

TITLE: INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR BELL MEDIUM HELICOPTERS
ADEC™ HEC SYSTEM

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PAGE NO. i

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**MECHANICAL SPECIALTIES, LLC REPORT 650-430-105
INSTRUCTIONS FOR CONTINUED AIRWORTHINESS**

For

**MECHANICAL SPECIALTIES MODEL 650-430-100-100
ADVANCED DUEL EXTERNAL CARGO HOOK /ADEC™
CARGO HOOK SYSTEM**

For

Bell Helicopters, Inc. Medium Series of Rotorcraft

FAA PROJECT NO.: ST19152SE-R

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Original Author:	J. Goodwin	Revision Author:	J. Goodwin
Date:	8/4/2025	Date:	10/2/2025

CHANGE LOG

Rev.	Author	Date	Description of Changes
I/R	J. Goodwin	8/4/2025	Original Release
1	J. Goodwin	10/2/2025	1. Added life limited components to section 3.0 2. Expanded Appendix A to include inspection sheets for operator logging of lift hours on each life limited component. 3. Added additional notes on routing instructions for wire harnesses and installing electrical components per drawing schematic 650-430-114-100. 4. Part number adjustments (BOM) in suspension assembly (650-430-104-100) 5. Part number adjustments (BOM) in hook (650-430-101-100) 6. Proof Loading instructions at 5 year overhaul revised – Minimum loads adjusted.

This Instructions for Continued Airworthiness Manual will be distributed with every kit sold, either on paper or electronically.

Updates to this manual are available online at www.mechspecialties.com/documents or by calling (360) 273-7604. Revisions will be disseminated to current customers via email address on file.

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LIST OF REFERENCES

1. Mechanical Specialties, LLC drawing 650-430-100-100, 650 ADEC™ Hook Installation, Revision 0, dated 8/1/2025, or later.
2. Mechanical Specialties, LLC drawing 650-430-101-100, 650 ADEC™ Cargo Hook Assembly, Revision 0, dated 5/6/2025, or later.
3. Mechanical Specialties, LLC drawing 650-430-104-100, Suspension Assembly, Revision 0, dated 4/28/2025, or later.
4. Mechanical Specialties, LLC drawing 650-430-110-100, 650 ADEC™ Manual Release Assembly, Revision 0, dated 6/16/2025, or later.
5. Mechanical Specialties, LLC drawing 650-430-118-100, Bulkhead Assembly, Revision 0, dated 5/6/2025, or later.
6. Mechanical Specialties, LLC drawing 650-430-114-100, Wiring Diagram, HEC System, Revision 0, dated 3/18/2025, or later.
7. Mechanical Specialties, LLC drawing 650-430-116 Placards, HEC system, Revision 0, dated 8/4/2025, or later.
8. 204-SI-3, Bell 205A Service Instructions for Cargo Suspension Unit
9. BHT-212-SI-5/BHT-412-SI-17, Bell 212 Service Instruction for External Cargo Hook Suspension Kit.
10. BHT-ALL-SPM, Bell Standard Practices Manual
11. FAA Advisory Circular, AC 43.13-1B, *Acceptable Methods, Techniques, and Practices – Aircraft Inspection and Repair*, Change 1, Current Revision.
12. FAA Advisory Circular, AC 43.13-2B chg. 1, *Aircraft Inspection and Repair*, ch. 7, *Rotorcraft External-Load-Device Installation Cargo Sling and External Racks*, Dated 27/9/2001.

LIST OF ABBREVIATIONS

AC:	Advisory Circular (FAA Publication)
ADEC™:	Mechanical Specialties' Trade Mark for "Advanced Dual External Cargo"
CG:	Center of Gravity
DAD:	Dual Actuation Device
FAA:	Federal Aviation Administration
HEC:	Human External Cargo
ICA:	Instructions for Continued Airworthiness
NHEC:	Non-Human External Cargo
PCDS:	Personnel Carrying Device System
PQRS/BQRS:	Primary/Backup Quick Release System
QRS:	Quick Release System
RFMS:	Rotorcraft Flight Manual Supplement
STC:	Supplemental Type Certificate
TC:	Type Certificate
TSO:	Technical Standard Order

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1.0 INTRODUCTION

1.1 PURPOSE

This document contains the Instructions for Continued Airworthiness (ICA) for the Mechanical Specialties, LLC Model 650 ADEC™, Human External Cargo (HEC) System. This ICA is for BELL Helicopters 204B, 205A, 205B, 205A-1, 212, 412, 412CF, 412EP, & UH-1 Series of Rotorcraft, thus referred to as the “Bell Medium.”

1.2 SYSTEM DESCRIPTION

Mechanical Specialties, LLC has designed the ADEC™ System for the BELL Medium series helicopters, for use in HEC and non-HEC operations.

The system consists of one cargo hook assembly that contains two independent dual actuation load carrying systems, suspension assembly, and mounting hardware. The cargo hook system is attached to the helicopter using the existing structural attach point. (see figure 1.#) Therefore, no structural modifications to the rotorcraft are being made. This HEC dual hook system replaces the Type Certificated, factory installed cargo hook.

The Mechanical Specialties, LLC Model 650 ADEC™ Human External Cargo (HEC) System is unique in that no part of this system is required to be removed during the transition between NHEC and HEC operations. Both NHEC and HEC loads are carried by the ADEC™ Hook's dual load beams. (see figure 1.2) Additionally, the MMEL of these aircraft is not affected by this STC.

Per AC29-1B, change 8, section 29.865B, para c.4 & para d.7.vi.A, any HEC system as a whole is required to have a dual actuation device to release the HEC from the aircraft. The dual actuation device consists of both the primary and secondary releases. The primary load carry system will release if either the primary electrical release or primary manual release is actuated. The secondary load carrying system will release if the secondary electrical release or secondary manual release is actuated. The HEC load will not depart the aircraft until BOTH the primary and secondary load carrying systems are separately released.

An intercommunications system between pilot and HEC is not provided with this system. A note located in the Rotorcraft Flight Manual Supplement (RFMS) (Doc No. 650-430-110) states:

This system is not authorized for use without a means of direct communication between Pilot-in-Charge (PIC) and HEC approved by the local aviation authority.

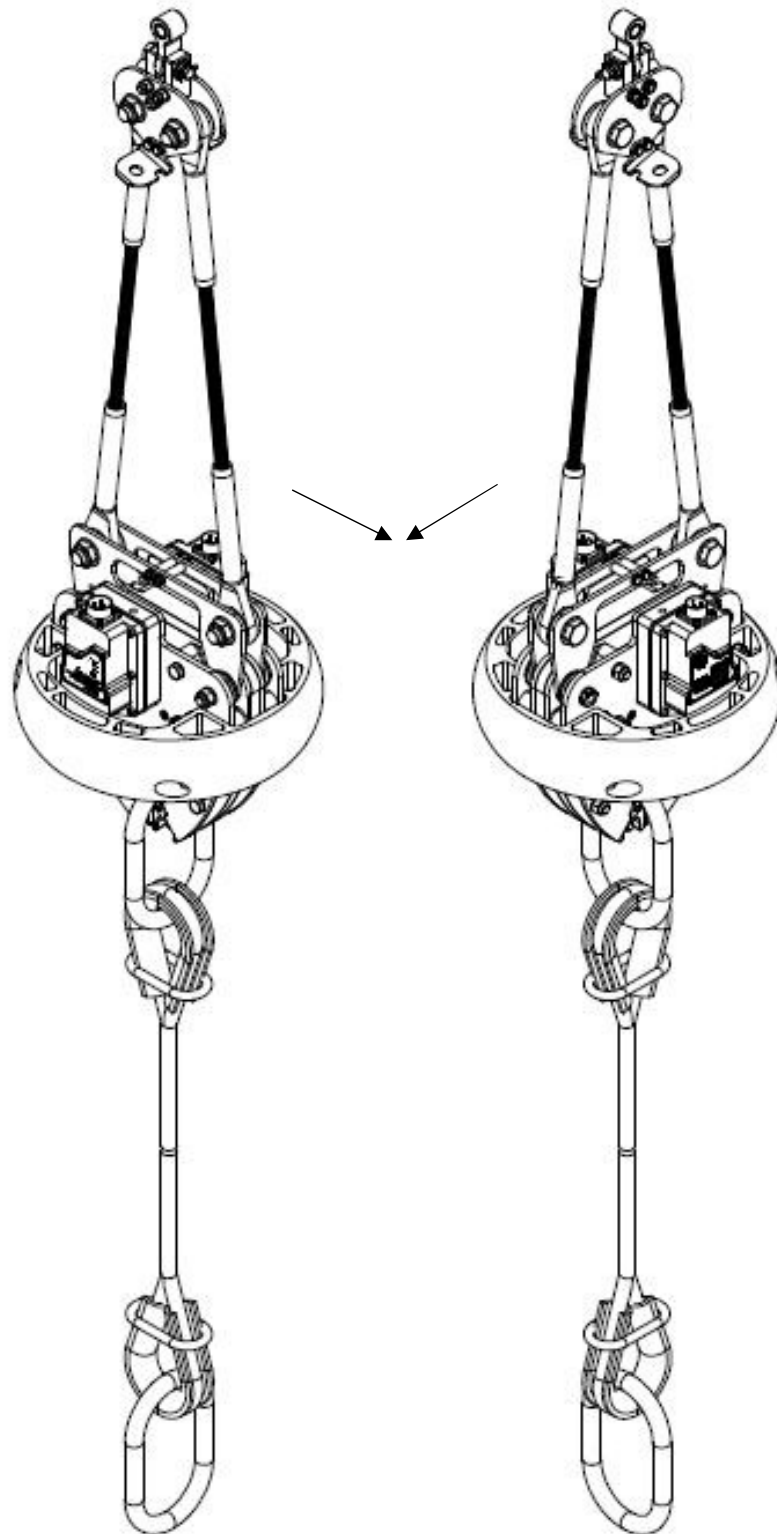


Figure 1.1: Model 650 ADEC™/HEC system (arrows indicate front of aircraft)

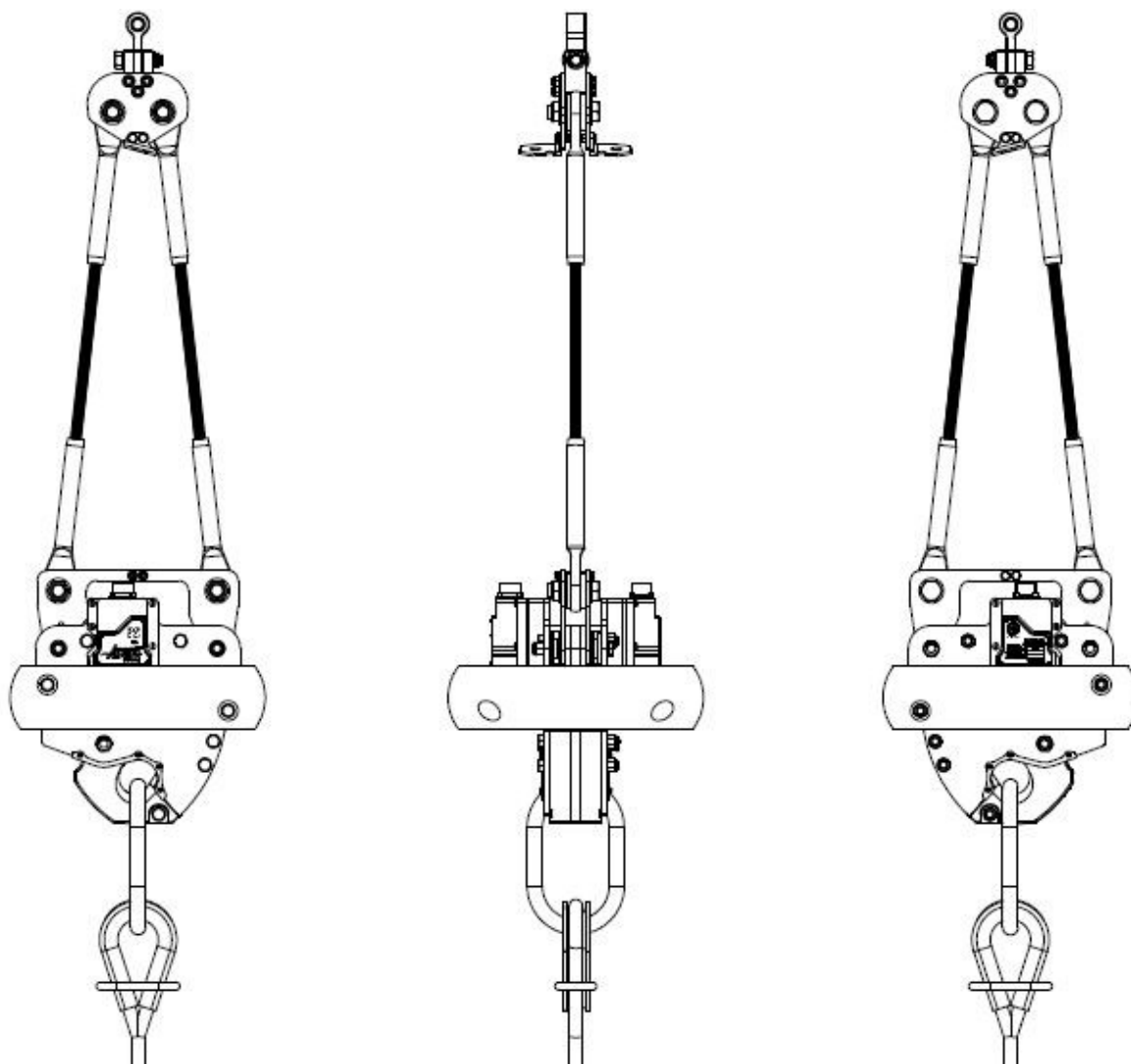


Figure 1.2: ADEC™ System Overview (views right, forward, & left)

NHEC AND HEC OPERATIONS UTILIZE BOTH LOAD BEAMS.

The Model 650 ADEC™ Human External Cargo (HEC) System has a NHEC load rating of 5,000 lbs. Any Bell aircraft listed within this STC equipped with the Type Certified cargo hook will be eligible to utilize this installation. Table 1.1 lists the cargo hook capacities of each of these aircraft. However, this STC will not increase an aircraft's certified rating beyond its cargo capacity found in the aircraft's respective Flight Manual Supplement.

Table 1.1: Cargo Hook Capacities

AIRCRAFT	NHEC CAPACITY (lbs.)	HEC CAPACITY (lbs.)
204B	4,000/5,000*	1,428 / 1,785*
205A-1	5,000	1,785
205B	5,000	1,785
212	5,000	1,785
412**	4,500	1,607
412CF	4,500	1,607
412EPI	4,500	1,607
412EPX	5,000	1,785
UH-1	4,000	1,428

*5,000 lbs. NHEC & 1,785 HEC external load is approved only when Bell 204-706-104 suspension assy. is installed per BHT-204B-FMS-1

** Bell 412 aircraft Flight Manuals and FMS are dependent on S/N. FMS 9.1 thru 9.4 all state 4,500 lbs.

***NOTE: Bell Helicopters may revise these capacities, installers must confirm with their rotorcraft respective, current, flight manual.

Both side of the dual load carrying assembly (ADEC™ cargo hook) are fitted with micro switches for open hook indication inside the helicopter.

The release system for each load carrying system will consist of a primary electrical release with a secondary lever-type manual release. See Figure 1.3 below. The releases are centrally located on the pilot's cyclic control but arranged so that only one can be operated at a time. The releases are independent of each other and must be operated individually to release the load from the helicopter. See Figure 1.4 below for the hook release controls block diagram.

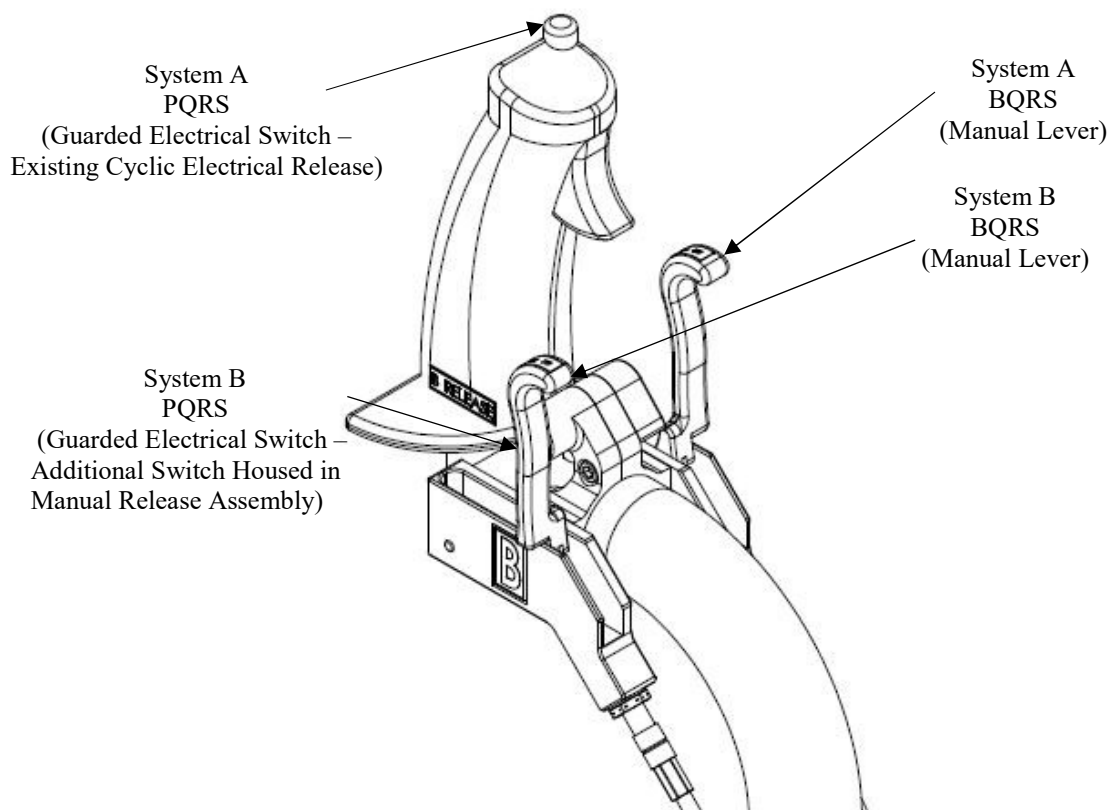


Figure 1.3: HEC Release Actuation Means

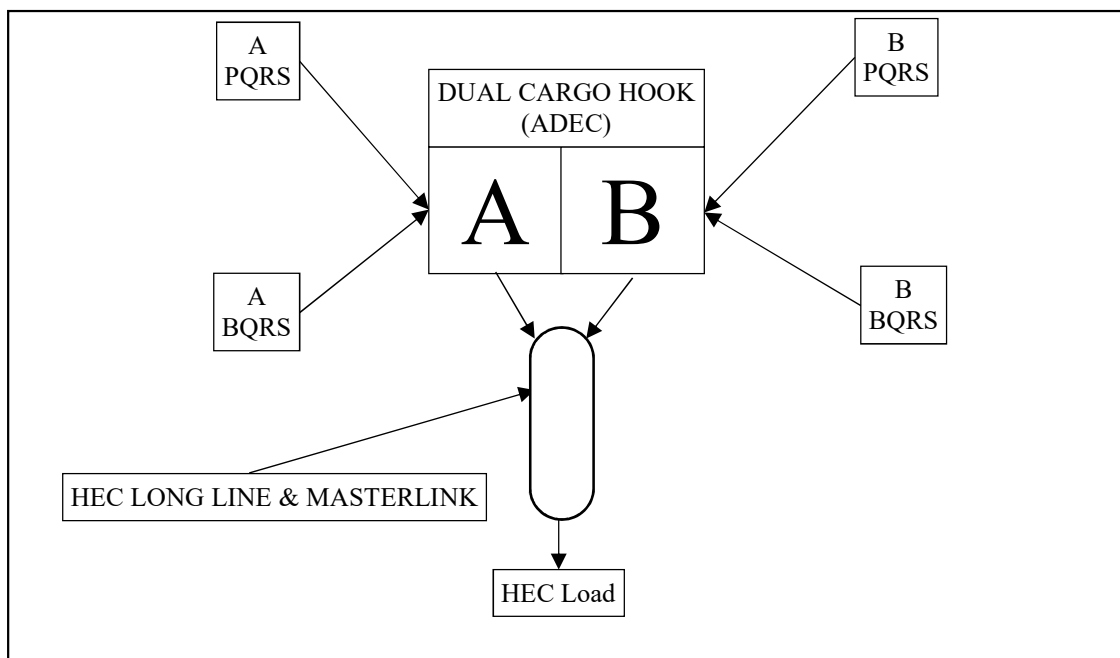


Figure 1.4: HEC Release Block Diagram

2.0 INCLUDED WITH INSTALLATION – KIT

Table 2.1: Items Included with Installation - Kit

<u>Components</u>	<u>Description</u>
650-430-100-100	650 ADEC™ System Installation
650-430-101-100	650 ADEC™ Cargo Hook Assembly
650-430-103-100	ADEC™ WIRE HARNESS SHORT, A
650-430-104-100	SUPENSION ASSEMBLY
650-430-105-100 ¹	ADEC™ CABLE ASSEMBLY SHORT
650-430-106-100 ²	ADEC™ CABLE ASSEMBLY SHORT
650-430-107-100 ¹	ADEC™ CABLE ASSEMBLY, LONG
650-430-108-100	ADEC™ WIRE HARNESS LONG
650-430-109-100 ²	ADEC™ CABLE ASSEMBLY, LONG
650-430-110-100	ADEC™ MANUAL RELEASE LEVER ASSEMBLY
650-430-113-200	WIRE HARNESS BRACKET
650-430-115-### ³	Lift-It® LCP HEC LONG LINE ASSEMBLY
650-430-116	PLACCARDS, ADEC™ /HEC SYSTEM
650-430-118-100	BULKHEAD ASSEMBLY
205-60-13	WIRE HARNESS
Misc.	Hardware, Electrical, and Other Components.

Note¹: -105 & -107 are paired

Note²: -106 & -109 are paired

Note³: ### = length in feet

Documentation

650-430-100-100 650 ADEC™ System Installation Drawing
650-430-110-100 650 ADEC™ Manual Release Assembly Drawing
650-430-114-100 Wiring Diagram, HEC System
650-430-105 Instructions for Continued Airworthiness (this document)
650-430-110 Rotorcraft Flight Manual Supplement
Copy of Supplemental Type Certificate

3.0 AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under §§43.16 and 91.403 of the Federal Aviation Regulation unless an alternative program has been FAA approved.

Life Limited Components

Part Number	Description	Replacement Interval	Qty. per Installation
650-430-115-### ¹⁻⁴	Lift-It® HEC Long Line	4 years / 2,000 hrs. ⁴	AR
C00002-00009 ⁵	MSI HLI Weigh System	14,000 lift hrs.	1
650-010-151-100 ⁶⁻⁷	Cable Assembly	8,500 lift hrs.	2

1. ### = length in feet
2. Service hours can be tracked on page A2 of this document. Print additional sheets as required.
3. New, unused long lines have a maximum shelf life of two years from the date of manufacture.
4. Four (4) years after date of initial use or 2,000 hours of service whichever is sooner.
5. Service hours can be tracked on page A3 of this document. Print additional sheets as required.
6. Service hours can be tracked on page A4 of this document. Print additional sheets as required.
7. Cable Assemblies are to be installed, serviced, and replaced in pairs, which are serialized as pairs from Mechanical Specialties.

Approved By: ANA M MARTINEZ HUETO
for Manager, West Certification Branch

Digitally signed by ANA M MARTINEZ
HUETO
Date: 2026.08.13 09:00:49 -07'00'

Date: August 13, 2026

4.0 INSPECTION / OVERHAUL SCHEDULE AND INSTRUCTIONS

Daily Inspection(s)

- Ensure that the two primary mounting bolts (through the Load Cell (C00002-00009) or Dead Link (650-010-150-100), are secured and the cotter pins are fully attached. (See Figure 4.1)
- Ensure that the two mounting bolts (NAS6207-50) connecting the Cargo Hook (650-430-101-100) and the suspension assembly are secured.
- Visually check the electrical harnesses for damage and security.
- Visually check the manual release cables and the connection to the cargo hooks for damage and security.
- Visually check the cargo hook for damage and hardware for security.
- Rotate Cargo Hook & Suspension Assembly the full range of motion to ensure there is no cable binding.
- **AS PER RFMS 650-430-110, BOTH PQRS AND BQRS FOR BOTH LOAD BEAMS MUST BE ACTUATED AND CONFIRMED OPERATIONAL BEFORE EACH FLIGHT.**

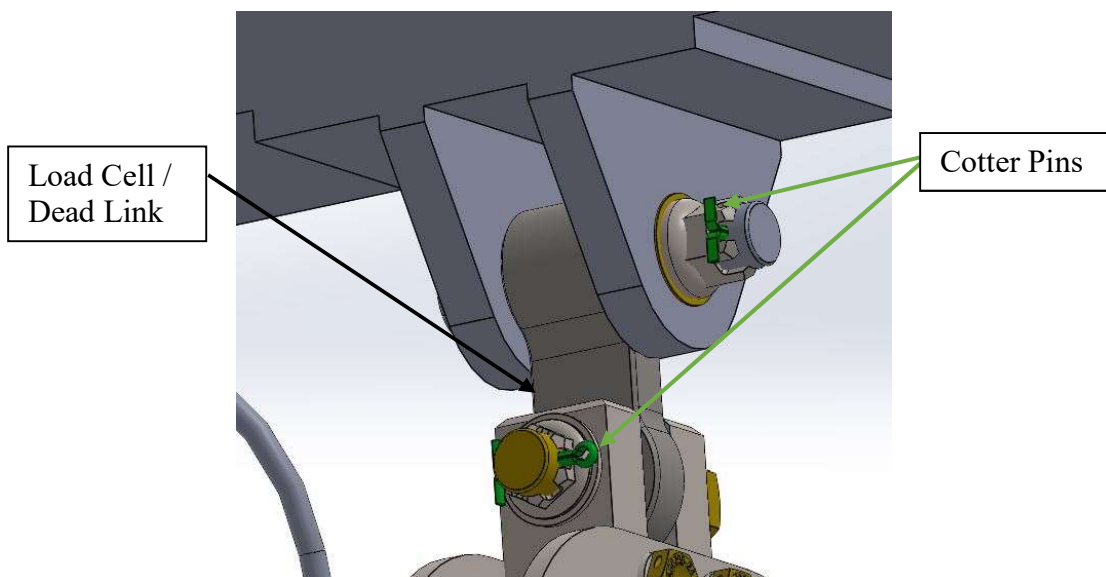


Figure 4.1: Cotter pin rendering (colored green for ICA view and installer's reference)

Suspension and Mounting Assembly (See Figure 4.2, and Table 4.1 for assembly and for part number callouts.)

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	205-60-6	BUSHING, FLANGED	8
2	205-60-8	BUSHING, HOOK MOUNT	4
3*	650-010-150-100	DEAD LINK ASSEMBLY	1
4	650-010-151-100	CABLE ASSEMBLY	2
5	650-010-205-500	SUSPENSION PLATE, UPPER	2
6	650-010-206-500	SUSPENSION PLATE, LOWER, RH	1
7	650-010-207-500	LUG	1
8	650-010-216-500	SUSPENSION PLATE, LOWER, RH	1
9	650-050-065-200	BRACKET, CABLE, LH	1
10	650-050-066-200	BRACKET, CABLE, RH	1
11	93013A240	SPACER	2
12	AN3-16A	BOLT	2
13	AN3-5A	BOLT	4
14	MS14145-8	NUT	1
15	MS21044N3	NUT	6
16	MS21044N5	NUT, SELF LOCKING	3
17	MS21083N10	NUT, SELF LOCKING	4
18	MS24665-302	COTTER PIN	1
19	NAS1149F0332P	WASHER	8
20	NAS1149F0363P	WASHER	4
21	NAS1149F0563P	WASHER	6
22	NAS1149F0863P	WASHER	2
23	NAS1149F1063P	WASHER	8
24	NAS6205-24	BOLT, HEX HD, 5/16-24	3
25	NAS6208-23D	BOLT	1
26	NAS6210-24	BOLT	4

Table 4.1: 650-430-104-100 Suspension Assembly BOM

*BOM lists 650-010-150-100 Dead Link, but may have MSIXM Sky-Weigh System (Load Cell P/N C00002-00009). See Mechanical Specialties' Sales for ordering the kit with either installed.

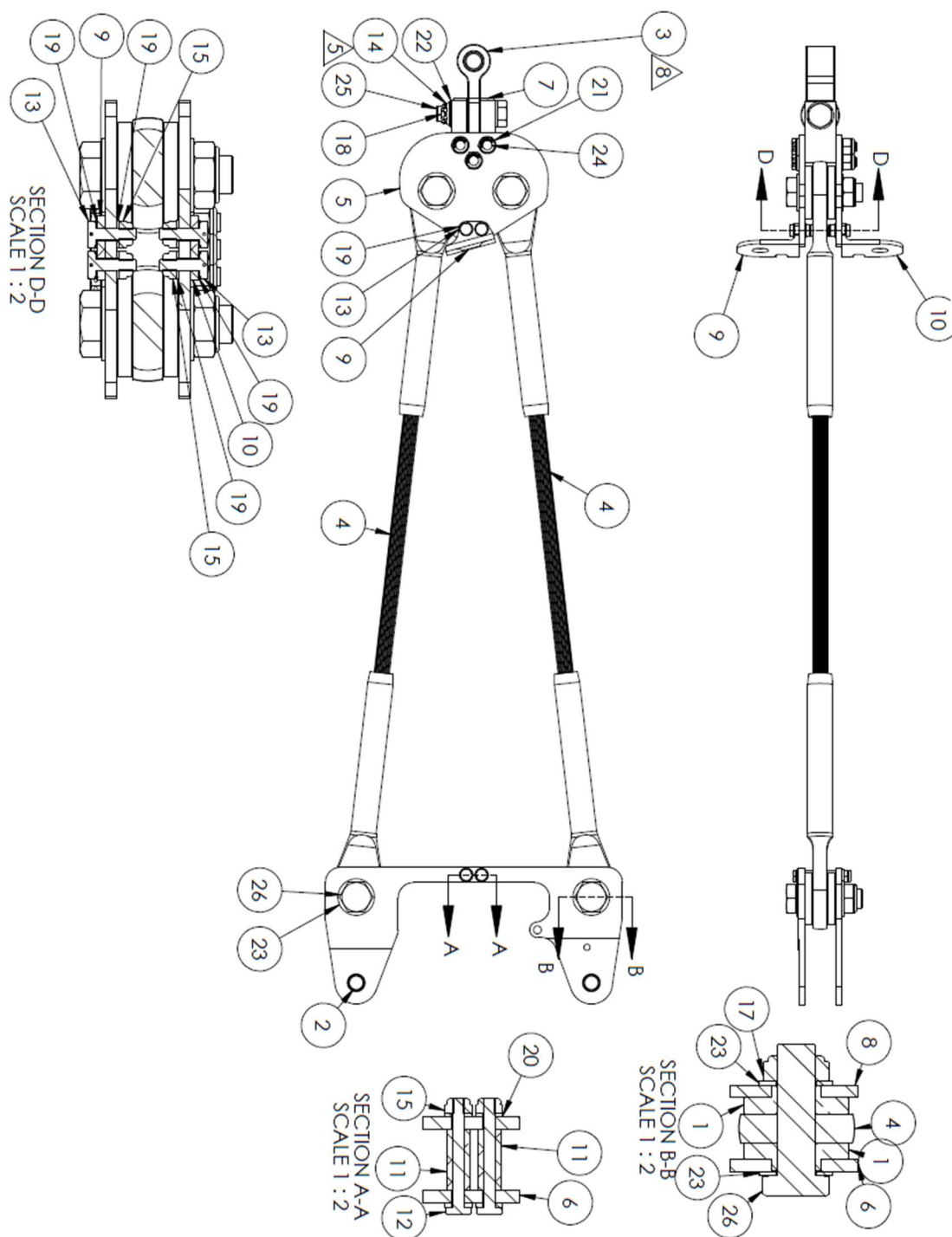


Figure 4.2: Suspension Assembly (650-430-104-100) Assembled

Annual / 100 Hour (Suspension Assembly)

(NOTE: removal of Suspension Assembly and NAS bolts may be required to perform this inspection)

- Physically check that Suspension Assembly rotates smoothly on 205-070-944-001 (mounting point) and hardware
 - If binding or rotation is not smooth, inspect the following:
 - Bushings, and NAS bolts used to suspend the assembly. Replace as needed.
 - Check for debris, clean with cleaning solvent and wipe dry.
- If bolts are loose, tighten. (item 24, 25, & 26 in Table 4.1)

2.5 years / 500 Hour (Suspension Assembly)

(NOTE: removal of Suspension Assembly and NAS bolts may be required to perform this inspection)

- Ensure Suspension Assembly rotates smoothly on 205-070-944-001 (mounting point) and hardware
 - It is recommended to clean holes with cleaning solvent and wipe dry. Ensure debris clear from all rotating components.
- Check that Suspension Assembly rotates smoothly on load cell.
 - It is recommended to clean holes with cleaning solvent and wipe dry. Ensure debris clear from all rotating components.
- Check Swaged Cable Assemblies, 650-010-151-100, for cracking / damage at end fittings
 - Twist the cable assembly $\frac{1}{4}$ to $\frac{1}{2}$ of a complete turn in order to inspect the wire rope for fraying
 - If cracking in the end fittings or fraying in the wire rope is found anywhere on the Swage assembly, remove the damaged assembly and replace.
- If bolts are loose, tighten. (items 24, 25, & 26 in Table 4.1)
- Inspect load cell (C00002-00009) assembly for cracking, damage, wear.
 - Clean both IDs of load cell pin with cleaning solvent and wipe dry.
 - Ensure debris is clear from Suspension Assembly, and load cell link to prevent damage to load cell assembly.
 - If galling or damage prevents smooth rotation, replace.
- If installed as alternate, inspect 650-010-150-100 (dead link assy.)
 - Clean IDs of dead link pin with cleaning solvent and wipe dry.
 - Ensure debris clear from dead link bushing or load cell pin to prevent damage to dead link assembly.
 - If galling or damage prevents smooth rotation, replace.
- Check fastener hardware for wear, or deformation, replace as necessary.
- After re-assembly, ensure Suspension Assembly and hook can pivot their full range of motion.

5 year / 1000 Hour (Suspension Assembly)

(NOTE: removal of Suspension Assembly and NAS bolts may be required to perform this inspection)

- Ensure Suspension Assembly rotates smoothly on 205-070-944-001 (mounting point) and hardware
 - It is recommended to clean holes with cleaning solvent and wipe dry. Ensure debris clear from all rotating components.
- Check that Suspension Assembly rotates smoothly on load cell.
 - It is recommended to clean holes with cleaning solvent and wipe dry. Ensure debris clear from all rotating components.
- Check Swaged Cable Assemblies, 650-010-151-100, for cracking / damage at end fittings
 - Twist the cable assembly $\frac{1}{4}$ to $\frac{1}{2}$ of a complete turn in order to inspect the wire rope for fraying
 - If cracking in the end fittings or fraying in the wire rope is found anywhere on the Swage assembly, remove the damaged assembly and replace.
- If bolts are loose, tighten. (items 24, 25, & 26 in Table 4.1)
- Inspect load cell assembly for cracking, damage, wear.
 - Clean both IDs of load cell pin with cleaning solvent and wipe dry.
 - Ensure debris is clear from Suspension Assembly, and load cell link to prevent damage to load cell assembly.
 - If galling or damage prevents smooth rotation, replace.
- If installed as alternate, inspect 650-010-150-100 (dead link assy.)
 - Clean IDs of dead link pin with cleaning solvent and wipe dry.
 - Ensure debris clear from dead link bushing or load cell pin to prevent damage to dead link assembly.
 - If galling or damage prevents smooth rotation, replace.
- Check fastener hardware for wear, or deformation, replace as necessary.
- After re-assembly, ensure Suspension Assembly and hook can pivot their full range of motion.

Cargo Hook Inspection / Overhaul

Note: The Bumper Ring may need to be removed for this and all other inspections/overhauls.

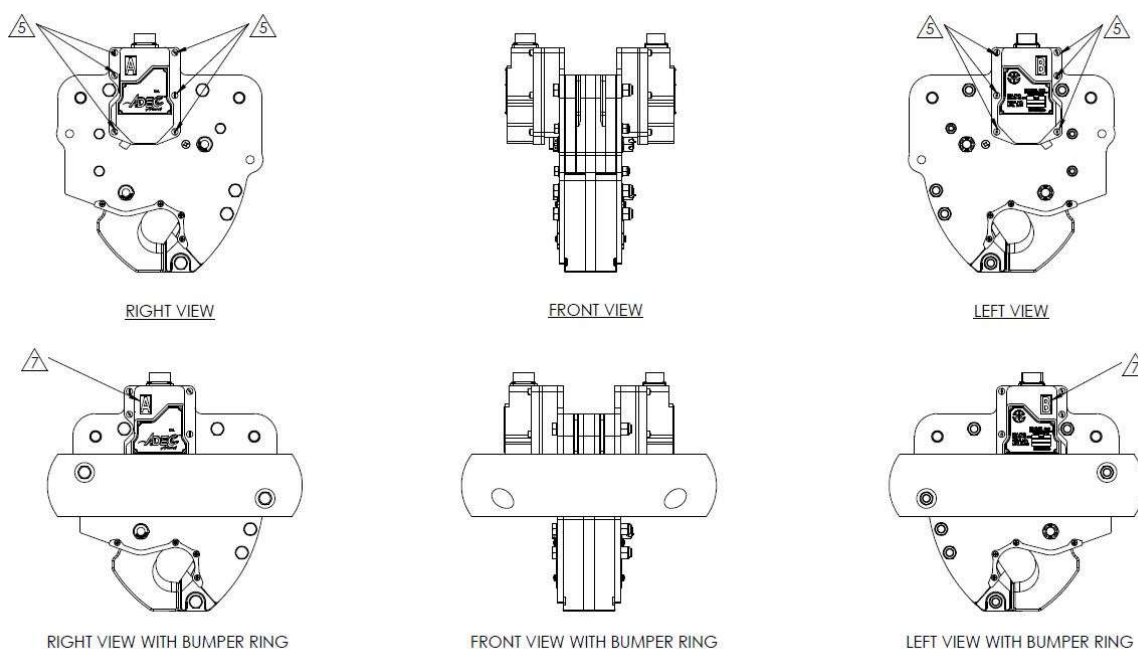


Figure 4.3: Hook Assembled with and without Bumper Ring

Flag note 5 is safety wire locations

Flag note 7 is noting location of placards/laser engraving location of “A” / “B”

Table 4.2: Model 650 ADEC™ Hook (650-430-101-100) BOM

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	1986K11	SPRING	2
2	301-010-110-005	LINK	2
3	301-060-097-005	301 SPRING	2
4	301-080-111-001	PIN, LINK	2
5	350-050-152-301	SPRING BUSHING	2
6	350-050-154-301	SPRING BUSHING	2
7	350-050-171-200	SWITCH CLAMP, LH	1
8	350-050-172-200	SWITCH CLAMP, RH	1
9	350-430-116-002	PLACARD	1
10	350-430-116-003	PLACARD	1
11	611-060-031-001	SPRING	2
12	650-010-002-100	CENTER PLATE ASSEMBLY	1

13	650-010-022-100	LATCH ASSEMBLY	2
14	650-010-033-501	LOAD BEAM, FIXED, LH	1
15	650-010-034-501	LOAD BEAM, FIXED, RH	1
16	650-010-201-100	SIDE PLATE, LH, ASSEMBLY	1
17	650-010-202-100	SIDEPLATE, RH, ASSEMBLY	1
18	650-010-203-201	SPACER, LH	1
19	650-010-204-201	SPACER, RH	1
20	650-010-208-200	SPACER, FORWARD, HOOK	2
21	650-010-209-200	SPACER, AFT, HOOK	2
22	650-020-031-100	LOAD BEAM, LH, ASSEMBLY	1
23	650-020-032-100	LOAD BEAM, RH, ASSEMBLY	1
24	650-040-003-500	SHAFT AND ARM, LH	1
25	650-040-004-500	SHAFT AND ARM, RH	1
26	650-040-008-100	LEVER ASSEMBLY	2
27	650-040-141-100	MODIFIED SOLENOID ASSEMBLY, CW	1
28	650-040-142-100	MODIFIED SOLENOID ASSEMBLY, CCW	1
29	650-050-001-200	SPRING HOUSING, LH	1
30	650-050-002-200	SOLENOID MOUNT PLATE	2
31	650-050-003-200	SOLENOID COVER, LH	1
32	650-050-004-200	SPRING HOUSING, RH	1
33	650-050-006-200	SOLENOID COVER, RH	1
34	650-050-007-200	DATA TAG, LH	1
35	650-050-008-200	DATA TAG, RH	1
36	650-050-057-500	SPACER, BUMPER RING	4
37	650-050-058-500	SPACER, LEVER	4
38	650-050-092-600	BUMPER RING	1
39	650-050-147-500	RELEASE ARM, LH	1
40	650-050-148-500	RELEASE ARM, RH	1
41	650-050-149-500	DRIVER	2
42	650-080-147-500	PIN, SPRING ANCHOR	4
43	650-080-148-500	PIN, BUMPER, LOAD BEAM	1
44	650-080-149-500	PIN, LEVER	4
45	650-430-111-100	SWITCH HARNESS, LH	1
46	650-430-112-100	SWITCH HARNESS, RH	1
47	909-050-065-001	LATCH BUMPER	2
48	909-050-158-001	BUMPER ASSY	2

49	92373A174	SPRING PIN, n1/8 X 5/16	2
50	96877A330	SCREW	2
51	AN4-33A	BOLT	3
52	AN6-16A	BOLT	1
53	AN6-34A	BOLT	4
54	AN6-40A	BOLT	2
55	MS17825-7	NUT, SELF LOCKING, SLOTTED	2
56	MS21044N4	NUT	3
57	MS21044N6	NUT, SELF LOCKING	7
58	MS21083N3	NUT	4
59	MS21318-1	DRIVE SCREW	8
60	MS24665-283	COTTER PIN	2
61	MS24694-S102	SCREW	8
62	MS24694-S110	SCREW	2
63	MS24694-S57	SCREW	8
64	MS24694-S65	SCREW	2
65	MS3102R16S-5P	CONNECTOR	1
66	MS35265-14	SCREW	8
67	MS35266-66	SCREW	12
68	NAS1149F0332P	WASHER	4
69	NAS1149F0432P	WASHER	6
70	NAS1149F0632P	WASHER	14
71	NAS1149F0732P	WASHER	4
72	NAS1149F0763P	WASHER	4
73	NAS6207-50D	BOLT	2
74	PT02A14-5P	CONNECTOR	1
75	TJM120711	WIRING BLOCK	1

Annual / 100 Hour (Cargo Hook)

- Check System A & B Load Beams, Side Plates, Abrasion Plates, and Bushings for wear.
 - Load Beams: rotation of each load beam & poorly engaging latches
 - Clean load beam holes and ensure smooth rotation.
 - Side Plates: wear greater than .03” around trunnion lugs. Cracking.
 - If either of these are found, remove the side plate from service and replace.

- Abrasion Plates: Missing hardware or Cracking.
 - If either of these are found, remove from service and replace.
 - Check side plates for corrosion under Abrasion Plates. (abrasion plates may need to be removed to perform this inspection) If corrosion is found on side plate greater than .020", replace.
- Bushings: wear affecting smooth rotation of the release mechanism.
- May require cleaning and inspection for damage if smooth Check Sides A & B Latch Lugs for wear / deformation
 - If gouge damage is found on any of the latch lugs, replace latch assembly 650-010-022-100.
- Check both Latch Rollers for wear / deformation and that they rotate freely.
 - Latch rollers should rotate freely. Ensure they are cleaned of any debris. Use cleaning solvent to clean and wipe dry
- Check hardware for wear, replace as necessary.
- Check Latch Bumper 909-050-065-001 for excessive wear, replace as needed.
- Check 909-050-158-001 Bumper Assemblies for excessive wear, replace as needed.
- Check 650-050-092-600 (Hook Bumper Ring) for wear or damage, replace as needed.
 - Damage constitutes cracks in outer diameter
 - Damage constitutes cracks where mounting bolts locate (see assembly /disassembly instructions – Figure 4.4 & 4.5)

2.5 year / 500 Hour (Cargo Hook)

- Check System A & B Load Beams, Side Plates, Abrasion Plates, and Bushings for wear.
 - Load Beams: rotation of each load beam & poorly engaging latches
 - Clean load beam holes and ensure smooth rotation.
 - Side Plates: wear greater than .03" around trunnion lugs. Cracking.
 - If either of these are found, remove the side plate from service and replace.
 - Abrasion Plates: Missing hardware or Cracking.
 - If either of these are found, remove from service and replace.
 - Check side plates for corrosion under Abrasion Plates. (abrasion plates may need to be removed to perform this inspection) If corrosion is found on side plate greater than .020", replace.

- Bushings: wear affecting smooth rotation of the release mechanism.
 - May require cleaning and inspection for damage if smooth rotation is not occurring. Replace if deformed.
- Check A & B Latch Lugs for wear / deformation.
- Check both Latch Rollers for wear / deformation and that they rotate freely.
- Check hardware for wear, replace as necessary.
- Check Latch Bumper 909-050-065-001 for excessive wear, replace as needed.
- Check 909-050-158-001 Bumper Assemblies for excessive wear, replace as needed.
- Check 650-050-092-600 (Hook Bumper Ring) for wear or damage, replace as needed.
 - Damage constitutes cracks in outer diameter
 - Damage constitutes cracks where mounting bolts locate (see assembly /disassembly instructions – Figure 4.4 & 4.5)

5 year / 1000 Hour (Cargo Hook – Overhaul)

Note: Cargo Hook Disassembly, Inspection / Overhaul, and Reassembly required for this level of maintenance. (See Section 6 for instructions.)

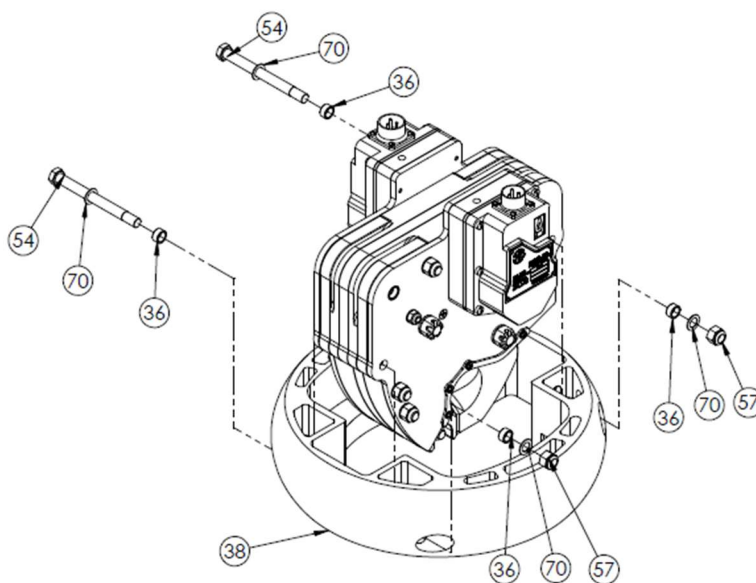


Figure 4.4: Bumper Ring (650-050-092-600) Installation / Removal

NOTE: It is highly recommended for operators to return their Model 650 cargo hook to Mechanical Specialties', LLC or to a Mechanical Specialties', LLC authorized repair station, for this overhaul. See section 8 (page 59) for contact information on overhauls and general maintenance or installation inquiries.

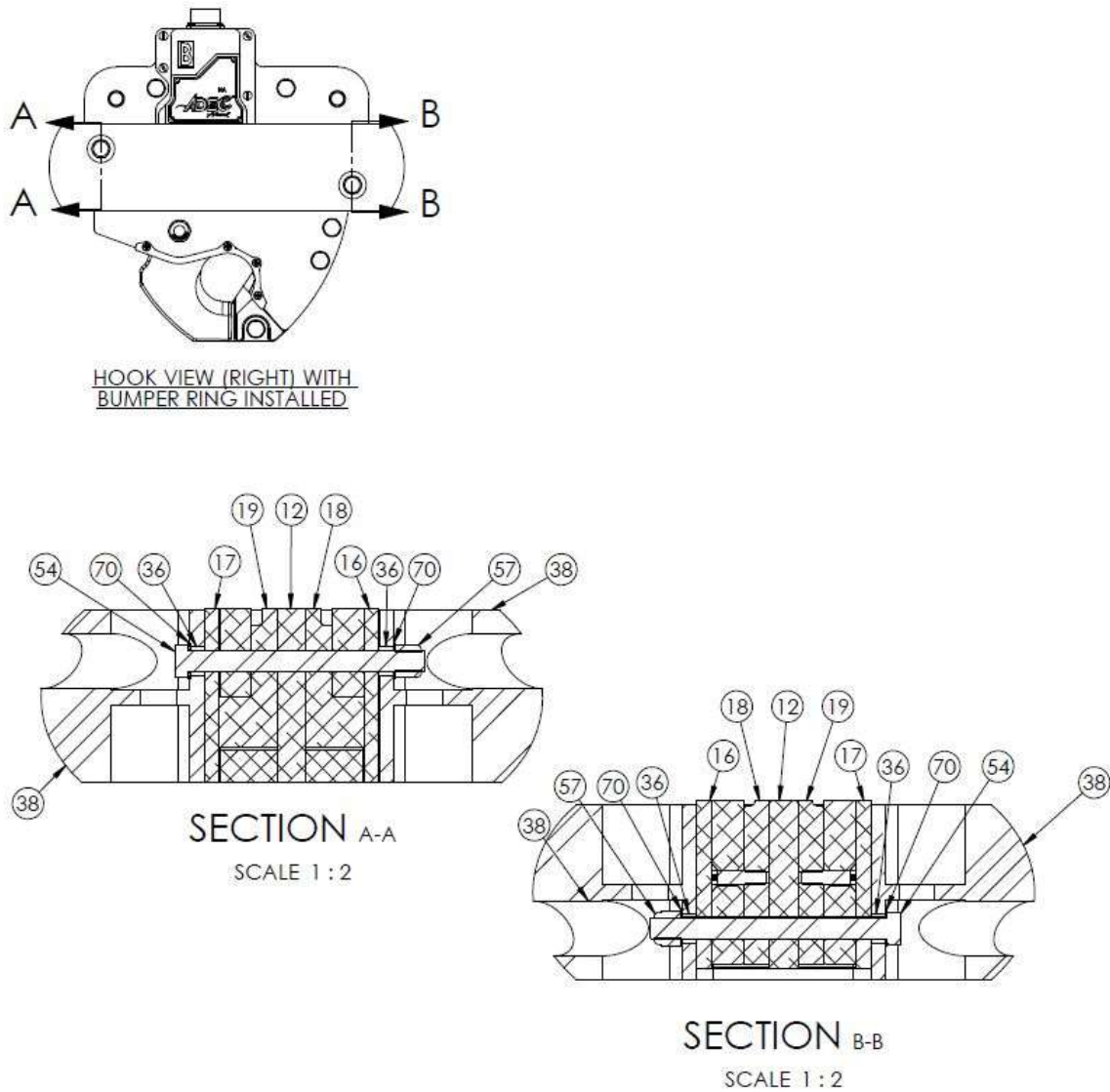


Figure 4.5: Bumper Ring Hardware Stackup

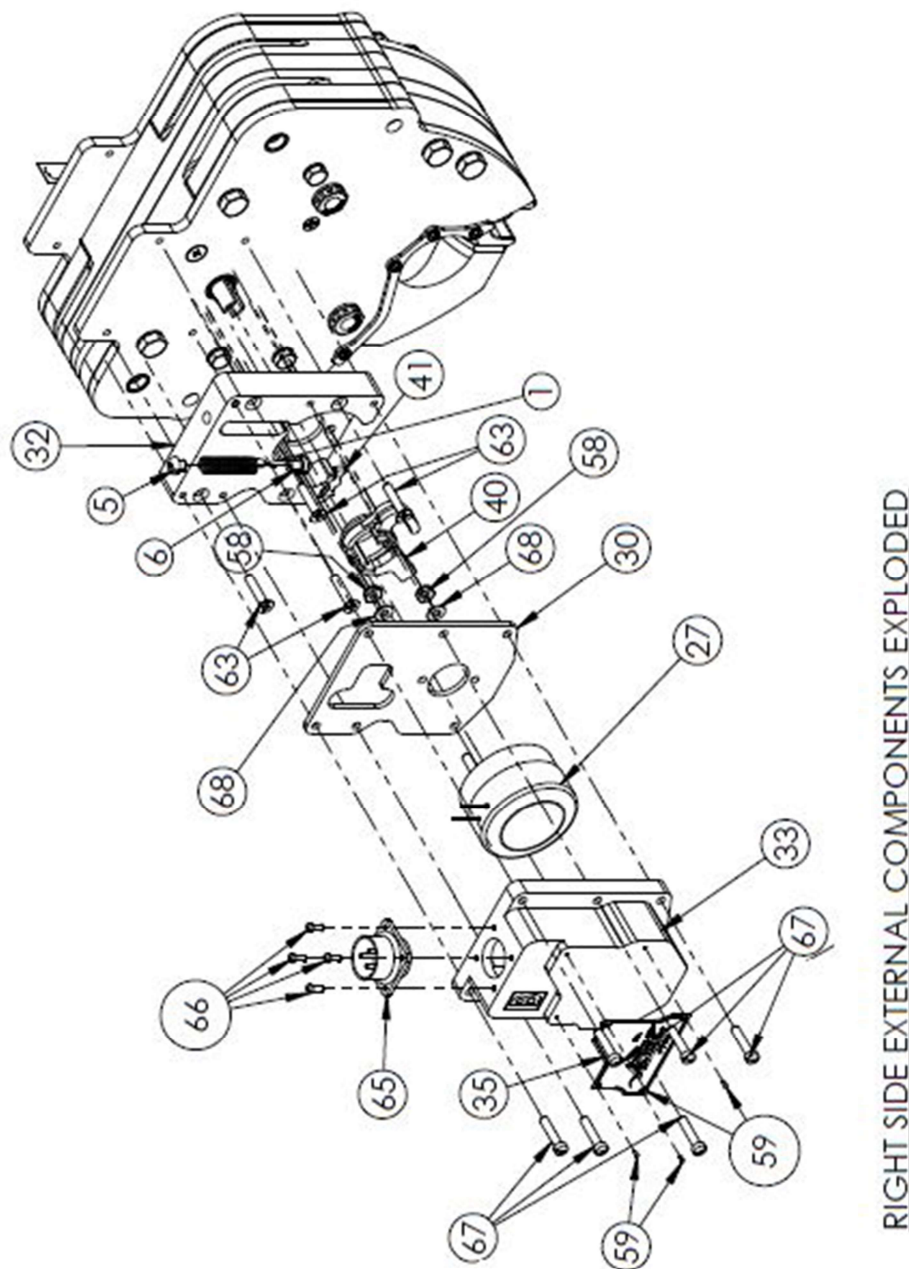


Figure 4.6: Hook Right Side Externals Exploded View (Sys. “B”)

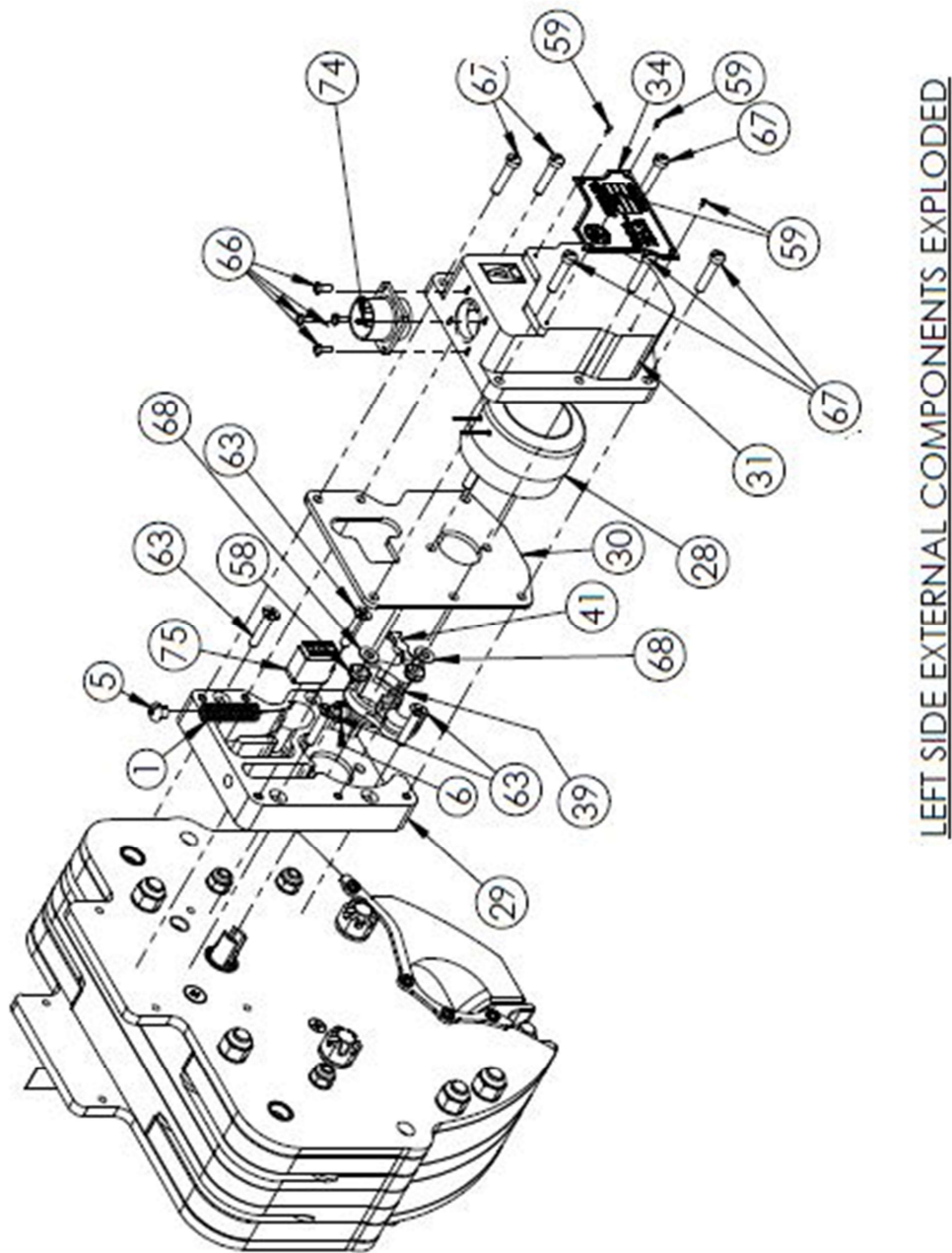


Figure 4.7: Hook Left Side Externals Exploded View (Sys. “A”)

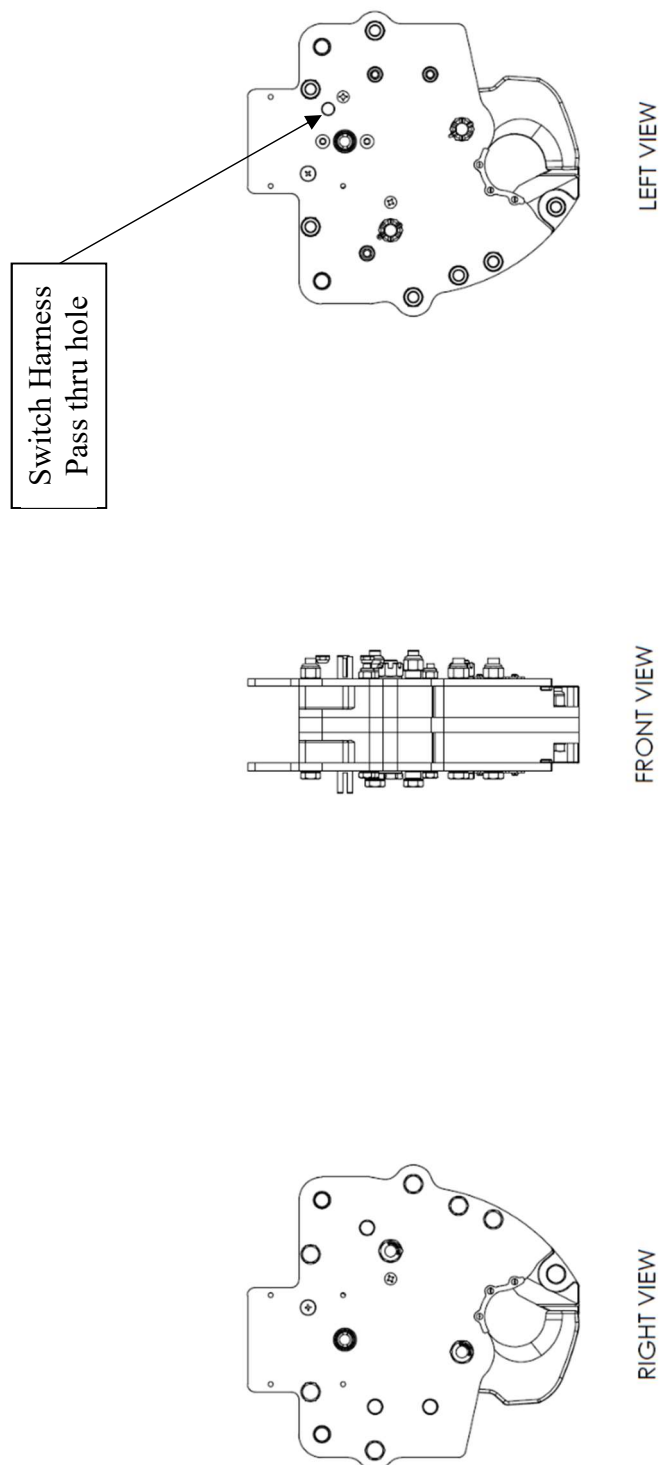
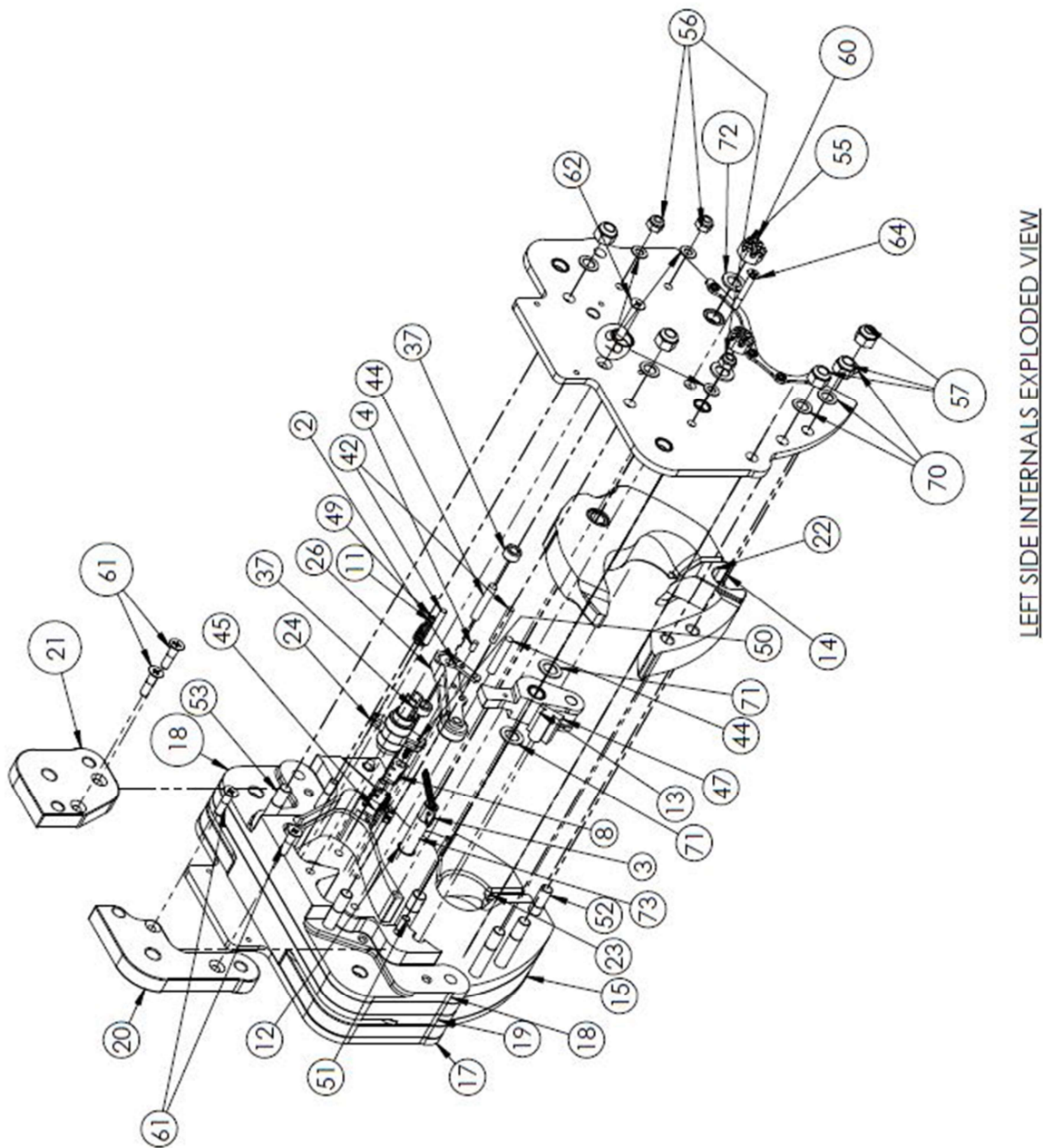
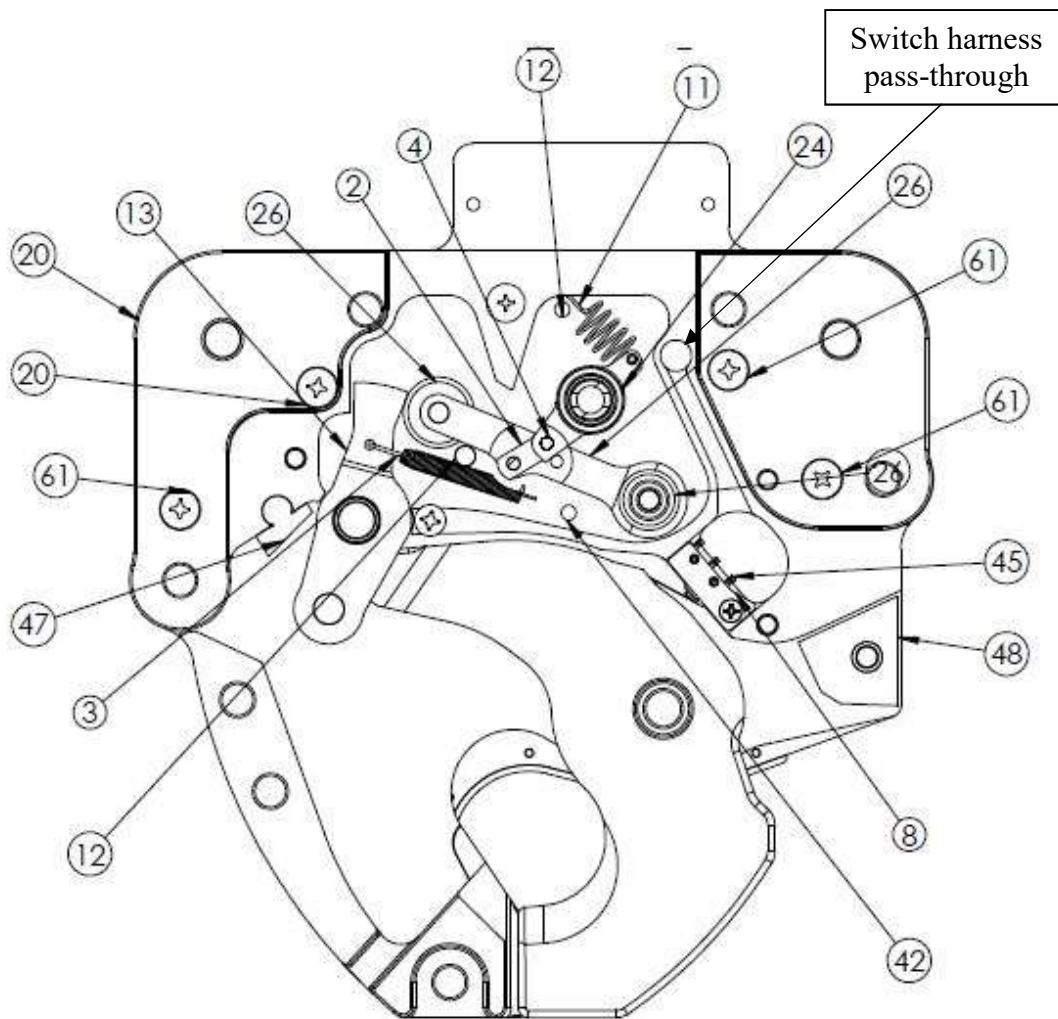


Figure 4.8: Right, Front, and Left Side Views - Assembled with Side Plates



LEFT SIDE INTERNALS EXPLODED VIEW

Figure 4.9: Hook Left Side Internals Exploded View



LEFT SIDE VIEW BEFORE ASSEMBLY
WITH 650-010-201-201 SIDEPLATE

Figure 4.10: Left Side Internals Assembled before Side Plate
NOTE: Callouts for parts are the same as Left Side (Figure 4.9)

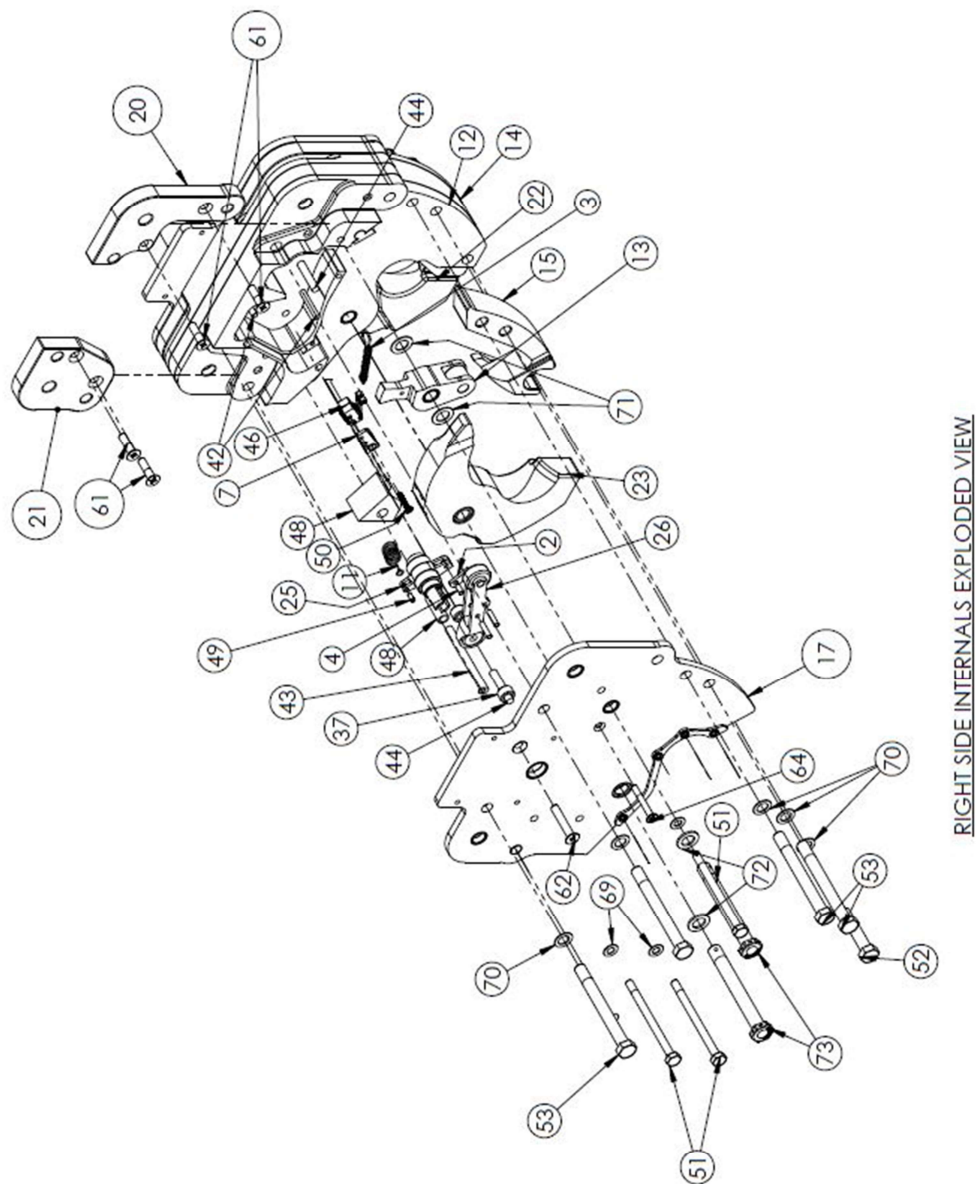


Figure 4.11: Hook Right Side Internals Exploded View

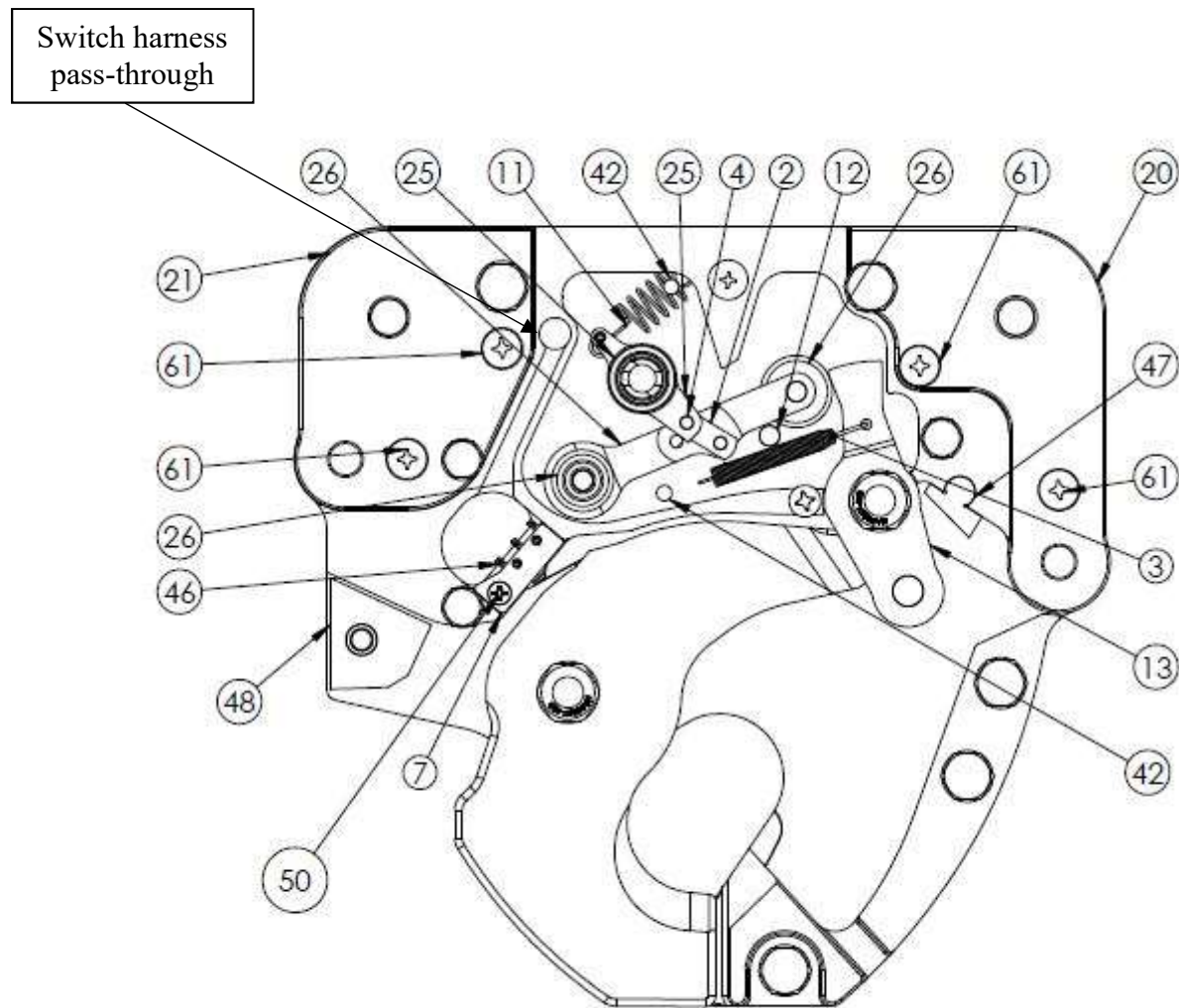


Figure 4.12: Right Side Internals Assembled Before Side Plate
NOTE: Callouts for parts are the same as Right Side (Figure 4.11)

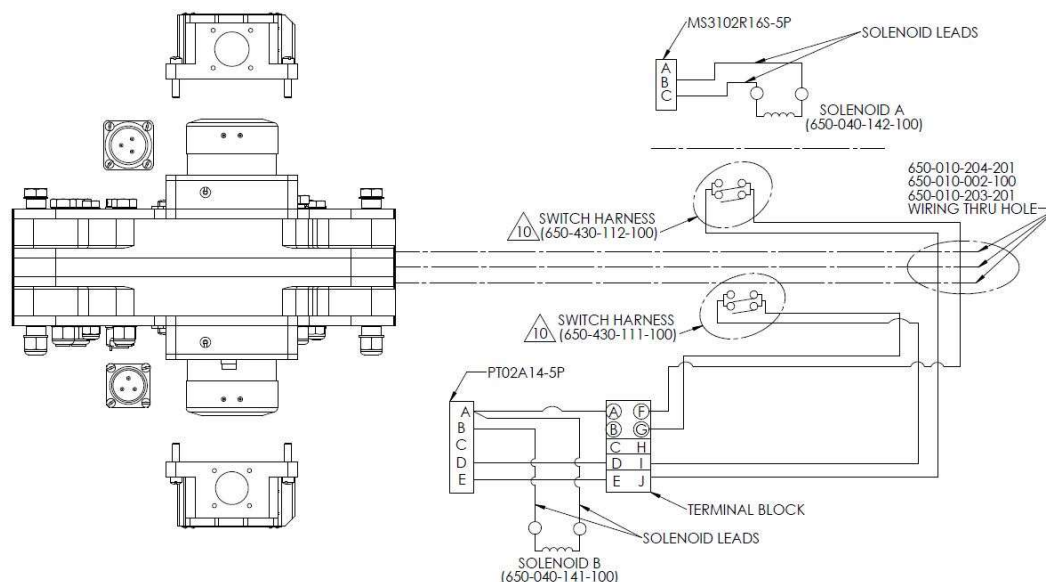


Figure 4.13: Model 650 Hook Electrical Wire Schematic and Locations

Disassembly Instructions (For 5-year maint. / overhaul)

- Remove Bumper Ring (Figure 4.4)
 - Loosen Nuts (Item 56), then remove bolts (52) from bumper ring (35) and hook assembly.
 - Bumper ring sides downward toward load beams to be removed. Bumper ring is to be installed with large webs facing down for clearance on external components shown in Figures 4.4 & 4.5.
- Remove System “A” External Components (Figure 4.6)
 - Loosen screws (items 64, 63, & 60) to remove release mechanism components from cargo hook. See Figures 4.6 and 4.7 for exploded views of each side of the cargo hook.
 - Inspect all threaded hardware for wear on plating (plating has been worn away completely), or damaged / stripped threads, and replace as necessary. Damage on threaded components or hardware can include rough or gritty turns during assembly / disassembly. Replace as necessary.
 - Inspect components (solenoid covers, spring housings, cover plates, etc.) for wear, gouges, or has cracks. If cracks are present replace as necessary. If wear exists greater than .03”, replace as necessary. Inspect placards / laser engraving and if text is unclear or damaged beyond being legible, replace placard or component.

- Inspect solenoid wires and connector for any damage or excessive wear on wire, solder or crimp connections, and connector pins. Replace as needed.
 - Solenoid pin should be round with minimal wear. If wear is found, replace pin as needed.
- Remove System “B” External Components (Figure 4.7)
 - Loosen screws (items 64, 63, & 60) to remove release mechanism components from cargo hook. See Figures 4.4 and 4.5 for exploded views of each side of the cargo hook.
 - Utilize pin removal tools to disconnect the electrical wire leads from the terminal block shown in the wire schematic on Figure 4.11.
 - Inspect solenoid wires and connector for any damage or excessive wear on wire, solder or crimp connections, and connector pins. Replace as needed.
 - Solenoid pin should be round with minimal wear. If wear is found, replace pin as needed.
 - Continue to remove the release mechanism components until the hook is disassembled per Figure 4.7.
 - Ensure switch harnesses, (item 42 & 43) with pins from terminal block (item 72), are able to pass through spacers and center plate assembly in further disassembly. (
 - Inspect all threaded hardware for wear on plating (plating has been worn away completely), or damaged / stripped threads, and replace as necessary. Damage on threaded components or hardware can include rough or gritty turns during assembly / disassembly. Replace as necessary.
 - Inspect components (solenoid covers, spring housings, cover plates, etc.) for wear, gouges, or has cracks. If cracks are present replace as necessary. If wear exists greater than .03”, replace as necessary. Inspect placards / laser engraving and if text is unclear or damaged beyond being legible, replace placard or component.
- Begin disassembly of internal mechanisms by removing all nuts, washers, and cotter pins from the left side of the hook as per Figure 4.7
 - Note that the countersunk screws (item 61 & 62) are to be removed last, prior to removing the side plate assemblies.
- Remove LH Side Plate Assembly (15) and inspect internals (Figure 4.8 & 4.9)
- Disassemble LH internals (Figure 4.8)
 - Note that the hook bolt heads will be on the right hand side of the assembly, allowing retention of all internal components on the LH side of the system.
- Remove RH Side Plate Assembly (16) and Inspect internals (Figure 4.10 & 4.11)

- NOTE: it is advised to utilize pins or bolts of the same diameter at each location to retain all internals in their correct location within the hook at this stage of disassembly.
- Disassemble RH internals (Figure 4.11)
 - Note that the hook bolt heads will be on the right hand side of the assembly. If removed without utilizing a pin or bolt from the left side of the system, the RH internals will not be retained in their position found in Figure 4.11.
- Inspections can now be performed on all sub-assemblies and hardware.
- Check Side Plate Assemblies (items 15 & 16)
 - Inspect for wear or damage greater than .05” around trunnion lugs (load beam pivot location) and upper lugs. Replace side plate if found.
 - Inspect for loose bushings – if found this indicates damage / permanent deformation to the side plate hole, replace side plate.
 - Abrasion Plates: check for missing hardware and cracking in abrasion plate. Replace Abrasion Plate or missing hardware
 - Bushings: wear or damage affecting smooth rotation of the release mechanism. Gently press out bushings and replace as necessary.
- Check load Beams for:
 - Wear / damage in excess of .06” on the load carrying surfaces. If found, replace.
 - Damage to bushings that cause rough rotation around NAS bolt, replace bushings if damage is found.
- Load Beams: rotation of each load beam and engagement with latch
 - Clean load beam holes and ensure smooth rotation.
 - If damage is found that prevents smooth rotation, replace as necessary.
- Check A & B Latch Lugs for wear / deformation.
- Check both Latch Rollers for wear / deformation and that they rotate freely.
- Clean and then check bearings in each lever for wear / deformation and check that they rotate smoothly.
 - If gritty or rough rotation is evident, replace bearing as necessary.
- Check shaft and arms (items 21 & 22), links, and all springs for wear or damage that prevents smooth rotation and actuation of the lever mechanism. Cleaning prior to this inspection may be required.
- Check Switch harnesses for wear / damaged switches. Perform continuity check on harnesses. If heat shrink is worn such that wire is showing, replace heat shrink. If wire is worn, in addition to heat shrink, replace harness.
- Check hardware and pins for wear, replace as necessary.
 - Check pins for deformation or bending. Clean pins of any debris or corrosion. If damage, gouging, or bends are found, replace.
- Ensure all debris is removed from components and clean

Assembly Instructions (For 5 year maintenance or for re-assembly)

NOTE: assembly instructions are reversed from disassembly

- Ensure all components are clean prior to assembly
- Ensure all sub-assemblies are assembled:
 - Bushings are assembled and have no burrs.
 - All pins are staked at their respective locations
 - Retaining hardware (side plate assemblies) are installed
- Install all internal components in the right side of the hook as shown in Figures 4.7 & 4.8. Apply 130-AA Lubriplate or Mobil 28 on all rotating surfaces (bushing holes, bolts through latch and load beam assemblies, etc.).
 - NOTE: It is recommended to assemble parts on center plate assembly, then assemble rh spacer, rh static load beam, etc.
 - NOTE: It is recommended to utilize the bolts required through each of the side / center plate holes to ensure proper alignment of the side / center plate assemblies (items 11, 15, & 16) with the spacers (17, 18).
- Ensure RH Switch Harness Leads (42 & 43) are wired through hole of Spacers and center plate. See Figure 4.12.
- Install the Right-Hand Side Plate Assembly (item 11) onto the hook assembly per Figures 4.10.
 - NOTE: It is recommended to install all of the bolts and countersunk screw in the hook for ease of assembly, and keeping the latch and load beam assemblies in place. (Figure 4.7)
- Install the bolts, washers, and countersunk screw from the right side of the hook assembly.
- Install all internal components in the left side of the hook as shown in Figure 4.9.
 - Both Switch Harness leads (Items 42 & 43) are to be assembled and pass-through holes in spacers and center plate assembly.
- Install the Left-Hand Side Plate Assembly (item 15) onto the hook assembly as shown in Figure 4.9.
 - Both Switch Harness leads (Items 42 & 43) are to be assembled and pass-through hole in LH side plate assembly.
- Finish assembly of internal mechanisms by installing all nuts, washers, and cotter pins from the left side of the hook as per Figure 4.10
 - Install Cotter Pins onto NAS bolts.
- Install switch harnesses into terminal block on LH externals, and connect to LH connector. See Figure 4.12 for hook schematic.
- Install LH and RH release mechanism components as per Figures 4.5 & 4.6.

Testing Instructions after assembly

- Perform continuity check on switches using multi-meter:
 - load beam in closed position (open circuit – indicator lights off)
 - load beam in open position (closed circuit – indicator lights on)
- Perform Functional test of manual release levers and electrical releases first (0 lb.)
- Hold all loads for 5 seconds before release.
- Perform load tests at the specified loads listed below:

NOTE: DO NOT PERFORM THESE TESTS WITH THE ROTORCRAFT.

RIGHT LOAD BEAM ONLY

LOAD (LB.)	RELEASE METHOD	OPERATOR	DATE
60	Electrical Switch		
60	Manual Back-up Lever		
1,000	Electrical Switch		
1,000	Manual Back-up Lever		
2,500	Electrical Switch		
2,500	Manual Back-up Lever		
5,000	Electrical Switch		
5,000	Manual Back-up Lever		
10,000	DO NOT RELEASE		

LEFT LOAD BEAM ONLY

LOAD (LB.)	RELEASE METHOD	OPERATOR	DATE
60	Electrical Switch		
60	Manual Back-up Lever		
1,000	Electrical Switch		
1,000	Manual Back-up Lever		
2,500	Electrical Switch		
2,500	Manual Back-up Lever		
5,000	Electrical Switch		
5,000	Manual Back-up Lever		
10,000	DO NOT RELEASE		

BOTH LOAD BEAMS CLOSED, RELEASE RIGHT LOAD BEAM ONLY

LOAD (LB.)	RELEASE METHOD	OPERATOR	DATE
1,000	Electrical Switch		
2,500	Electrical Switch		
5,000	Electrical Switch		

BOTH LOAD BEAMS CLOSED, RELEASE LEFT LOAD BEAM ONLY

LOAD (LB.)	RELEASE METHOD	OPERATOR	DATE
1,000	Electrical Switch		
2,500	Electrical Switch		
5,000	Electrical Switch		

HEC Long Line Inspection

Daily Inspection/Per Flight

Note: removal of the long line outer cover may be required to perform these inspections.

- Per ASME B30.30-2019, visually inspect the rope assembly to discover gross damage that may be an immediate hazard, such as distortions, abrasion, cut strands or deterioration of end connections.
- Per ASME B30.30-2019, visually inspect the rope assembly for heat/electrical damage, chemical or UV degradation, local changes to diameter, lay length or twisting of rope.
- Per CI 2001-04, visually inspect for high or low strands or randomly uneven cross-sections.
- Per CI 2001-04, visually inspect for excessive twist or corkscrewing.
- Per CI 2001-04, visually inspect for broken filaments, fuzzy areas or kinks.
- Per Lift-It Long Line User Manual, HECSHLL, Revision 6, if any of the visual damage shown below or listed above is present in the rope, the rope assembly will be removed from service for evaluation by Lift-It or other qualified personnel with recognized degree or certificate or with extensive training, knowledge and experience of synthetic rope assemblies.
- Per Lift-It Long Line User Manual, HECSHLL, Revision 6, visually inspect for damaged thimbles or master links which show signs of corrosion, cracks, distortion, sharp edges, incorrect shape, or localized wear.
- Per Lift-It Long Line User Manual, HECSHLL, Revision 6, inspect for loose thimbles which are not captivated by the eye splice with ears, retaining ring, or lashing.
- Per Lift-It Long Line User Manual, HECSHLL, Revision 6, visually inspect for tears, holes, cuts, or punctures to covers along with broken seams or zippers.
- After inspection, and there is no damage, ensure long line outer cover is installed prior to use.

VOLUME REDUCTION					
	Rope displaying original bulk.		Rope strands showing full volume.		
	Rope displaying strand volume reduction from abrasion. Remove rope from service.		Rope strands reduced by abrasion. Remove rope from Service.		
CUT STRANDS		PULLED STRANDS		INCONSISTENT DIAMETER	
					
Rope displays cut strands. Rope must be retired or the cut section removed and after inspection, the remaining rope re-spliced, proof tested and certified.		Caused by snagging on equipment or surfaces. Not a permanent condition that can be corrected by working the pulled strand back in to the rope, if the pulled strand is not cut or damaged.		Flat areas or lumps and bumps that may result from shock loading or broken internal strands.	
COMPRESSION		MELTING OR GLAZING		DISCOLORATION	
					
Rope exhibits fiber-set from compression. A slight sheen is visible. This is not a permanent condition and can be eliminated by flexing the rope. This condition should not be confused with glazed or melted fiber. (See Melting or Glazing).		Damage depicted is caused by excessive heat which melted and fused the fibers. This area will be extremely stiff. Unlike fiber compression, melting damage cannot be corrected by flexing the rope. Melted areas must be cut out and the rope re-spliced, proof tested and certified or removed from service.		Fused, Brittle, Stiff Fibers which indicate chemical exposure and contamination.	
					
CUT STRANDS Rope displays cut strands, the result of exposure to damaging surfaces or edges, abrasion or cyclic tension wear.		MELTING OR GLAZING Damage depicted is caused by excessive heat which melted and fused the fibers. Damage is manifested by visibly charred and melted fibers, yarns and/or strands. This area will be extremely stiff. Unlike fiber compression, melting damage cannot be corrected by flexing the rope.			
					
DISCOLORATION Fused, brittle, stiff fibers which indicate chemical exposure and/or contamination.	INCONSISTENT DIAMETER Flat areas, lumps and/or bumps that may result from shock loading or broken internal strands.	VOLUME REDUCTION Rope displaying volume reduction from abrasion, exposure to damaging surfaces and/or cyclic tension wear.			

Figure 4.14: Lift-It Fraying Guide

Annual / 100 Hour

- Per CI 2001-04, Lay out rope in a straight line on a smooth surface under hand or mechanical tension to straighten the rope. Visually examine the entire rope length for detectable damage and deterioration including eye splices or end-to-end splices using the daily inspection figures as guidance.
- Per CI 2001-04, sight the rope down the length to look for high or low strands and randomly uneven sections.
- Per CI 2001-04, tactile inspection of the entire rope length checking by feel for unevenness, rough spots or stiff sections.
- Per CI 2001-04, measure the rope circumference at several locations including all locations that may exhibit signs of damage noting any differences of more than 10 percent difference from nominal diameter.
- Per CI 2001-04, with enough tension to straighten the rope and overcome any ground friction, measure the total length of the rope. The length should not vary by more than ± 5 percent of the original new length.
- Per Lift-It Manual, HECSHLL, Revision 6, inspect for internal abrasion especially at any sights where the external fibers may exhibit unusual features or potential damage.
- Per ASME B30.30-2019, while inspecting for internal abrasion, check the interior of the rope structure for dirt or grit that may be causing damage to the rope yarns.
- Visually inspect entire assembly for any apparent damage from a heat source.
- Visually inspect for localized wear, cracking, distortion, sharp edges or corrosion of thimbles and master links. Attention should be at any welded locations of the thimbles.
- Visually inspect the master links for any deformation



Figure 4.15: Lift-It Interior Wear Guide

5.0 PLACARDS AND MARKINGS

Note: Parts may have engraved markings for redundancy.

Inside aircraft, in full view of the pilot:

A Hook Manual Release Lever. (0.25" x 2.5")



Installed on Release Assembly Handle shown in Figure 5.1 (Arrow 1)

B Hook Manual Release Lever (0.25" x 2.5")



Installed on Release Assembly Handle shown in Figure 5.1 (Arrow 1)

System "A" Electrical Release. (0.5" x 1.2")



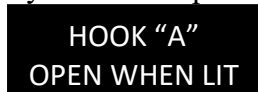
Pilot's Cyclic LH Side near Existing Hook Release Button (pinky). Figure 5.1 (Arrow 3)

System "B" Electrical Release. (0.5" x 1.2")



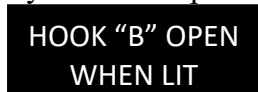
RH Side of Release Handle Assembly near Electrical Release Figure 5.1 (Arrow 2)

System "A" Open Indicator. (0.5" x 1.2")



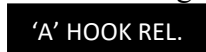
Installed adjacent to Red Warning Light "A" on Instrument Panel.

System "B" Open Indicator. (0.5" x 1.2")



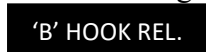
Installed adjacent to Red Warning Light "B" on Instrument Panel.

CB 1 Marking. (0.19" x .90")



Installed with 15-amp circuit breaker.

CB 2 Marking. (0.19" x .90")



Installed with 15-amp circuit breaker.

CB 3 Marking. (0.19" x 0.90")

HOOK LIGHTS

Installed with 1-amp circuit breaker.

CB 4 Marking. (0.19" x 0.90")

LOAD CELL

Installed with 2-amp circuit breaker.

System "A" Hook Marking. X2 (0.625" x 1.0")

A

Rear Face of Left Side of Hook as shown in Figure 5.1 (Arrow 4)

AND

Left side of Manuel Release Assembly of Cyclic. Figure 5.2 (Arrow 4)

System "B" Hook Marking. X2 (0.625" x 1.0")

B

Rear Face of Right Side of Hook as shown in Figure 5.1 (Arrow 4)

AND

Right side of Manuel Release Assembly of Cyclic. Figure 5.2 (Arrow 4)

Velocity No Exceed Marking (0.5" x 1.75")

HEC VNE 65 KIAS

Installed on 650 Exterior Loads Flip Chart Placard

NOTE: See Figures 5.1 and 5.2 for above Decal installation locations.

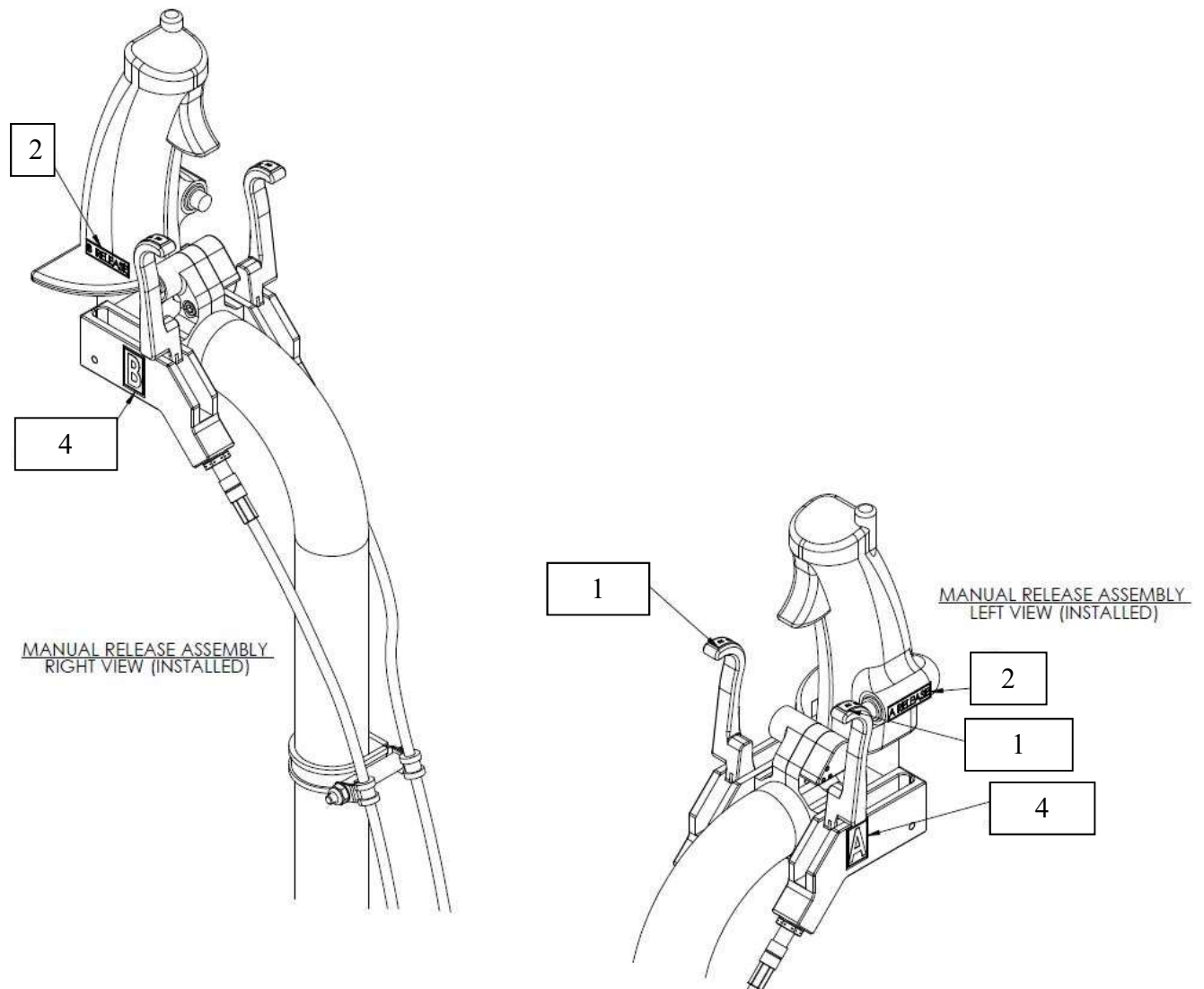


Figure 5.1: Cyclic Detail

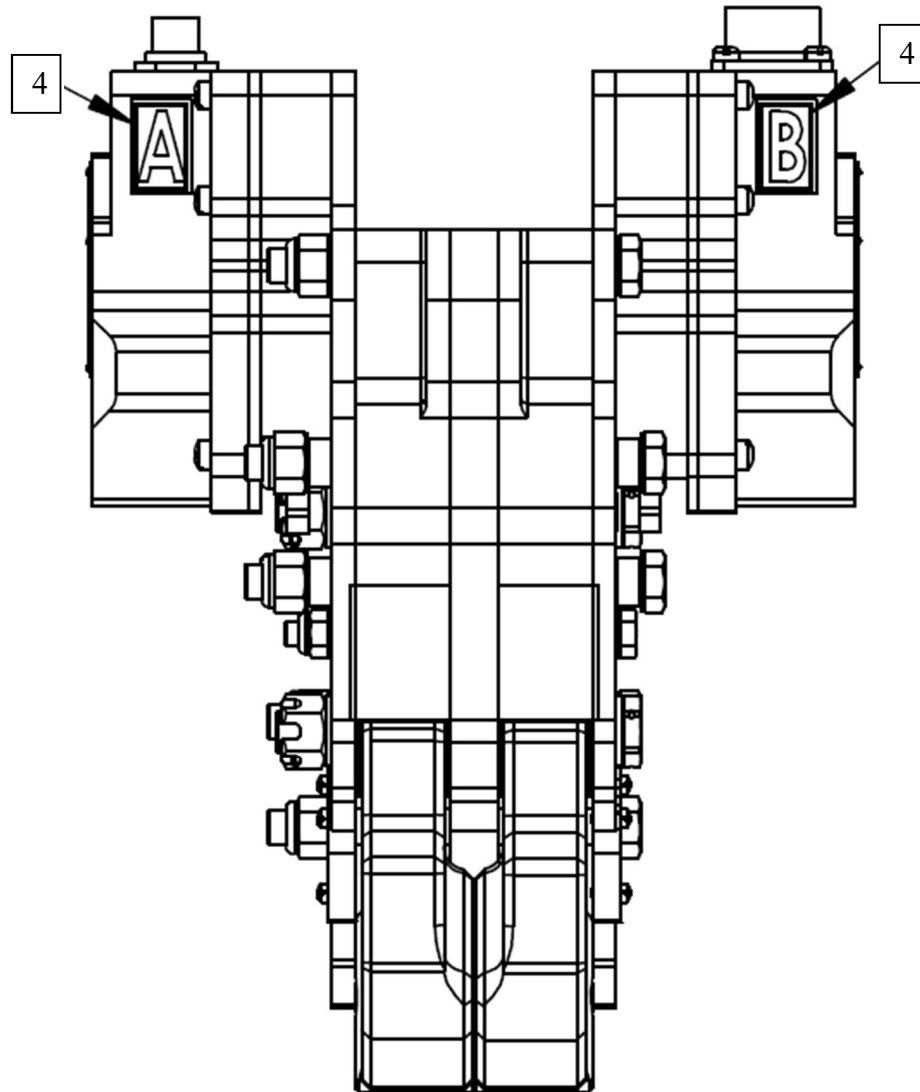


Figure 5.2: 650-430-101-101 Hook Detail (rear view)

Maximum weight decal for 5,000 lb. NHEC capable rotorcraft. (3.250"x 6.0")

WARNING	
NON-HEC MAX LOAD: 5,000 lb. USE BOTH LOAD BEAMS AS SHOWN GENERAL LONG- LINE ONLY, DO NOT USE HEC LONG-LINE FOR NON- HEC LOADS SEE ICA FOR INSTALLATION INSTRUCTIONS	HEC MAX LOAD: 1,785 lb. USE BOTH LOAD BEAMS AS SHOWN HEC LONG-LINE ONLY, USE 650-430-115-### FOR HEC LOADS SEE ICA FOR INSTALLATION INSTRUCTIONS P/N 650-430-116-001

Installed on LEFT side of rotorcraft in line with Hook mount point.

Maximum weight decal for 4,500 lb. NHEC capable rotorcraft. (3.250" x 6.0")

WARNING	
NON-HEC MAX LOAD: 4,500 lb. USE BOTH LOAD BEAMS AS SHOWN GENERAL LONG- LINE ONLY, DO NOT USE HEC LONG-LINE FOR NON- HEC LOADS SEE ICA FOR INSTALLATION INSTRUCTIONS	HEC MAX LOAD: 1,607 lb. USE BOTH LOAD BEAMS AS SHOWN HEC LONG-LINE ONLY, USE 650-430-115-### FOR HEC LOADS SEE ICA FOR INSTALLATION INSTRUCTIONS P/N 650-430-116-002

Installed on LEFT side of rotorcraft in line with Hook mount point.

Maximum weight decal for 4,000 lb. NHEC capable rotorcraft. (3.250"x 6.0")

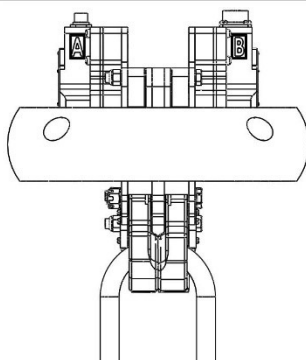
WARNING

NON-HEC MAX
LOAD: 4,000 lb.

USE BOTH LOAD
BEAMS AS SHOWN

GENERAL LONG-
LINE ONLY,
DO NOT USE HEC
LONG-LINE FOR
NON- HEC LOADS

SEE ICA FOR INSTALLATION
INSTRUCTIONS

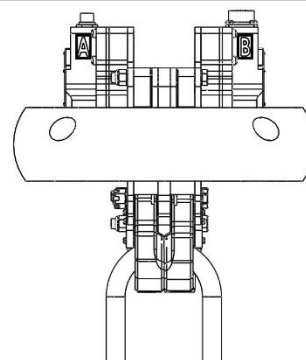


HEC MAX
LOAD: 1,428 lb.

USE BOTH LOAD
BEAMS AS SHOWN

HEC LONG-LINE
ONLY, USE
350-430-115-###
FOR HEC LOADS

SEE ICA FOR INSTALLATION
INSTRUCTIONS



P/N 650-430-116-003

Installed on LEFT side of rotorcraft in line with Hook mount point.

NOTE: Refer to specific rotorcraft RFM (table 1.1) for max cargo load and which placard to install.

6.0 EXISTING INSTALLATION & REMOVAL



Figure 6.1: Factory Cargo Hook in “Hell Hole” viewed from below (UH-1H)

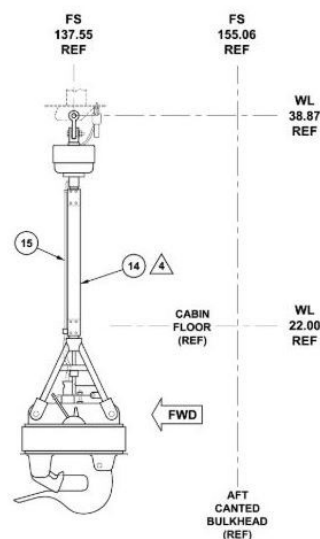
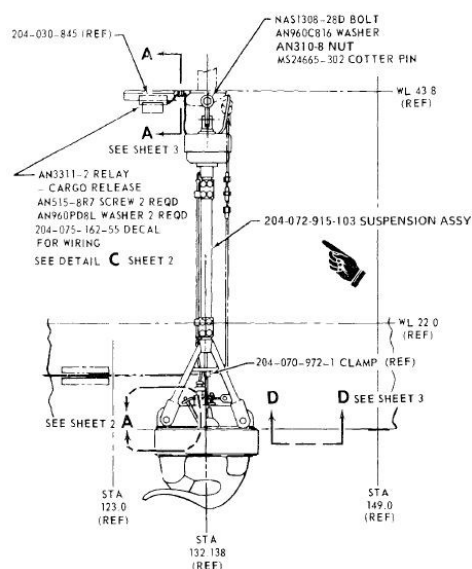


Figure 6.2: Reference Installation diagram from Bell Helicopters Installation (left)
Figure 6.3: Reference Installation diagram from Bell Helicopters Installation (right)

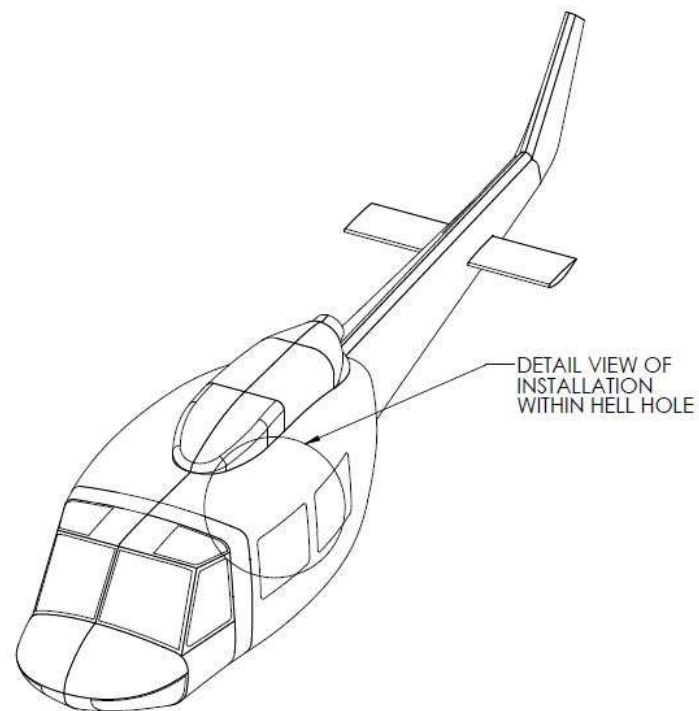


Figure 6.4: Mechanical Specialties Model 650 ADEC™ Hook & Suspension System

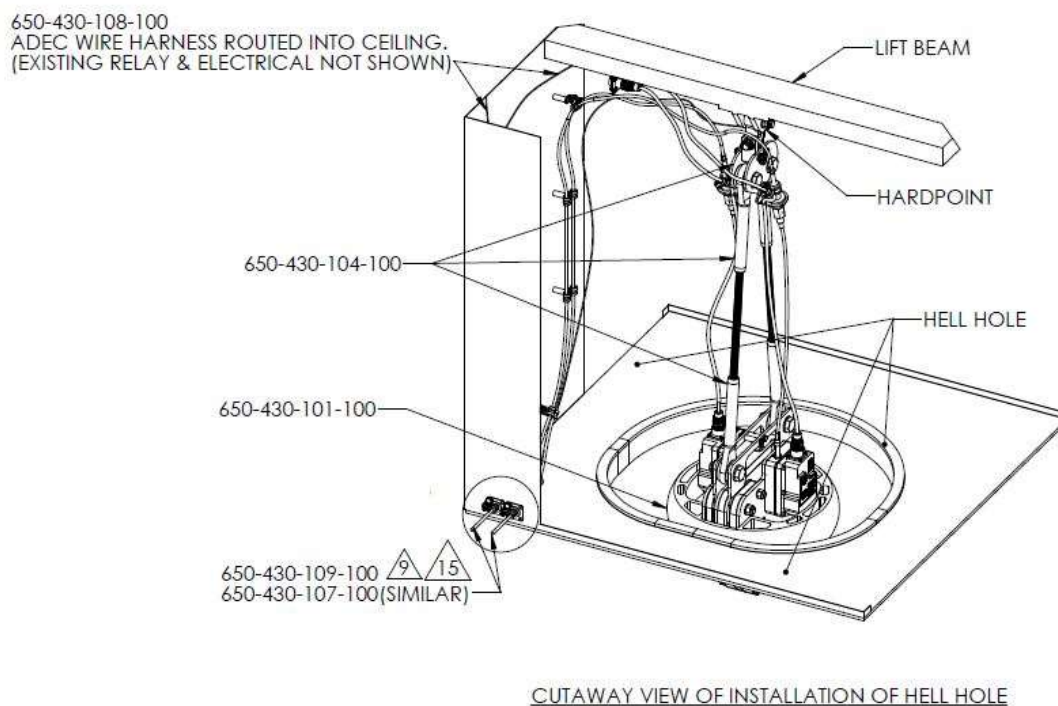


Figure 6.5: Mechanical Specialties Model 650 ADEC™ Hook & Suspension System

Prior to installation, the aircraft must have the BELL Medium hard point installed on the lift beam, found within the hell hole. This system mounts to this fitting. Note, this fitting and lift beam within the airframe and are not part of Mechanical Specialties' ADEC™ Kit. Figures 6.2 & 6.3 are for the operators'/installers' reference to what cargo hook system may already exist on the aircraft.

Refer also to the following:

Mechanical Specialties drawing 650-430-100-100, *407 ADEC™ System Installation*, Rev. 0 or later.

Mechanical Specialties drawing 650-430-110-100, *650 ADEC Manual Release Assembly*, Rev. 0 or later.

Mechanical Specialties drawing 650-430-114-100, *Wiring Diagram, HEC System*, Rev. 0 or later.

6.1 PRE-INSTALLATION STEPS

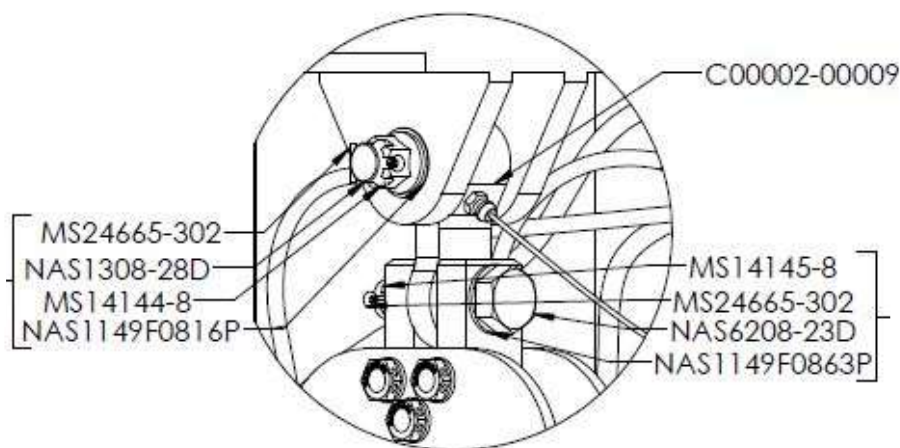
To install the HEC system, remove the existing cargo hook system from the aircraft. See below for reference instructions beginning from the front of the aircraft. Section 6.2 onward details the installation steps of the Model 650-430-100-100 ADEC™ system.

NOTE: some rotorcraft may utilize other cargo hook systems not shown in this manual

1. Begin by disconnecting all electrical and manual release cables from the existing cargo hook.
2. BQRS kick pedals (left and/or right side) are to be either removed or tagged "INOPERABLE"
3. Per 650-430-114-100 wiring diagram, remove "CARGO HOOK ARM" and "CARGO RELEASE ARMED LIGHT" from the aircraft. The electrical system for both "A" and "B" load carrying systems are to follow the path shown in 650-430-114-100.
4. Remove the cargo hook and from the existing mounting point within the hell hole. (Figure 6.2 & 6.3)
5. Remove the existing pulley system for ease of installing Model 650 ADEC system, or clearly tag each unused pulley within the airframe with "INOPERABLE"

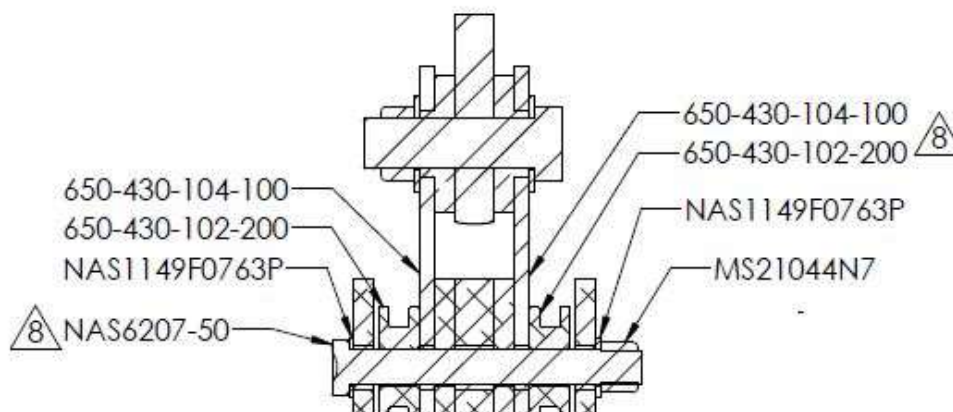
6.2 SUSPENSION ASSEMBLY & HOOK INSTALLATION.

With existing hook and suspension system removed, Install the Model 650 ADEC Hook as per 650-430-100-100 drawing. Note that the drawing details the assembly and installation of the system within the “hell hole” and the manual release assembly on the cyclic controls. Section 6.3 covers the routing of the BQRS cables through the airframe. The PQRS wire harness (650-430-108-100) is to be routed with the existing electrical system to connect to the circuit breakers and cyclic control within reach of the P.I.C.



C00002-00009 SHOWN,
(DEAD LINK SIMILAR)

Figure 6.6: Suspension Assembly Installation



CUTAWAY OF MOUNTING BOLTS (2X)

Figure 6.7: Hook Installation on Suspension Assembly (Hardware Stack-Up)

6.3 BQRS CABLES

The ADEC™ HEC System controls consist of two electrical releases (PQRS) and two manual backup release cables (BQRS). The control cable release mount, shown below in Figure 6.8, is clamped onto the pilot's cyclic. See drawing 650-430-110-100 for further details on sub-assembly and rigging instructions. The end of this section includes figures for rigging the BQRS Cables within the Model 650 ADEC hook. Note that the manual release cables are to be secured within the belly every 12"-18" while minimizing bends. If equipped with load cell system, wire harnesses are to be routed with BQRS cables.

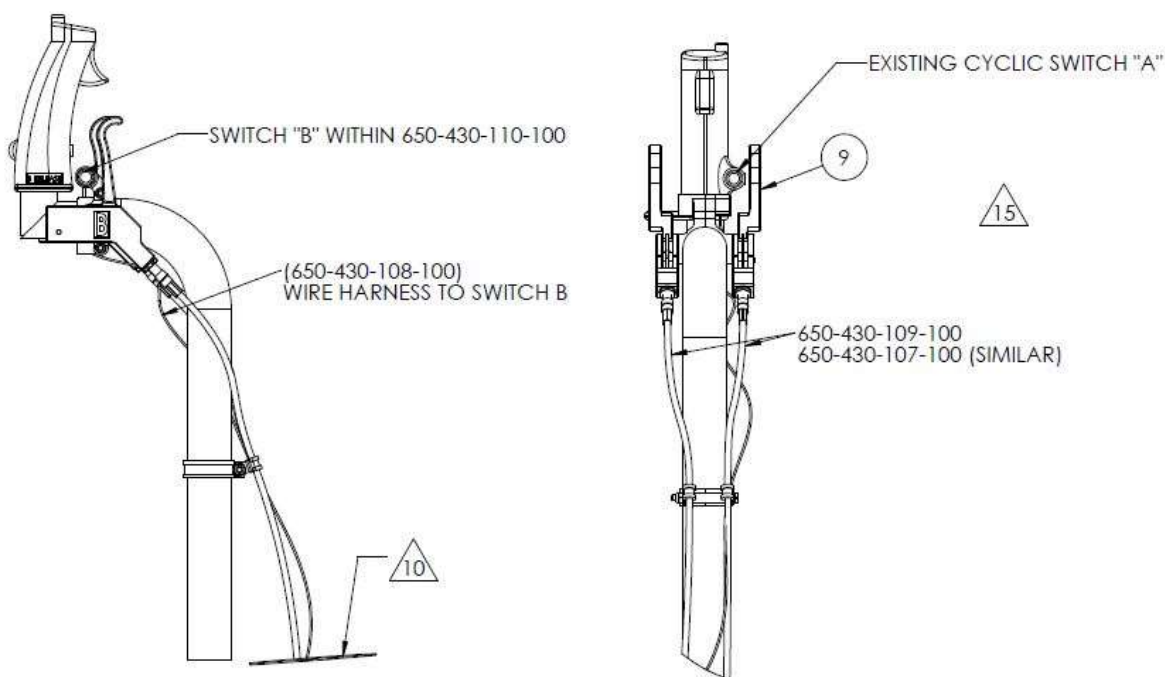


Figure 6.8: 650-430-110-100 (Manual Release Assembly)

Utilize drawing 650-430-100-100 to reference locations of the cables & mounting hardware.

Detailed in the following pages is an example of a left-handed installation of the BQRS on a UH-1H for reference. Other installations may vary based on rotorcraft model, other installed systems, handedness, or other factors. This example is NOT the only way of installation.

A full functions test must be performed to insure proper installation. See Section 7 for tests.

Ensure that the bolt attaching the cyclic handle to the upright is positioned so the bolt head is on top of the upright, this will allow the lever assembly to be bolted with the proper clearance. (See Figures below)

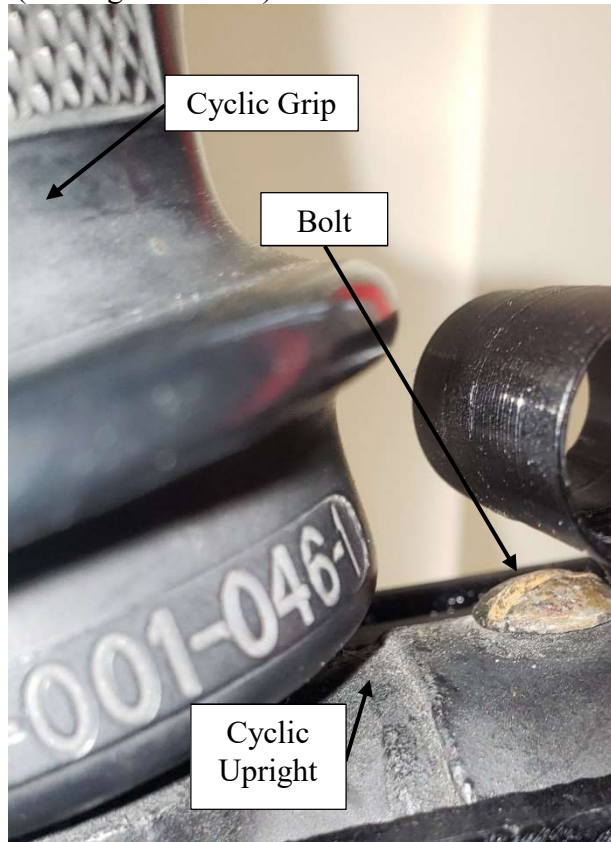


Figure 6.9: Cyclic Bolt without Washer

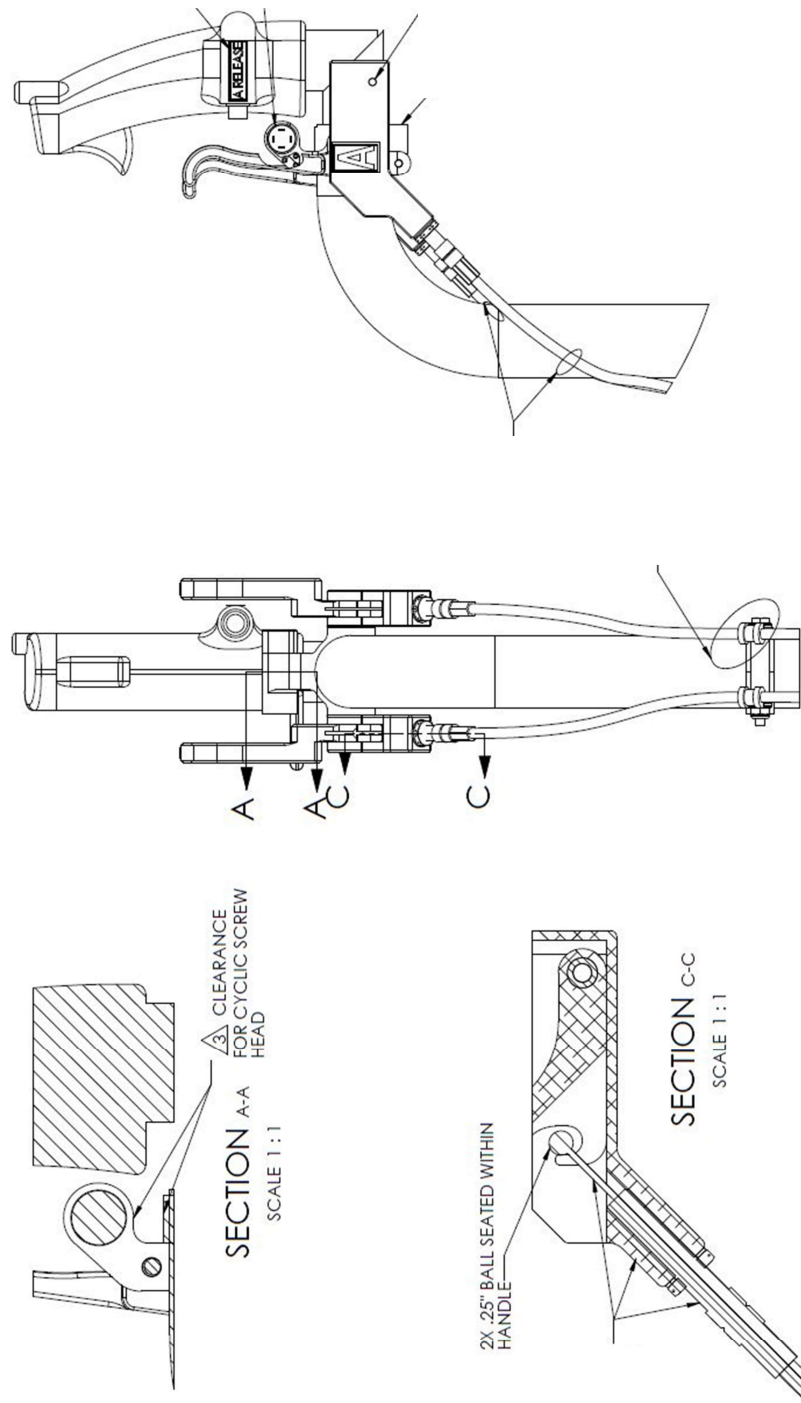


Figure 6.10: Section views per 650-430-110-100

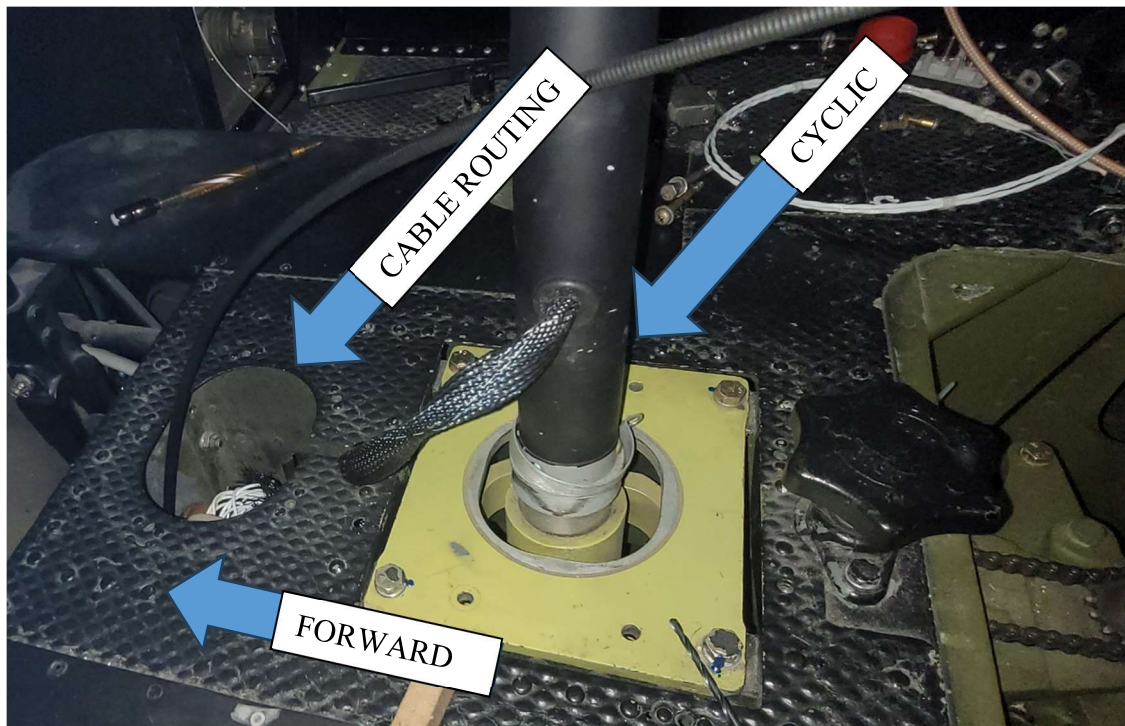


Figure 6.11: Cables to Floor

Cables run from Cyclic down through floor panel. 3x ø.300" holes may need to be added to floor in front of cyclic as shown in 650-430-100-100 installation drawing. Grommet Edging (caterpillar grommet) supplied is to be utilized to protect cables and wires from chafing.



Figure 6.12: Cable to Side (on left side of rotorcraft belly)

Cable is then routed along the left side of rotorcraft to avoid the control rods. See figures 6.9 and 6.10.

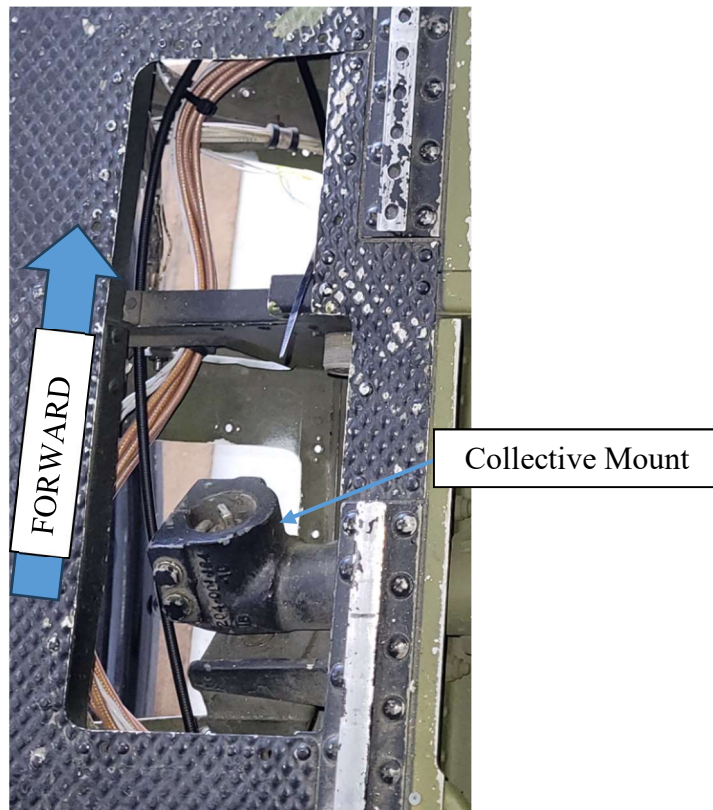


Figure 6.13: Side routing

Cable runs along outside with existing wiring. 650-430-108-100 wire harness wires for system “B” should be secured similarly

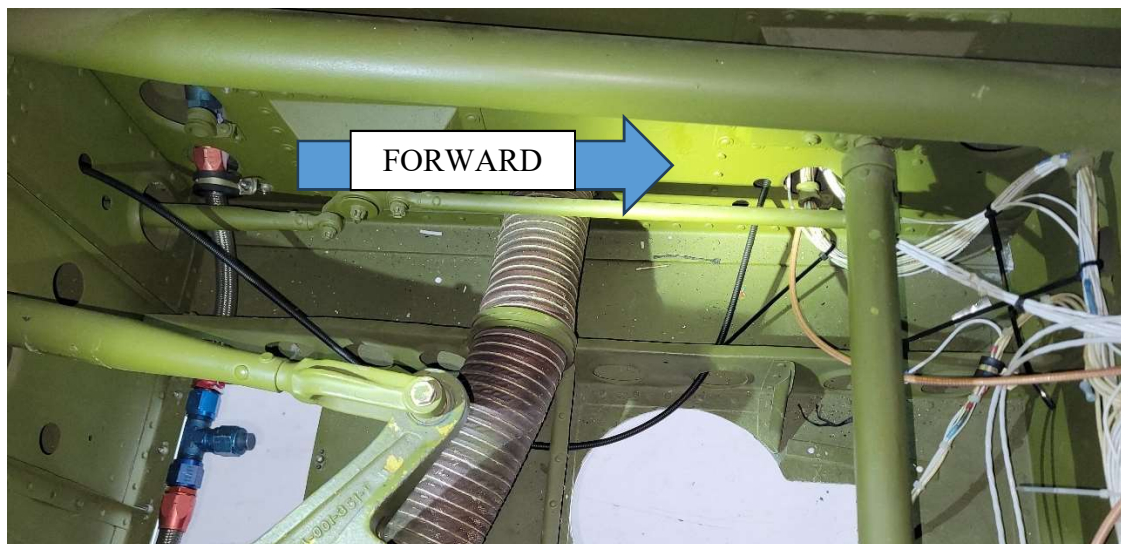


Figure 6.14: Through center

Cable run through support strut holes in center of floor. Avoid areas where cables could be rubbed by control rods. NOTE: cables can be routed for right hand installation and would follow the right hand side of the aircraft belly, and continue through center as shown in Figure 6.11

Once cables are routed through belly, use existing attachment points (Potted Inserts) (see below) for clamps as needed. Avoid tight turns (BEND RADII MUST BE MINIMUM OF 2.00"); this will prevent binding and unnecessary friction.

Manual Release Cables should be secured every 12"-18" along cable length to avoid slack in the cable.

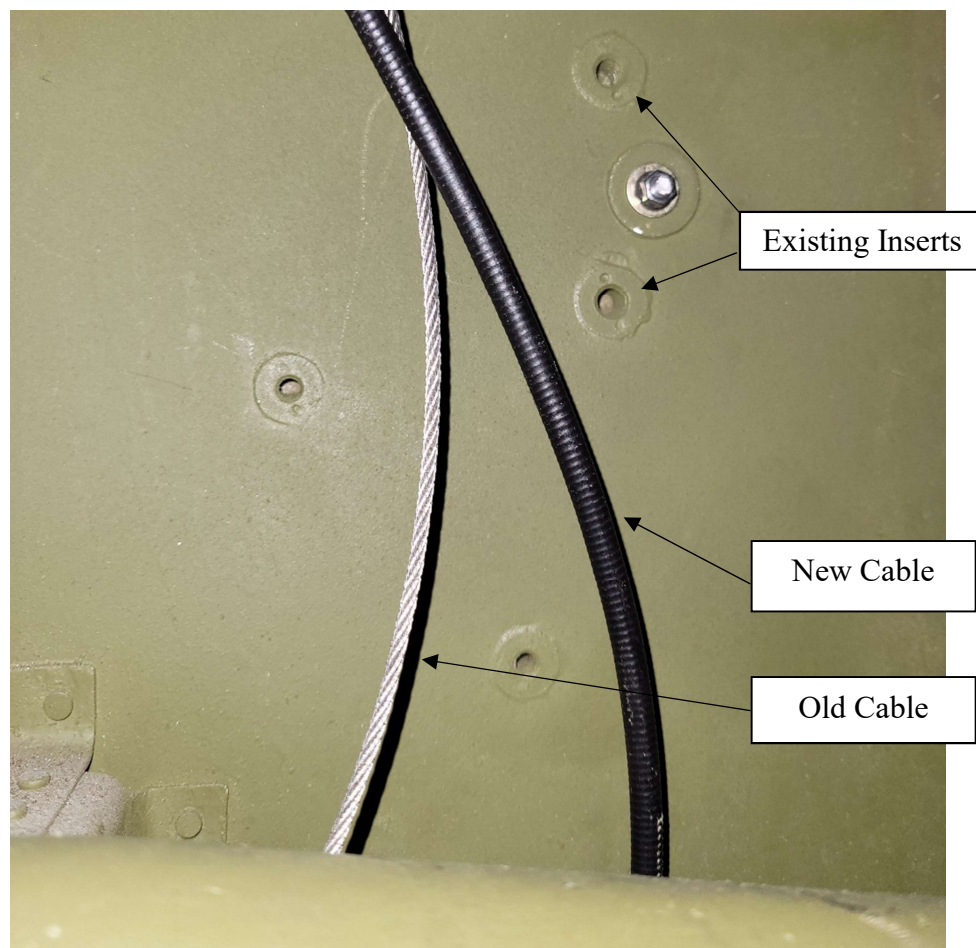


Figure 6.15: Preinstalled mounting points

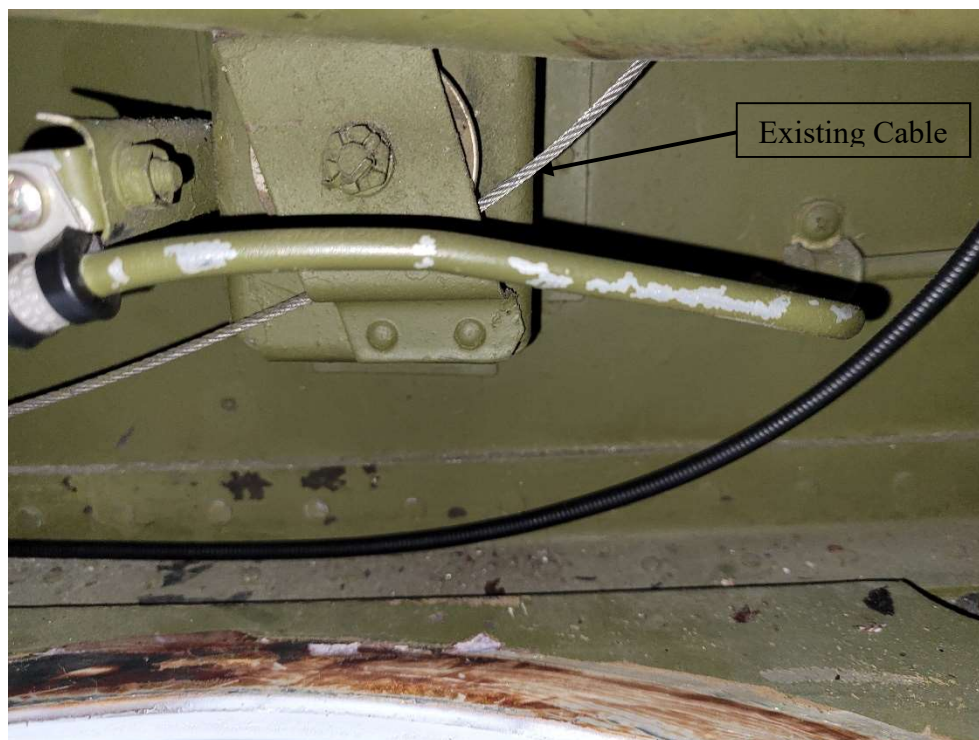


Figure 6.16: Existing vs Installed cables.

NOTE: The Mechanical Specialties, LLC BQRS uses two cables whereas the original installation is only one. All existing cable is to be removed, and any components not removed as part of the existing BQRS must be clearly tagged with “INOPERABLE.”

NOTE: The original cable is thinner and is not clad in a conduit cover. Installation of 650-430-107-100 or 650-430-109-100 requires a minimum radius of 2.00” at any bend in the system. See figure 6.12

NOTE: The Mechanical Specialties, LLC Cables are not designed to pass through the existing pulleys used for the existing BQRS; do not route them through the pulleys as this will interfere with ADEC™ BQRS function. See figure 6.13.

These notes will affect the locations and hookups needed to route and prevent damage to the system. As per 650-430-100-100, cable routing within belly of fuselage is to be installed in accordance with AC43.13-1b, change 1 or later.

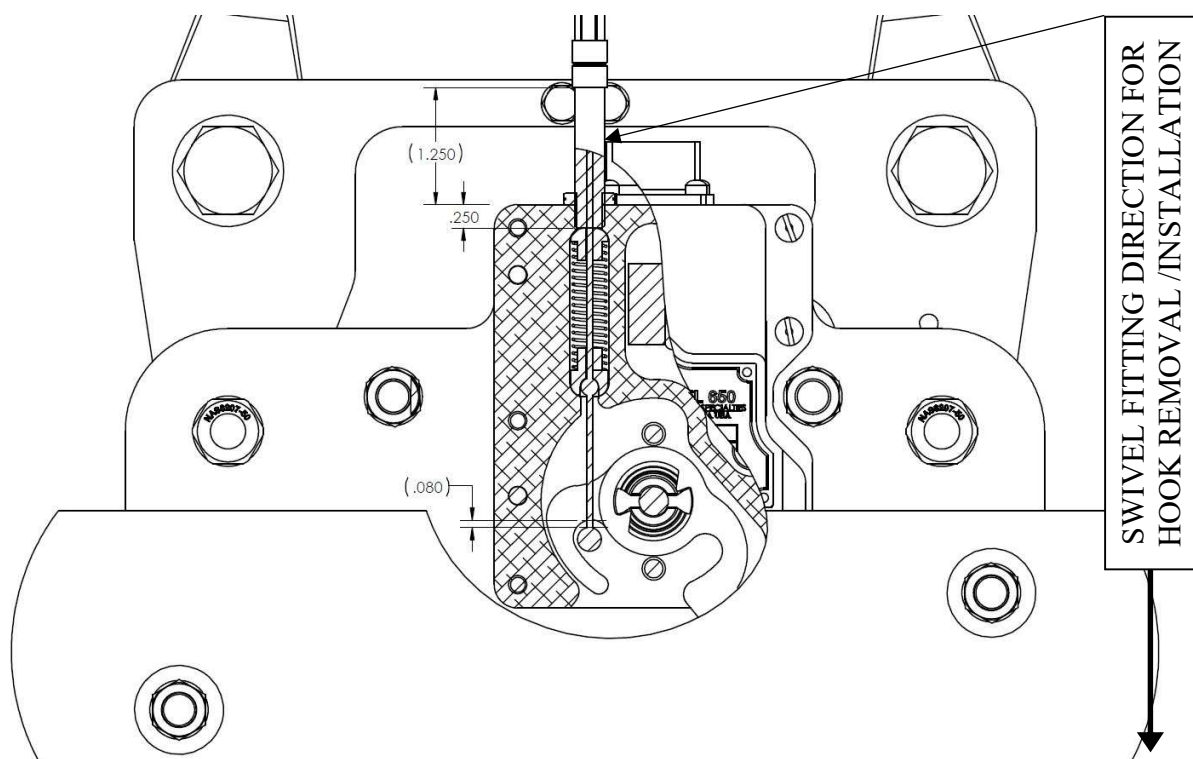


Figure 6.17: Cutaway view of Rigging when “set” within Hook (2x)

NOTE: threaded swivel fitting on either 650-430-105-100 or 650-430-106-100 should be .25” deep within the hook for installation when set. The 1.250” and .080” dimensions in Figure 6.14 are for operator’s reference. Manual release lever on exterior of hook should not have any pre-load on the mechanism due to cable rigging.

Utilize Jam Nut to secure cable assemblies to cargo hook. During hook removal or installation, swivel fitting(s) of both cable assemblies are to be threaded into hook approximately .75”-1.00” in order to reconnect or disconnect the short cable assembly from the threaded mating part of the paired cable at the top of the suspension assembly. See Figure 6.15 for mating location between paired cable assemblies.

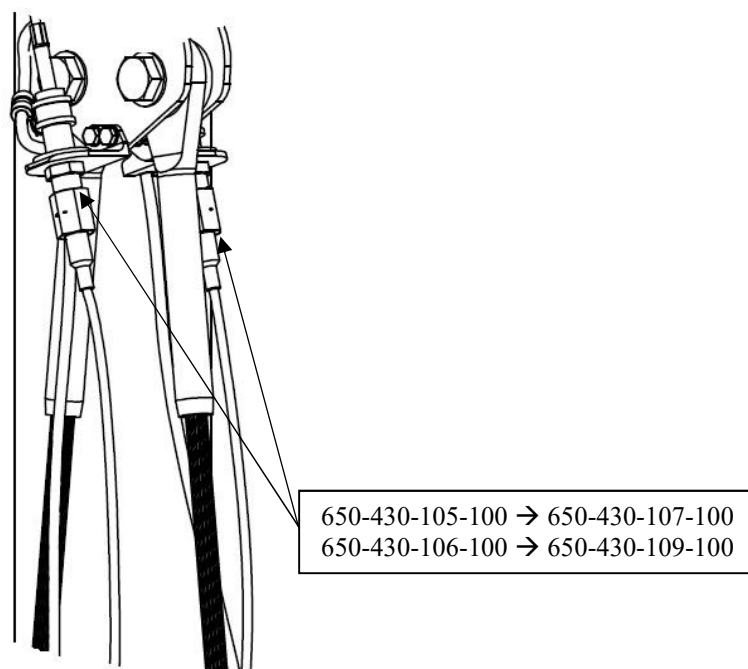


Figure 6.18: Cable Assemblies Mating locations

6.4 ELECTRICAL INSTALLATION

Refer to Mechanical Specialties, LLC Electrical Schematic drawing 650-430-114-100 for detail. See the following pages for installation notes for electrical system (PQRS) from hell hole into rotorcraft ceiling to circuit breaker panel and pilot's cyclic. Follow guidance from AC43.13-1B, Chapter 11 for installation of wiring and relay. If system is equipped with load cell, route load cell wire harness from load cell with BQRS cables (see section 6.3 for routing locations). Additional MS21919 clamps and hardware may be utilized to secure load cell wire harnesses to BQRS cables.

ADEC™ Hook 650-430-101-101: System “A”

The 15 Amp “HOOK” circuit breaker is replaced by a 15A circuit breaker, p/n 7274-11-15 (Figure 6.18, CB1). Label this breaker with the provided “A’ HOOK REL.” placard. (Standard circuit breaker labels may also be utilized)

ADEC™ Hook 650-430-101-101: System “B”

A 15A circuit breaker, p/n 7274-11-15 (Figure 6.18, CB2) is added for System “B” Label this breaker with the provided “B’ HOOK REL.” placard. Connect MS25089-1AR to “B Release,” as shown in Wiring Diagram (650-430-114-100).

The existing cargo hook relay (Figure 6.19) is mounted to the inside wall of the hell hole. Existing wiring is routed upward into the ceiling. Installer to mount System “B” relay, MS24166-D1, within helicopter ceiling bulkheads/longerons alongside existing electrical equipment See Figure 6.19-6.20 for existing routing locations and ceiling locations.

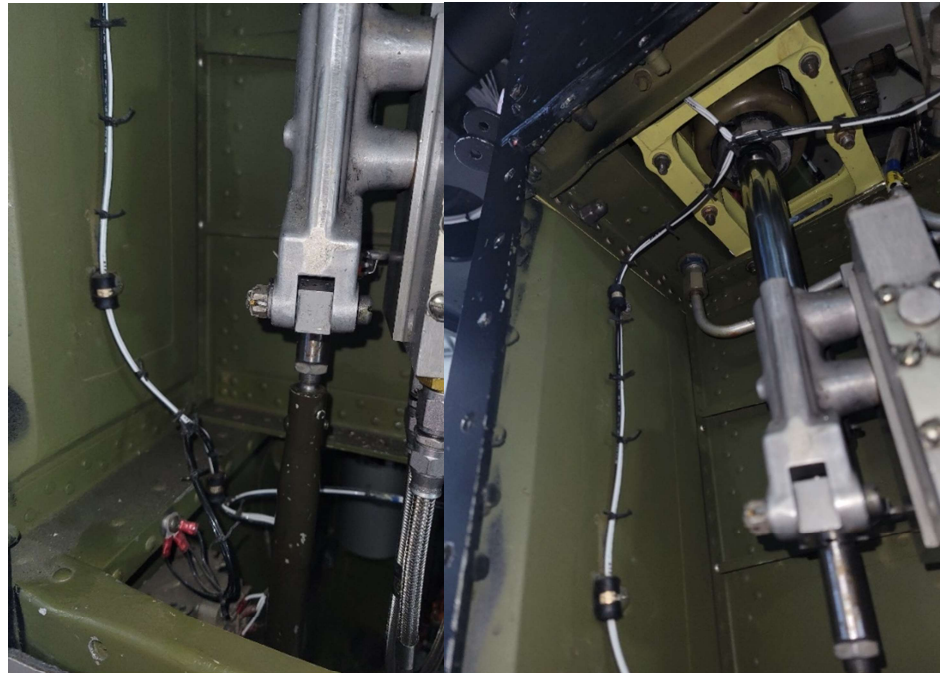


Figure 6.19: Existing Cargo Hook Relay and Wiring



Figure 6.20: Ceiling routing from Hell Hole

Figure 6.20 shows exit point of existing cargo hook electrical provisions from Hell Hole. Relay (MS24166-D1) mounting location within ceiling to be determined by installer as individual operator's additional equipment may differ between aircraft. Ensure relay and wire harnesses are installed free of chafing and any other hazards while following guidance from AC43.13-1B, Chapter 11 for installation and routing.

Hook Open Lights

Install P/N MS25041-4 lights (Figure 6.18, L1 & L2) on the instrument panel **in clear view of the Pilot in charge (PIC)**. These lights illuminate when either "A" or "B" load beams are open. Power is supplied to the lights by a 1A circuit breaker, P/N 7274-11-15 (Figure 6.18, CB3) which is added to the aircraft. Label this breaker with the provided "HOOK LIGHTS" placard.

Load Cell Indicator

Install MSI P/N 503052-0002 **in clear view of the Pilot In Charge (PIC)**. This Load Indicator is to be connected to a provided 2A circuit breaker, P/N 7274-11-2 (Figure 6.18, CB4) via the provided HLI PWR I/O cable, P/N 209088. To connect the power cable to the breaker, follow steps in the *MSI HLI Hardware User Guide, Rev A*. Connect the HLI I/O Signal Cable, P/N 158447, to the indicator.

NOTE: The 90-degree connector should be inside the aircraft, connected to the indicator. The bulkhead fitting on the other end of the cable is on the exterior of the aircraft.

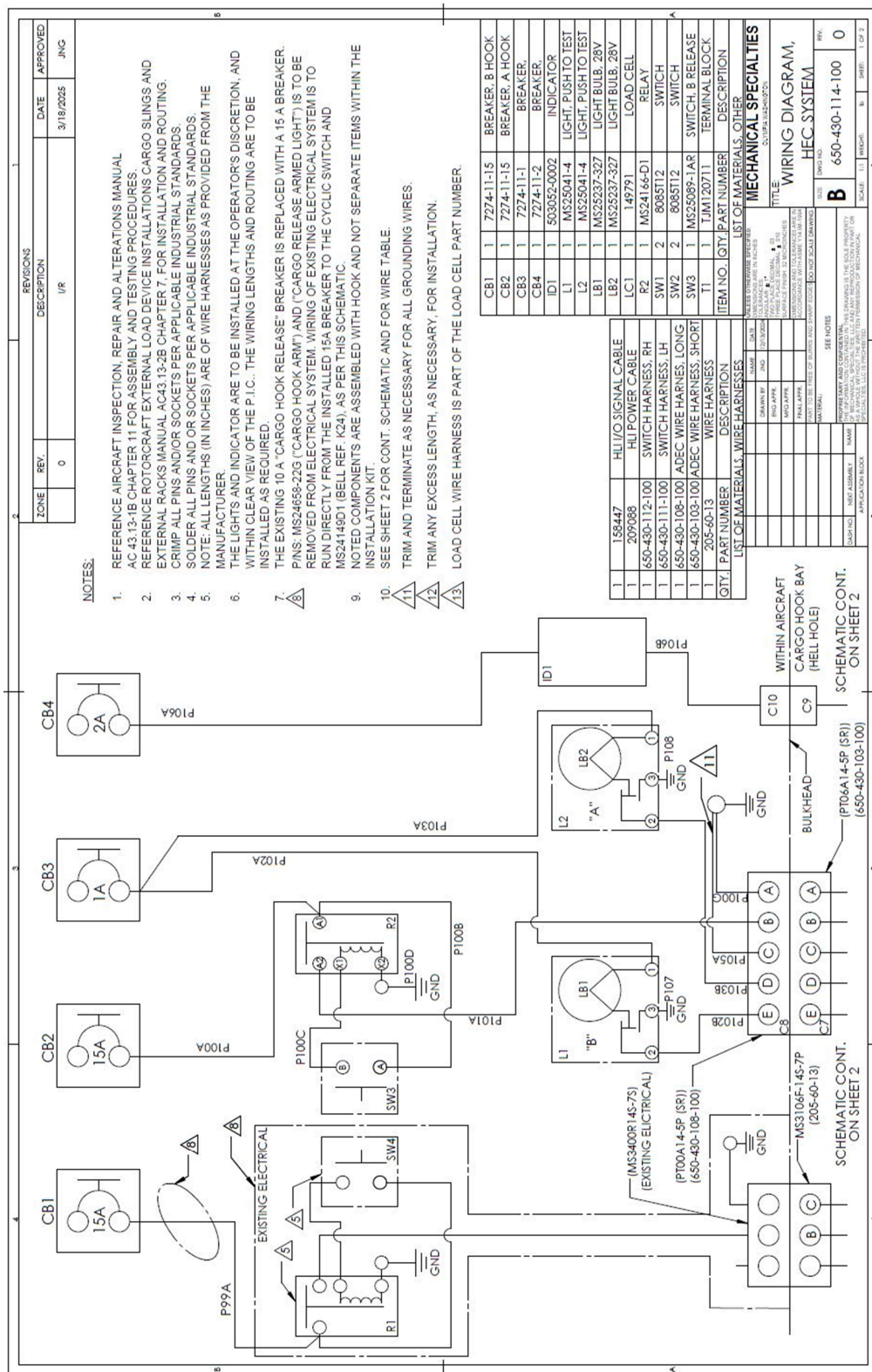
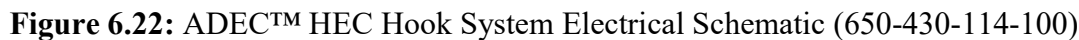


Figure 6.21: ADEC™ HEC Hook System Electrical Schematic (650-430-114-100)



6.5 FULL REMOVAL INSTRUCTIONS

Reverse installation steps to remove HEC system from helicopter.

7.0 FUNCTIONAL CHECKS

After initial installation, and any subsequent time the HEC system is reinstalled, function checks must be performed.

Electrical Release Testing:

1. Test System A electrical release. Check that open indication light illuminates. Close and re-latch load beam.
2. Test System B electrical release. Check that open indication light illuminates. Close and re-latch load beam.

If the electrical release mechanisms do not open smoothly or on the first attempt, verify the following:

1. The circuit breakers are pushed in.
2. The electrical cables are connected per the wire diagram, Mechanical Specialties, LLC drawing number 650-430-114-100. (schematic shown on previous pages)
3. If failure to release during tests persists, refer to troubleshooting table on the following page.

Manual Release Testing:

1. Test System A manual release. Check that open indication light illuminates. Close and re-latch load beam.
2. Test System B manual release. Check that open indication light illuminates. Close and re-latch load beam.

If the manual release mechanisms do not open smoothly or on the first attempt, verify the following:

1. The control cables are installed per Mechanical Specialties, LLC drawings 650-430-100-100 and 650-430-110-100.
2. “A” release goes to “A” hook, “B” release goes to “B” hook.
3. The control cables are properly secured within the aircraft to prevent slack, and that release cable conduit is not pinched or damaged.
4. If failure to release during tests persists, refer to troubleshooting table on the following page.

7.1 TROUBLESHOOTING GUIDE

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Cargo hook will release with manual release cable but won't release electrically.	Open circuit - faulty wiring, circuit breaker, cargo hook solenoid.	Disconnect electrical connector from cargo hook. Place leads of multimeter on pins System A & B cargo hook connectors. Check for reading of 2-3 ohms. If open circuit indication is attained, replace solenoid.
Cargo hook will release electrically but not manually.	Check manual release rigging and for damage/binding to cable	Readjust rigging, replace damaged cable, repair internal mechanism of cargo hook.
Cargo hook will not release electrically or manually.	Cargo hook internal mechanism.	Remove cargo hook from service. Repair internal mechanism.
Load beam will not latch.	Cargo hook internal mechanism	Remove cargo hook from service. Repair internal mechanism.
Visible cracks or deformation	Overloaded or fatigue damage	Remove cargo hook from service. Replace damaged parts.
Visible corrosion or gouges deeper than .03" deep.	Visible gouges or corrosion.	Remove cargo hook from service. Replace damaged parts.

8.0 REPLACEMENT PARTS AND SERVICE

Contact Sales at Mechanical Specialties, LLC for replacement parts or overhaul inquiries.

Mechanical Specialties, LLC
1000 85th Ave SE
Olympia, WA 98501
(360) 273-7604
sales@mechspecialties.com

TITLE: INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR BELL MEDIUM HELICOPTERS
ADEC™ HEC SYSTEM

DOCUMENT NO.: 650-430-105
REVISION NO.: 1
DATE: 10/2/2025
PAGE NO. A1

APPENDIX A

INSPECTION SHEETS FOR LIFE LIMITED COMPONENTS

LOG*: SERVICE HOURS TRACKING OF P/N: 650-430-115-####¹ (HEC Long Line)

Sheet Number**: _____

SERIAL NUMBER	DATE	START TIME	END TIME	HOURS	NOTES:

*Note: this document and any data collected is for the operator's records. It is to be utilized for maintaining a service log of the long line assembly, 650-430-115-####¹, per Lift-It service life requirements for HEC operations. 2,000 hours/4 years from date of manufacture.

**Print additional sheets, as required.

LOG*: SERVICE HOURS TRACKING OF P/N: C00002-00009 (Load Cell)

Sheet Number**: _____

SERIAL NUMBER	DATE	START TIME	END TIME	HOURS	NOTES:

*Note: this document and any data collected is for the operator's records. It is to be utilized for maintaining a service log of the MSI Load Cell Assembly PN, C00002-00009 per Mechanical Specialties' service life requirements for HEC operations. 14,000 lift hours from initial use.

**Print additional sheets, as required.

LOG*: SERVICE HOURS TRACKING OF P/N: 650-010-151-100*** (Cable Assembly)

Sheet Number**: _____

SERIAL NUMBER	DATE	START TIME	END TIME	HOURS	NOTES:

*Note: this document and any data collected is for the operator's records. It is to be utilized for maintaining a service log of the Cable Assembly, 650-010-151-100, per Mechanical Specialties' service life requirements for HEC operations. 8,500 lift hours from initial use.

**Print additional sheets, as required.

***Cable assemblies are serialized as pairs within suspension assembly - log hours are for serialized pair of cables.

TITLE: INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR BELL MEDIUM HELICOPTERS
ADEC™ HEC SYSTEM

DOCUMENT NO.: 650-430-105
REVISION NO.: 1
DATE: 10/2/2025
PAGE NO. B1

APPENDIX B

Full Text of TSO-C167

19



Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, D.C.

TSO-C167

Effective
Date: 6/9/04

Technical Standard Order

Subject: Personnel Carrying Device Systems (PCDS), also known as Human Harnesses

1. **PURPOSE.** This Technical Standard Order (TSO) is for manufacturers of personnel carrying device systems (PCDS), who are applying for a TSO authorization or letter of design approval. In it, we (the Federal Aviation Administration, or FAA) tell you what minimum performance standards (MPS) your PCDS must first meet to obtain approval and identification with the applicable TSO marking. Hereon, we refer to a PCDS as a “human harness.”

2. **APPLICABILITY.** This TSO affects new applications submitted after this TSO’s effective date.

3. **REQUIREMENTS.** New models of a human harness, identified and manufactured on or after this TSO’s effective date, must meet the MPS based on the following documents:

- National Fire Protection Association (NFPA) 1983, “Standard on Fire Service Life Safety Rope and System Components,” 2001 edition, for a life safety harness Class III, and
- Society of Automotive Engineers (SAE) Aerospace Standard (AS) 8043, Revision A, “Restraint Systems for Civil Aircraft,” issued March 2000, as amended by appendix 1 of this TSO.

a. **Functionality.** This TSO’s standards apply to equipment intended to transport personnel externally from a helicopter (human external cargo (HEC) operations). This equipment is intended for long-term, work related activities where the user is required to remain in the device for extended periods of time. Note that 14 CFR § 133.45 specifies limitations for external-load operations as rotorcraft-load combination Class D, the certification requirements for HEC operations are found in 14 CFR § 27.865 or 14 CFR § 29.865, as applicable.

b. **Functional Qualification.** Demonstrate the required performance under the test conditions in the MPS (see APPENDIX 1 of this TSO).

c. **Deviations.** We have provisions for using alternative or equivalent means of compliance to the criteria in the MPS of this TSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety. Apply for a deviation per 14 CFR § 21.609.

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4. MARKING.

a. Mark at least one major component permanently and legibly with all the information listed in 14 CFR § 21.607(d), except for:

(1) Section 21.607(d)(2). Use the name, type, and part number instead of the optional model number.

b. The label also must include the information required in NFPA 1983 Section 3.1.4.2(2) or 3.1.4.2(3), as applicable.

c. In addition, mark the following permanently and legibly with at least the manufacturer's name, subassembly part number, and the TSO number:

(1) Each component that is easily removable (without hand tools),

(2) Each interchangeable element, and

(3) Each sub-assembly of the article that you determined may be interchangeable.

5. APPLICATION DATA REQUIREMENTS. Under 14 CFR § 21.605(a)(2), you, as a manufacturer/applicant must give the FAA's Aircraft Certification Office (ACO) manager responsible for your facilities, one copy each of the following technical data to support our design and production approval:

a. Operating instructions and equipment limitations, sufficient to describe the equipment's operational capability.

b. Installation procedures and limitations, sufficient to ensure that the human harness, when installed according to the installation procedures, still meets this TSO's requirements. The limitations must identify any unique aspects of the installation. Finally, the limitations also must include a note with the following statement:

The conditions and tests for TSO approval of this article are minimum performance standards. Those installing this article, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft.

c. Schematic drawings of the installation procedures.

d. List of the components, by part number, that make up the human harness complying with the standards in this TSO. You should include vendor part number cross-references, when applicable.

e. Instructions for Continued Airworthiness covering the periodic maintenance, calibration, and repair, for the continued airworthiness of an installed human harness. Instructions should

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include recommended inspection intervals and service life. Refer to APPENDIX 1, paragraph **5d**.

f. Material and process specifications list.

g. The quality control system description required by 14 CFR §§ 21.605(a)(3) and 21.143(a), including functional test specifications. These test each production article to ensure compliance with this TSO.

h. Manufacturer's TSO qualification test report.

i. Label drawing giving the information required by paragraph **4** of this TSO.

j. A list of all drawings and processes, including revision level, to define the article's design. For a minor change, you only need to make revisions to the list available on request.

6. MANUFACTURER DATA. Besides the data to be furnished directly to the FAA, each manufacturer must have the following technical data available for review by the responsible manager:

a. The functional qualification specifications for qualifying each production article to ensure compliance with this TSO.

b. Equipment calibration procedures.

c. Corrective maintenance procedures within 12 months after TSO authorization.

d. Schematic drawings.

e. Material and process specifications.

7. FURNISHED DATA. With each article manufactured under this TSO, provide one copy of the technical data and information in paragraph **5a** through **5j** and paragraph **6** of this TSO. Add any other data or information necessary for the proper installation, certification, and use, or for continued airworthiness, or both, of the human harness.

8. AVAILABILITY OF REFERENCED DOCUMENTS.

a. You can buy copies of NFPA 1983 from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101, telephone (617) 770-3000, fax (508) 895-8301. You can get copies through the NFPA Internet website @ www.nfpa.org.

b. You can buy copies of 14 CFR part 21 Subpart O, 14 CFR part 27, 14 CFR part 29, and 14 CFR part 133 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402-9325. Telephone (202) 512-1800, fax (202) 512-2250. You also can get copies from the Government Printing Office (GPO), electronic CFR Internet website @ www.access.gpo.gov/ecfr/.

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c. You can get Advisory Circular (AC) 20-110, "Index of Aviation Technical Standard Orders," and AC 20-36, "Index of Articles Certified under the Technical Standard Order System," from the U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785, telephone (301) 322-4477, fax (301) 386-5394. You also can get copies from the FAA's Regulatory and Guidance Library (RGL) @ www.airweb.faa.gov/rgl. On the RGL website, select "Advisory Circulars."

d. You can buy copies of SAE AS 8043, Revision A, from the Society of Automotive Engineers, Inc., Department 331, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Telephone (724) 776-4970, fax (724) 776-0790. You can also get copies through the SAE Internet website @ www.sae.org.

Susan J. M. Cabler

Susan J. M. Cabler
Acting Manager, Aircraft Engineering Division
Aircraft Certification Service

6/9/04

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Appendix 1

**APPENDIX 1. MINIMUM PERFORMANCE STANDARD FOR A PERSONNEL
CARRYING DEVICE SYSTEM (PCDS), ALSO KNOWN AS A HUMAN HARNESS**

1. Purpose. This appendix prescribes the minimum performance standards (MPS) for a personnel carrying device system (PCDS). Hereon, we (the Federal Aviation Administration) refer to a PCDS as a “human harness.”

2. Requirements. We base the MPS on the following standards:

- National Fire Protection Association (NFPA) 1983, “Standard on Fire Service Life Safety Rope and System Components,” 2001 edition, and
- Society of Automotive Engineers (SAE) Aerospace Standard (AS) 8043, Revision A, “Restraint Systems for Civil Aircraft,” issued March 2000.

3. NFPA 1983. The following sections of NFPA 1983 – on life safety harness system components, Class III – apply to this TSO:

For:	See NFPA 1983:
Definitions	a. Sections 1.3.1 to 1.3.30, except 1.3.8 and 1.3.26. b. Section 1.3.31. Replace section with the following: <u>Life Safety Harness:</u> A system component; materials arranged and secured on the body to support a person during human external cargo (HEC) operations. HEC is a person (or persons), who is ferried, raised, lowered, or otherwise transported external to the rotorcraft fuselage. In 14 CFR §§ 27.865 and 29.865, we define certification requirements for external loads, including HEC. We define operating limitations for HEC operations in 14 CFR § 133.45(e).
Product Labeling and User Instruction Requirements	Sections 3.1.4.2(2), 3.1.4.2(3), and 3.2.3.2.
Design and Construction Requirements	Sections 4.3.1.3, 4.3.2, 4.3.3, 4.3.4, 4.3.5, and 4.3.6.
Performance Requirements	Sections 5.3.4, 5.3.5, 5.3.6, and 5.3.9.
Testing Requirements	Sections 6.3.1, 6.3.2, 6.3.3, 6.3.4, 6.3.5, and 6.3.6.

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**APPENDIX 1. MINIMUM PERFORMANCE STANDARD FOR
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4. SAE AS 8043, Revision A.

- a. The following sections of SAE AS 8043, Revision A, apply to this TSO:

For:	See SAE AS 8043, Revision A:
Definitions	Paragraphs 3.4, 3.4.1, 3.4.2, 3.4.3, 3.5, and 3.8.
General Requirements	Paragraphs 4.1, 4.3, 4.6, and 4.9.
Webbing Requirements	Paragraph 5.3.
Webbing Test Procedure	Paragraphs 8, 8.2, 8.3, and 8.4.
Requirements for Adjusting Hardware Release	Paragraph 6.4.2.
Requirements for Assembly Performance	Paragraph 7.1.4.
Test Procedure for Nonmetallic Hardware	Paragraph 9.2.2.

- b. We modified the following SAE AS 8043, Revision A, paragraphs, which also apply to this TSO:

SAE AS 8043, Revision A:	Replace with:
Paragraph 3.1 (Definitions)	<u>PCDS</u> (also called “Human Harness”): A device or system that has the structural capability and features needed for safely transporting occupants externally during human external cargo (HEC) operations. These systems include, but are not limited to, life safety harnesses.
Paragraph 4.5 (General Requirements)	<u>Adjustment</u> : A harness shall be capable of snug adjustment, by the occupant, by a means easily within the reach of that person and easily operable, or shall be provided with a locking retractor. The harness shall maintain the adjusted position during flight. Non-locking retractors shall not be used. If a harness is designed to fit a range of sizes, it shall be clearly marked to specify the waist size and height or the chest size and height of the occupant for which it is designed.

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SAE AS 8043, Revision A: Replace with:	
Paragraph 5.2 (Webbing Requirements)	<u>Breaking Strength</u> : The webbing in a human harness must have a breaking strength not less than 22kN (5,000 lbs), when tested by the procedure in Paragraph 8.2. Breaking strength after the abrasion tests of Paragraph 10.5 must be not less than 16.7 kN (3,750 lbs), when tested by the procedure in Paragraph 8.2.
Paragraph 5.4 (Webbing Requirements)	<u>Resistance to Light</u> : The webbing in a human harness, after testing by the procedure in Paragraph 8.4, must have a breaking strength not less than 13.3 kN (3,000 lbs).
Paragraph 6.1 (Metallic Hardware)	<u>Corrosion Resistance</u> : Metallic hardware parts of a human harness must not corrode, after subjected to the conditions in Paragraph 9.1. Metallic adjusting devices must not fail, gall, or wear to an extent that impairs normal adjustment. A buckle must not separate when a force of not more than 0.22 kN (5 lbs) causes it partially to engage.
Paragraph 9 (Test Procedure for Metallic Hardware)	<u>Test Procedure for Hardware</u> : Use three samples of hardware for each test, unless otherwise specified.
Paragraph 9.1 (Test Procedure for Metallic Hardware)	<u>Corrosion Resistance</u> : Test hardware using conditions in ASTM B117-73 ² , Standard Method of Salt Spray (Fog) Testing. The test must consist of 24-hour exposure to salt spray, followed by 1 hour of drying. In a salt spray test chamber, place samples in a position most likely to develop corrosion on the larger areas. At the end of the test, wash the hardware with water to remove the salt. After drying, examine the hardware for corrosion.
Paragraph 6.2.1 (Nonmetallic Hardware)	<u>Temperature Resistance</u> : Nonmetallic hardware parts of a human harness, when subjected to the conditions in Paragraph 9.2.1, must not warp or otherwise deteriorate to cause the assembly to operate improperly.
Paragraph 6.2.2 (Nonmetallic Hardware)	<u>Solvent Resistance</u> : Nonmetallic hardware parts of a human harness, when subjected to the conditions in Paragraph 9.2.2, must not deteriorate to cause the assembly to operate improperly.

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**APPENDIX 1. MINIMUM PERFORMANCE STANDARD FOR
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SAE AS 8043, Revision A: Replace with:

Paragraph 9.2.1 (Test Procedure for Nonmetallic Hardware)	<u>Temperature Resistance:</u> Subject nonmetallic hardware to the conditions in Procedure D of ASTM D756-78 ² , Standard Methods of Test for Resistance of Plastics to Accelerated Service Conditions. Disregard the measurements in Paragraph 7 of that procedure.
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Paragraph 6.4.1 (Adjusting Hardware Release)	<u>Release Force:</u> Any adjusting release hardware of a human harness must release when a force of not more than 0.13 kN (30 lbs) is applied to a pull or lift release mechanism. Release mechanisms requiring a twisting or torsional motion must release with a force equal to 0.13 kN (30 lbs) applied at the appropriate moment arm relative to the axis of rotation, when tested as prescribed in Paragraph 9.4.
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Paragraph 10.5 (Test Procedure for Assembly Performance)	<u>PCDS (or Human Harness), Abrasion Conditioning Procedure:</u> Test the webbing breaking strength on an area of webbing conditioned using the procedure in Paragraph 8.2. Use the adjustment hardware and webbing combination that best represents the human harness' hardware and webbing. The combination must not show wear before conditioning. Use test equipment that provides the conditions of Figure 4 of SAE AS 8043, Revision A, with a length of stroke of 152-203 mm (6-8 inches) and a cycle rate of 16-18 cycles per minute. One cycle consists of one lengthening stroke and one shortening.
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NOTE: Condition the webbing for 4 hours at
 21 ± 1 degree C (70 ± 3 degrees F) and
 65 ± 2 percent relative humidity. Test samples
within 1 hour after conditioning.

5. Additional Requirements. The following requirements also apply to this TSO:

- a. The maximum operating weight for harnesses approved under this TSO is 450 pounds. The maximum operating weight is the total weight of the individual and all equipment supported by the harness.
- b. Construct the harness with stitching that will not unravel when broken.

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c. Load-bearing Hardware.

(1) Construct all load-bearing hardware (D-rings, buckles, links, and so on) using forged, machined, stamped, extruded, or cast metal. Castings must meet Class I, Grade A requirements of SAE-AMS-STD-2175 (formerly MIL-STD-2175A), Classification and Inspection of Castings. All hardware parts must lack burrs and sharp edges, and must be designed and installed to minimize injury to the occupant.

(2) The load-bearing hardware must meet the fatigue requirements of 14 CFR § 27.571 or 14 CFR § 29.571 as applicable, and the corrosion resistance requirements of NFPA 1983 Paragraph 6.5.6.

d. The manufacturer must prepare Instructions for Continued Airworthiness (ICA) per 14 CFR § 27.1529 or 14 CFR § 29.1529, as applicable. The ICA must include at least the information required by NFPA 1983 Paragraph 3.2.3.2.