests that all 430018-1 hybrid weights be removed and replaced with the 430016-7 lead weights.

The 430018-1 balance weight is similar in size and shape (but not in weight) to the 430016-7 balance weight. It is possible the 430018-1 balance weight has been installed in the field repairs on models M20C, M20D, M20E and M20G aircraft. This is the reason Mooney Engineering has determined that this will require an inspection, and if a 430018-1 weight is installed, perform procedures as described in this Service Bulletin M20-345A. **The attached compliance card needs to be filled out and returned to Mooney International Corporation upon completion of this Service Bulletin M20-345A.**

INSTRUCTIONS: **Read entire procedures before beginning work.**

STEP 1 - Inspection of Elevator Flight Control for 430018-1 Hybrid Weight:

ORIGINAL EQUIPMENT AS DELIVERED FROM THE FACTORY		
MODEL	**ELEVATOR P/N**	**WEIGHT P/N**
M20C **M20D** **M20E**	**430000-5 (LH) 430000-6 (RH)**	**430016- 7**
M20G	**430000-503 (LH) 430000-504 (RH)**	
M20F	**430000-503 (LH) 430000-504 (RH)**	**430018-1 or 430016-7**

1.1. Inspect of both elevators for the presence of a hybrid weight, part number 430018-1. The hybrid weight has a steel sleeve at its center plug. Inspect the weight visually and with a neodymium magnet on both sides of the balance weight assembly where the center plug is exposed, to see if the magnet sticks to the steel insert of the hybrid weight as indicated in **Figure SBM20-345-1 and SBM20-345-2**.

1.2. If the weight is determined not a 430018-1 balance weight, the aircraft may be flown and no further inspections are required for Service Bulletin M20- 345A. Record this inspection in Aircraft Log Book.

1.3. If the balance weight is determined to be a hybrid weight 430018-1, and initial inspection shows no sign of cracking or chipping, Continue to **STEP 2** for further action.

1.4. If the balance weight is determined to be a 430018-1, and cracks are present DO NOT FLY, Continue to **STEP 3**.

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STEP 2 - Detailed Inspection of 430018-1 weights:

NOTE:

Flight may be continued if the aircraft passes the inspections contained in this service bulletin, but must be re-examined in accordance with this service bulletin M20-345A at each annual or until 430018-1 weights are replaced with 430016-7 solid lead weights.

2.0 - REMOVING ELEVATOR WITH 430018-1 WEIGHTS

NOTE:

Record ALL Surface Rigging Values before removing components. Run trim wheel up, all the way to the stop before removing components. It may be feasible to use a roll of duct tape to hold the Elevator at a slight angle, to aid the removal of hardware. Damage may occur if extending Elevator at extreme angles.

NOTE:

Keep Control Yoke from moving in/out with a piece of PVC or suitable tube, as damage could occur if control rod assembly snags on painted skins.

2.1. Disconnect elevator push pull tubes by removing Bolt AN3-10, Washers NAS1149F0332P, Nut MS17825-3 and Cotter Pin MS24665-151, refer to **Figure SBM20-345-3**.

2.2. Remove bolts, nuts and washers from the four attaching hinges, note each hinge hardware on zone chart(s) **LH Figure SBM20-345-5** and **RH Figure SBM20-345-6** as required, refer to **Figure SBM20-345-3**.

2.3. Strip paint from balance weight per applicable Service and Maintenance Manual Section XI.

2.4. Inspect balance weight with 10x magnification, if there is no evidence of cracks or chipping of material, continue with **Step 2.1.0 BALANCE ELEVATOR With 430018-1 Weights**.

2.5. If the inspection of Step 2.4 reveals cracks or chipping, continue to **Step 3**.

2.1.0 BALANCE ELEVATOR With 430018- 1 Weights (Complete and Painted)

2.1.1. Paint balance weights 430018-1 (temporary paint is allowable).

2.1.2. Balance elevators with 430018- 1 weights to specifications below, be sure to install static wicks (if removed), refer to **Step 4.1** for knife edge support diagram.

Maximum allowable static unbalance moment:
22.0 inch/pounds (1.725 pounds) at 12.75 inches aft of hinge line).
Minimum allowable static unbalance moment:
20.00 inch/pounds (1.57 pounds) at 12.75 inches aft of hinge line).

2.1.3. Fill out Flight Control Balance Sheets from **Figures SBM20-345-7 and SBM20-345-8** for balance criteria.

2.1.4. When Balance is within Specifications, continue to **STEP 6 - Install Elevator Flight Controls.**

STEP 3 - Replacing 430018-1 Hybrid Weights with 430016-7 Lead Balance Weights:

3.0 ELEVATOR WEIGHT REPLACEMENT

NOTE:

Record ALL Surface Rigging Values before removing components. Run trim wheel up, all the way to the stop before removing components. It may be feasible to use a roll of duct tape to hold the Elevator at a slight angle, to aid the removal of hardware. Damage may occur if extending Elevator at extreme angles.

NOTE:

Keep Control Yoke from moving in/out with a piece of PVC or suitable tube, as damage could occur if control rod assembly snags on painted skins.

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3.1. Disconnect elevator push pull tubes by removing Bolt AN3-10, Washers NAS1149F0332P, Nut MS17825-3 and Cotter Pin MS24665-151, refer to **Figure SBM20-345-3**.

3.2. Remove bolts, nuts and washers from the four attaching hinges, note each hinge hardware on zone chart(s) **LH Figure SBM20-345-5** and **RH Figure SBM20-345-6** as required, refer to **Figure SBM20-345-3**.

3.3. Remove both elevators by pulling it straight aft.

CAUTION:

Use Proper Handling of Lead Balance Weight(s) Personal Protective Equipment (PPE) gloves, non-permeable clothing and approved respirators are recommended.

3.1.0 Installing 430016-7 weight to Elevator (LH/RH): WEIGHT LIMIT (LBS) MAX = 3.50 AND MIN = 3.00

3.1.1. Remove each factory balance weight from elevator, use care while removing Iron rivets, not to damage existing holes in elevator rib, refer to **Figure SBM20-345-3**.

3.1.2. Temporarily install weight 430016- 7 to elevator, match drill upper and lower mounting holes to new weight for installing mounting hardware.

NOTE:

It may be required to slightly file (with rasp) balance weight(s) to fit in flight control slot.

CAUTION:

Use Proper Handling of Lead Balance Weight(s) Personal Protective Equipment (PPE) gloves, non-permeable clothing and approved respirators are recommended.

3.1.3. When all mounting holes have been match drilled, remove weight and move to drill- press or suitable area to drill each hole as indicated in **Figure SBM20-345-3**.

3.1.4. Temporary install balance weight to elevator.

3.1.5. Balance per **STEP 4 - Balance Elevator Flight Controls**, if balancing needs material to be removed from factory balance weight, continue to **STEP 3.1.6**, if balance is within tolerance continue to **STEP 5**. - NOTE: Allow for Touch-up Paint weight and mounting hardware.

CAUTION:

Use Proper Handling of Lead Balance Weight(s) Personal Protective Equipment (PPE) gloves, non-permeable clothing and approved respirators are recommended.

3.1.6. Clamp the lead weight in a vice and use a rasp to trim the end of the weight until it weighs the specific number from the balance check per **STEP 4 - Balance Elevator Flight Controls**,

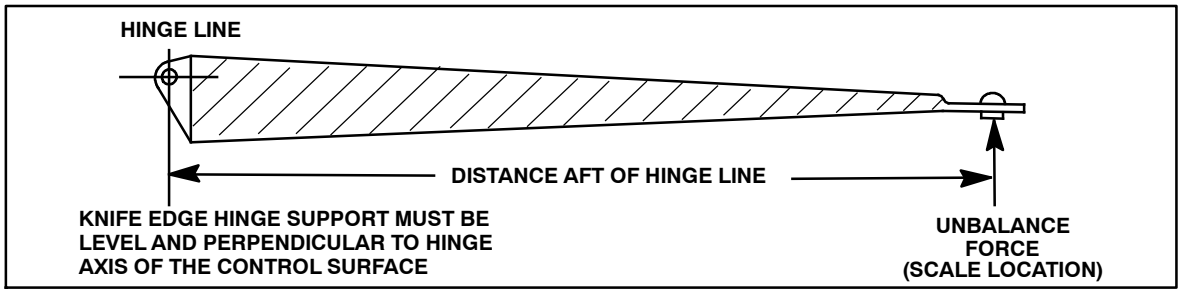
3.1.7. Touch-up paint as required, per Mooney Service and Maintenance Manual Section XI, refer to Aircraft paint kit for color(s), contact Mooney Service Parts for availability.

3.1.8. Continue to: **STEP 5 - Elevator Installation**

STEP 4 - Balance Elevator Flight Controls

M20F Aircraft - Balance Elevator (Complete and Painted) as shown below:

4.1. Balance elevators with 430016- 7 weights to specifications below, be sure to install static wicks (if removed).



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Maximum allowable static unbalance moment:
16.75 inch/pounds (1.30 pounds or 20.8 ounces at 12.87 inches aft of hinge line).
Minimum allowable static unbalance moment:
14.00 inch/pounds (1.09 pounds or 17.4 ounces at 12.87 inches aft of hinge line).

4.2. When balancing is completed, install balance weight to elevator with Iron rivets p/n 224497, and flat washers NAS1149F0332P as shown in **Figure SBM20-345-3,** refer to the applicable Mooney Service and Maintenance Manual - Note: use care while flattening iron rivet. Mooney does not have any other mounting hardware approved at this time.

4.3. Fill out Flight Control Balance Sheets from **Figures SBM20-345-7 and SBM20-345-8** for balance criteria.

4.4. When Balance is within Specifications, continue to **STEP 5 - Install Elevator Flight Controls.**

STEP 5 - Installation of Elevator Flight Controls

6.0 ELEVATOR INSTALLATION

5.1. Install in reverse sequence as removed, refer to Section VI in the applicable Service and Maintenance Manual for hardware torque values. Refer to Elevator Hinge Zone chart(s) **LH Figure SBM20-345-5** and **RH Figure SBM20-345-6** for stack- up of hardware (use new nuts and cotter pins upon reassembly).

STEP 6 - Return Aircraft To Service

6.1. Inspect flight controls for full travel, proper rigging, free- play, binding, security of mounting, proper lubrication and proper direction of control surface movement with relation to control wheel movement, refer to Flight Controls Section VI of the applicable Service and Maintenance Manual.

6.2. Check tail strobe operation.

6.3. Confirm level flight, refer to Section VI of the applicable Service and Maintenance Manual.

6.4. Aircraft operating with 430018-1 weights, refer to the Temporary Change Notice (TCN) in Service Instruction SIM20-145 (pending approval).

6.5. Make a copy of all Flight Control Balance Sheets from **Figures SBM20-345-7 and SBM20-345-8**, insert new data in aircraft logbook. Email copy to support@mooney.com.

NOTE:

Fill out compliance card and send by MAIL or FAX to Mooney International Corporation as indicated on the attached Compliance Card. (See Figure SBM20-345-9).

6.6. Return aircraft to service.

6.7. Procedure complete.

WARRANTY: Labor and/or replacement parts (if required) will not be covered under Mooney International Corporation warranty policy for affected aircraft that are beyond warranty agreement.

REFERENCE DATA:
1. Applicable Mooney Illustrated Parts Catalog and Service and Maintenance Manual
2. Mooney Service Instruction M20-145 (pending approval)
3. Mooney Owner's Manual POH-001194 (Dated: March 1967)

PARTS LIST: Mooney International Corporation, Service Bulletin Parts Kit(s): M20-345-001
(Qty indicates (2) elevator weights)

NOTE:

Replacement Weights should be available by end of 1st Quarter 2023. Contact your Authorized Mooney Service Center to place your order.

Item	P/N	Description	Qty
1.	430016-7	Weight, Elevator (file/cut as required for Balance)	2
2.	224497	Iron Rivet (.187” x 1.375”)	12
3.	NAS1149F0332P	Flatwasher (Used with Iron Rivets)	24

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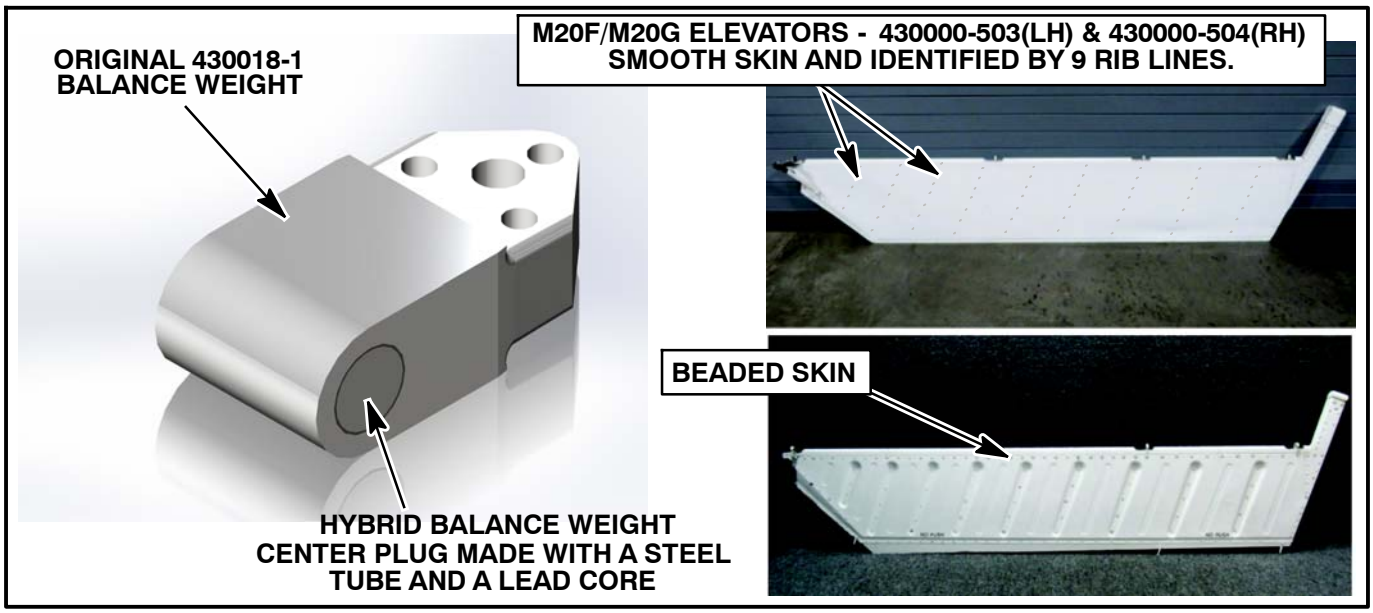

Figure SBM20-345-1 - M20F/M20G SMOOTH SKIN ELEVATORS AND BALANCE WEIGHT IDENTIFICATION

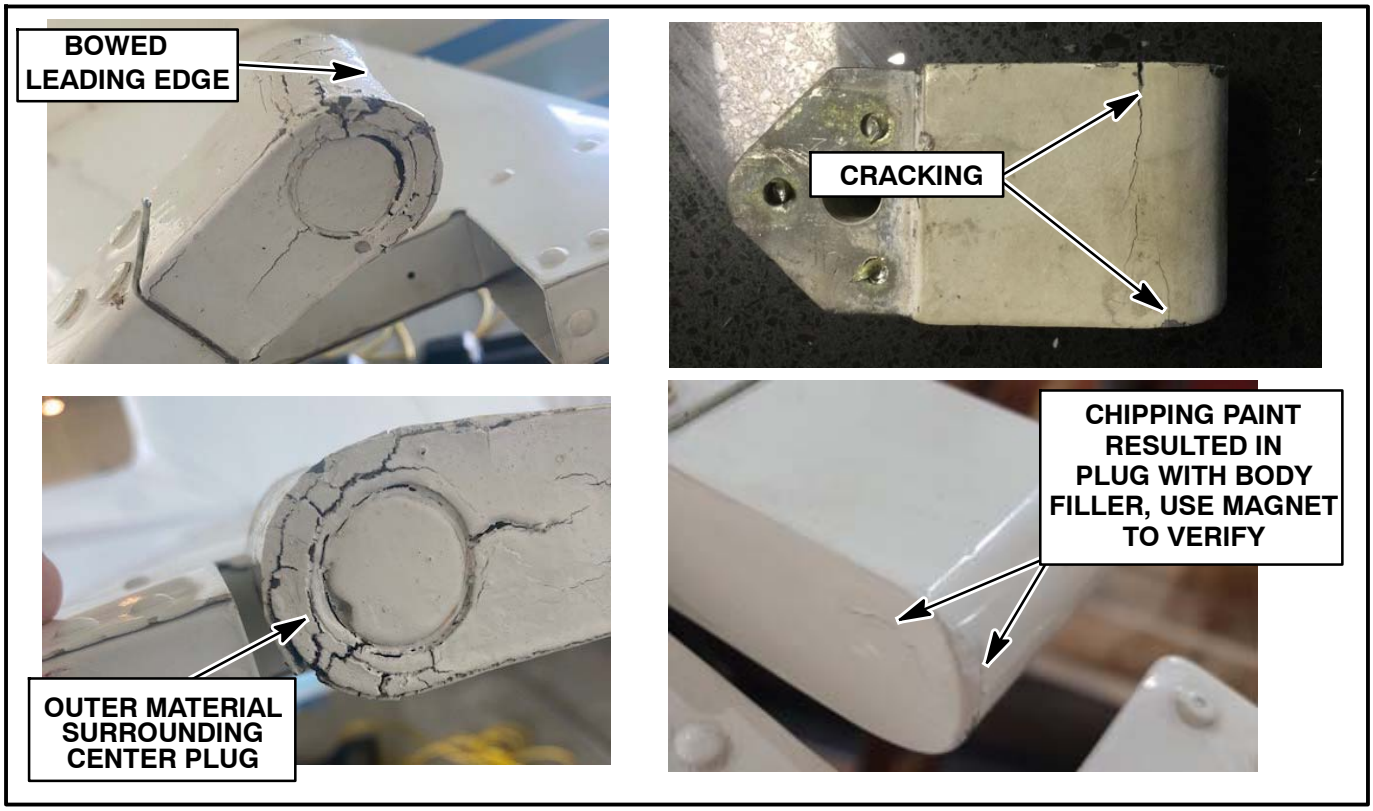

Figure SBM20-345-2 - SIGNS OF GALVANIC CORROSION, CRACKING AND FILLED SIDES OF THE 430018-1 BALANCE WEIGHT

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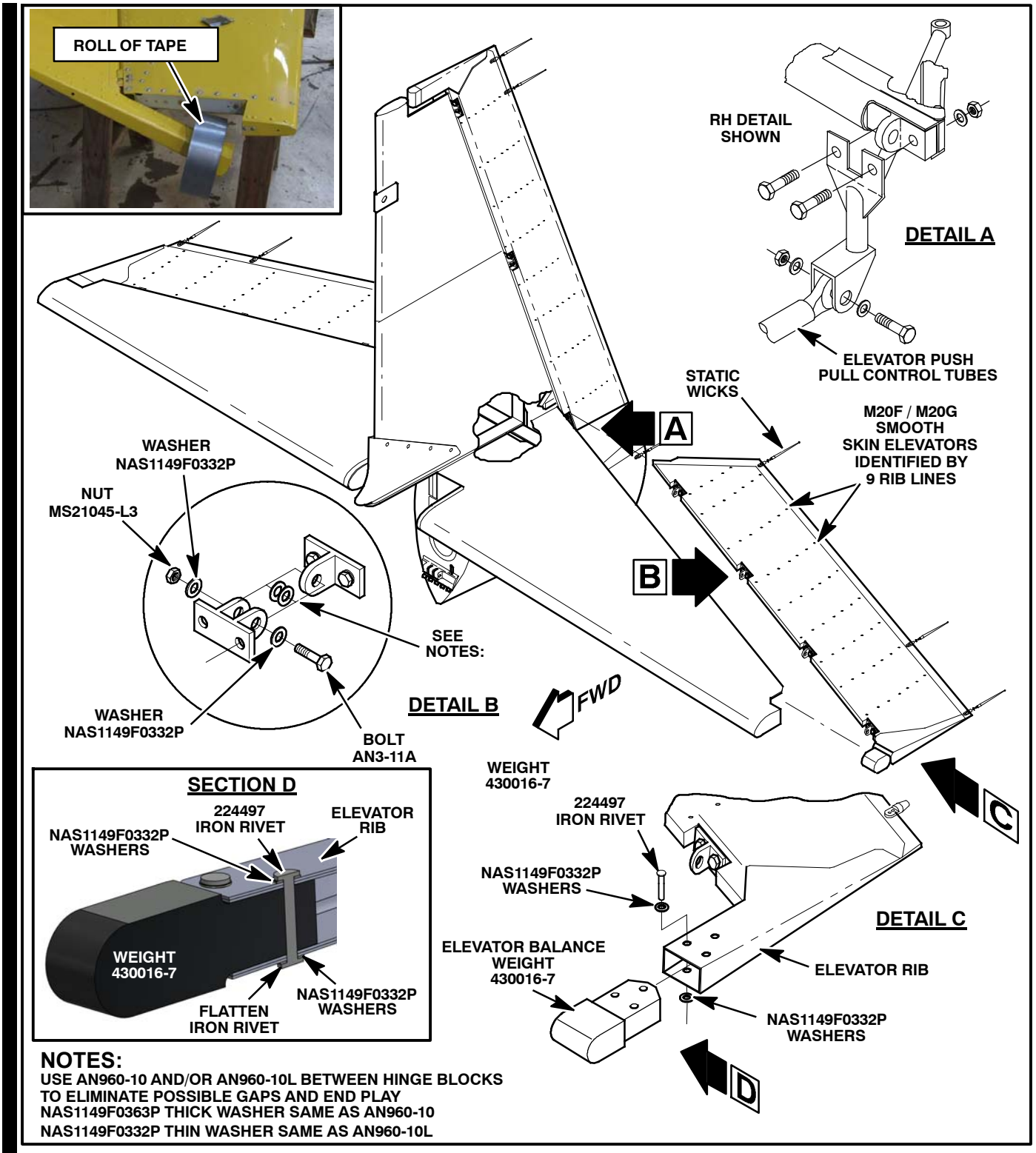

Figure SBM20-345-3 - ELEVATOR INSTALLATION

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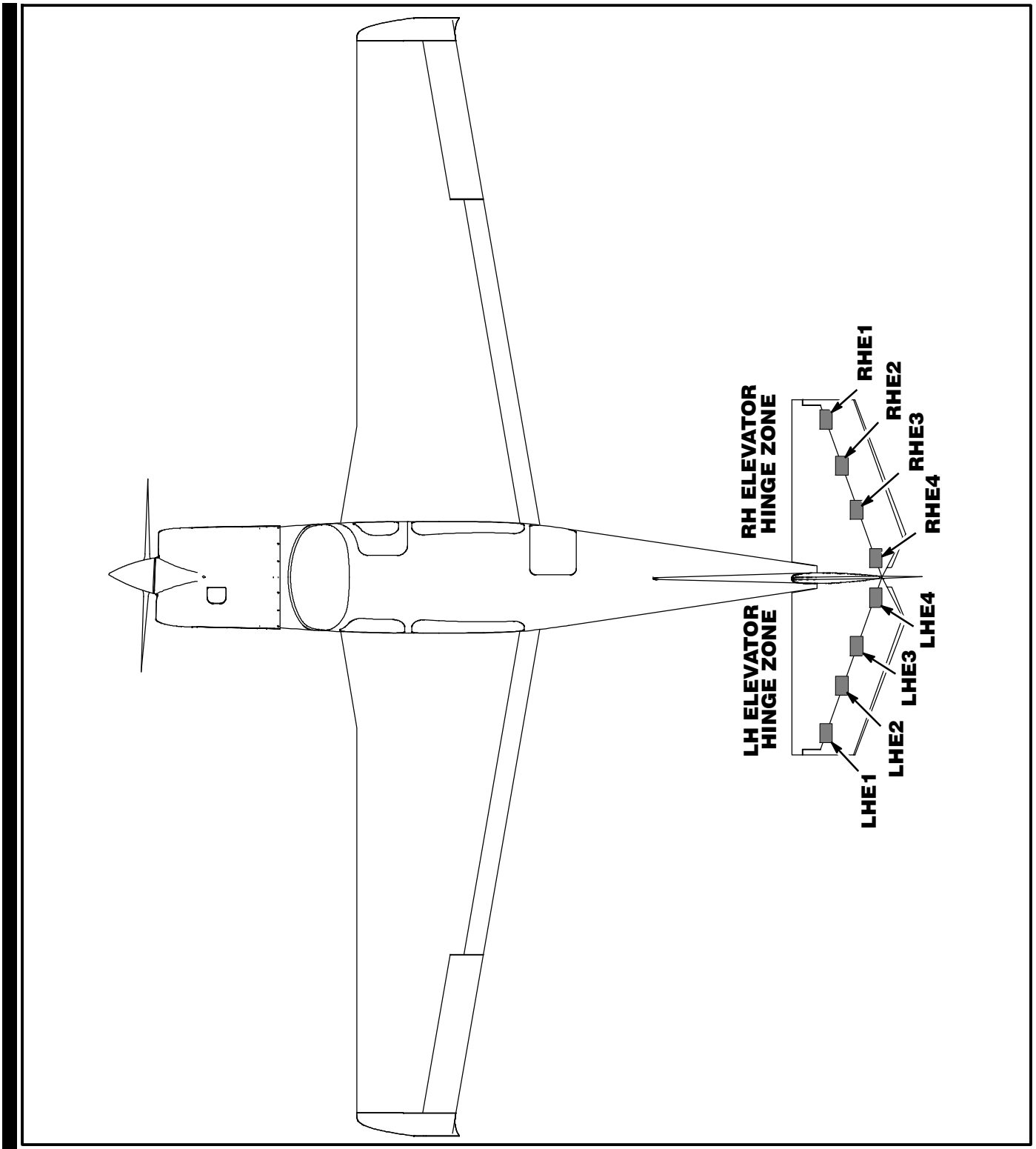

Figure SBM20-345-4 - OVERALL LOCATION OF CONTROL SURFACE HINGE ZONES

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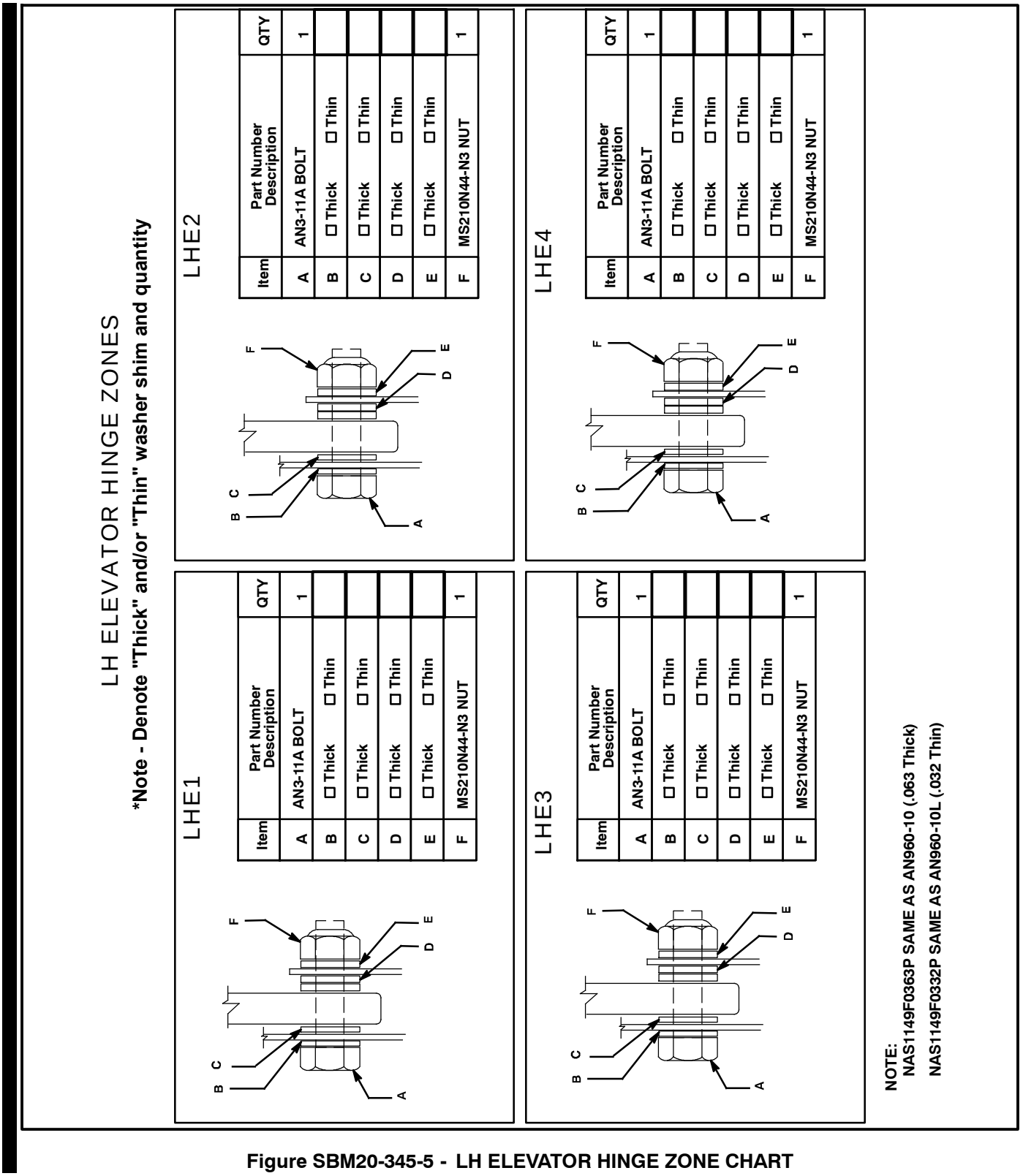

Figure SBM20-345-5 - LH ELEVATOR HINGE ZONE CHART

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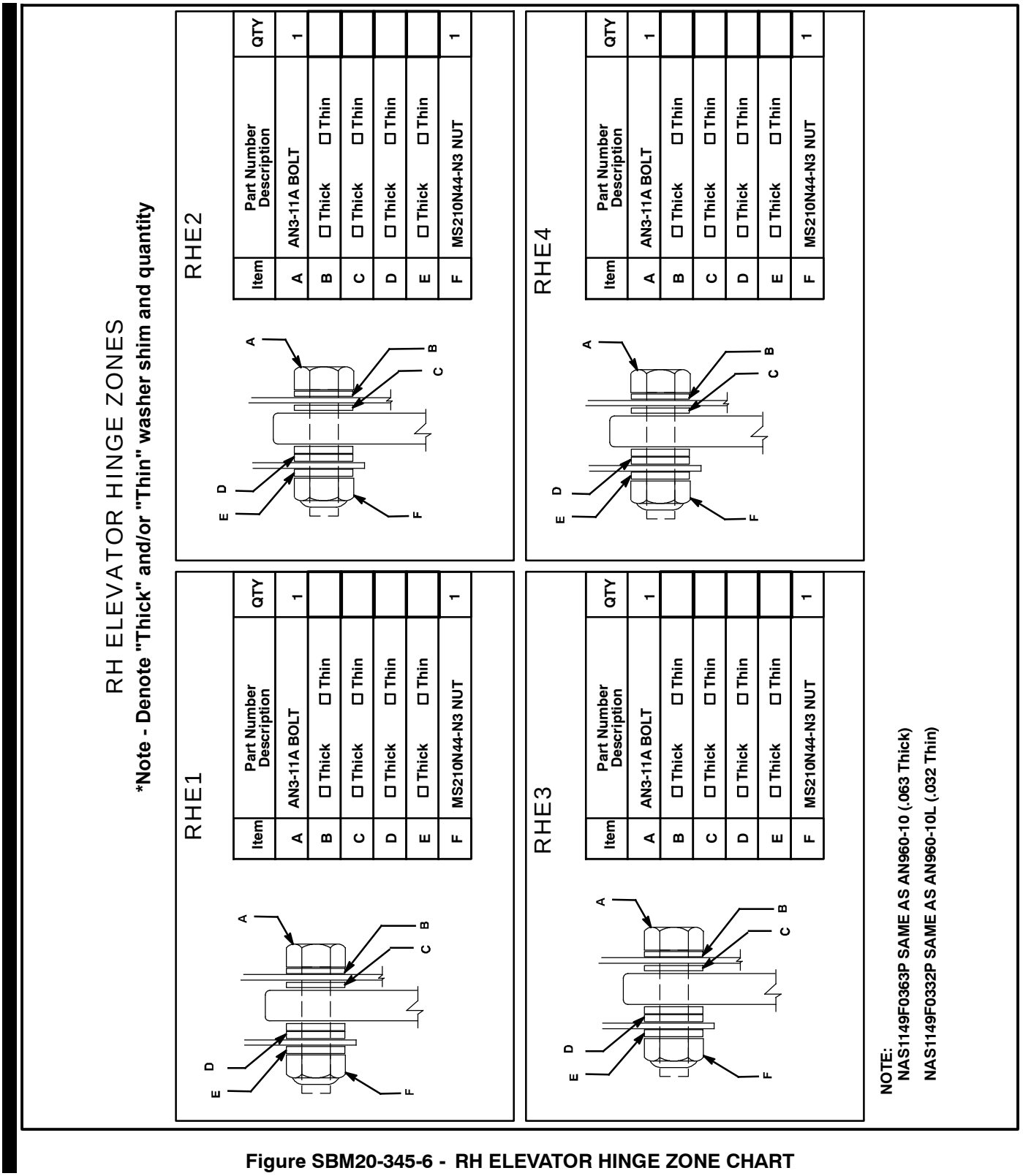

Figure SBM20-345-6 - RH ELEVATOR HINGE ZONE CHART

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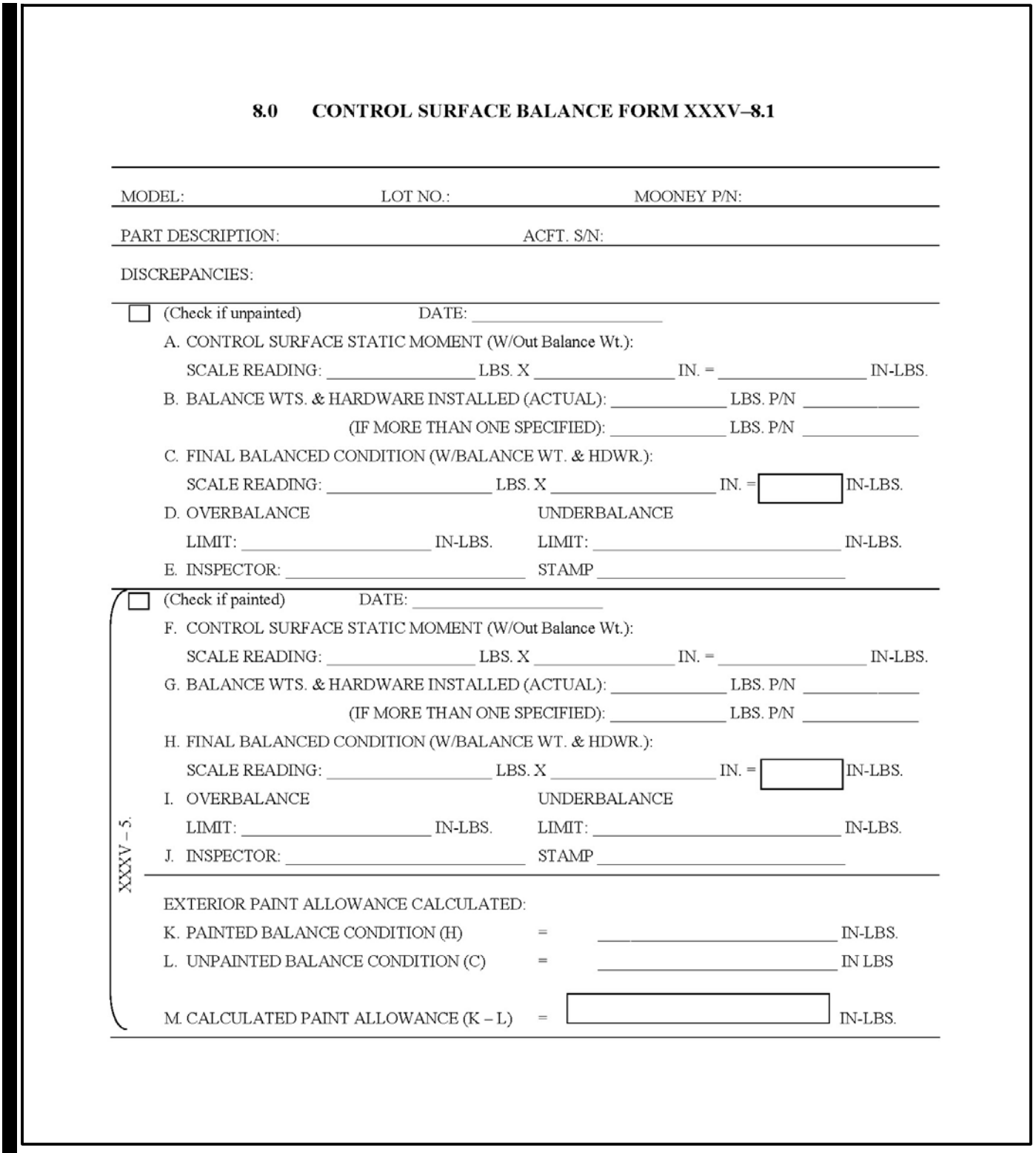

8.0 CONTROL SURFACE BALANCE FORM XXXV–8.1

MODEL: LOT NO.: MOONEY P/N:

PART DESCRIPTION: ACFT. S/N:

DISCREPANCIES:

☐ (Check if unpainted) DATE: _____

A. CONTROL SURFACE STATIC MOMENT (W/Out Balance Wt.):

SCALE READING: _____ LBS. X _____ IN. = _____ IN-LBS.

B. BALANCE WTS. & HARDWARE INSTALLED (ACTUAL): _____ LBS. P/N _____

(IF MORE THAN ONE SPECIFIED): _____ LBS. P/N _____

C. FINAL BALANCED CONDITION (W/BALANCE WT. & HDWR.):

SCALE READING: _____ LBS. X _____ IN. = ☐ IN-LBS.

D. OVERBALANCE UNDERBALANCE

LIMIT: _____ IN-LBS. LIMIT: _____ IN-LBS.

E. INSPECTOR: _____ STAMP _____

☐ (Check if painted) DATE: _____

F. CONTROL SURFACE STATIC MOMENT (W/Out Balance Wt.):

SCALE READING: _____ LBS. X _____ IN. = _____ IN-LBS.

G. BALANCE WTS. & HARDWARE INSTALLED (ACTUAL): _____ LBS. P/N _____

(IF MORE THAN ONE SPECIFIED): _____ LBS. P/N _____

H. FINAL BALANCED CONDITION (W/BALANCE WT. & HDWR.):

SCALE READING: _____ LBS. X _____ IN. = ☐ IN-LBS.

I. OVERBALANCE UNDERBALANCE

LIMIT: _____ IN-LBS. LIMIT: _____ IN-LBS.

J. INSPECTOR: _____ STAMP _____

XXXV – 5.

EXTERIOR PAINT ALLOWANCE CALCULATED:

K. PAINTED BALANCE CONDITION (H) = _____ IN-LBS.

L. UNPAINTED BALANCE CONDITION (C) = _____ IN LBS

M. CALCULATED PAINT ALLOWANCE (K – L) = ☐ IN-LBS.

Figure SBM20-345-7 - FLIGHT CONTROL BALANCE SHEET

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8.0 STATISTICAL SAMPLING ANALYSIS FORM XXXV–8.2

CONTROL SURFACE DESCRIPTION: _____ DATE: _____
CONTROL SURFACE PART NO.: _____
Size of Sampling, $\eta(\eta \geq 6)$ _____
Limit Std. Deviation from Table 9.1, S_{LIMIT} = _____ IN-LBS.
Type of Allowance Being Measured _____
_____

SAMPLE RECORD:				
No. of Sample	A/C S/N	L/H or R/H As Applicable	Delta Moment Form 8.1 (M) Column A	Column B Square of Values in Column A
1. 2. 3. 4. 5. 6.				
7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20.				
			SUM =	SUM =

Sample Mean, $\frac{\text{Sum of Col. A}}{\text{No. of Sample}} =$ ☐

Sample Std. Deviation, $S = \frac{[(\text{No. of Sample}) \times (\text{Sum of Col. B})] - (\text{Sum of Col. A})^2}{(\text{No. of Sample}) \times (\text{No. of Sample} - 1)}$

S = ☐

Compare and verify that: $S \leq S_{LIMIT}$: _____ ≤ _____

cc: Engineering/Structures INSPECTOR: _____ STAMP: _____

Figure SBM20-345-8 - FLIGHT CONTROL BALANCE SHEET

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MOONEY INTERNATIONAL CORPORATION

KERRVILLE, TEXAS 78028 - FAX 830-257-4635

SERVICE (BULLETIN) (INSTRUCTION) NO._____HAS BEEN COMPLIED

WITH ON AIRCRAFT MODEL _____ SERIAL NUMBER _____

Tach. Time: _____ **N-Number** _____ **(Reg. No.)**

Owner: _____ **Date of Compliance:** _____

_____ **Complied By:** _____

_____

_____

Inspection Report: _____

_____

_____

_____

Form 07-0001

_____

_____

_____

PLACE STAMP HERE

MOONEY INTERNATIONAL CORPORATION
ATT'N: TECHNICAL SUPPORT
165 Al Mooney Road North
Kerrville, Texas 78028

SEND TO: Mooney International Corporation
165 Al Mooney Road North
Kerrville, TX 78028
FAX: (830) 257-4635 or EMAIL support@mooney.com

Figure SB M20-345-9 - Compliance Card