MECHANICAL SPECIALTIES, LLC
975 85TH AVE SE
OLYMPIA, WA 98501

MODEL 301 CARGO HOOK

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

OPERATING AND MAINTENACE MANUAL

REVISION C

REVISION HISTORY

Rev.	Date	Description of Changes
A	7/11/2012	Changed Address
B	10/8/2013	Added overhaul interval
C	7/10/2021	Reformatted Manual. Updated Manual to reflect new part numbering system. Added more detailed parts breakdowns.

OPERATING AND MAINTENANCE INSTRUCTIONS

CARGO HOOK – MODEL 301

RELEASE OF LIABILITY

Helicopter external cargo load operations are, in the best of conditions, dangerous work. Mechanical Specialties, LLC cannot be, in any way held responsible for injury or death due to accidents resulting directly or indirectly from this type of work.

The user of this hook understands and accepts this liability.

1.0 SCOPE

This manual contains the overhaul instruction and test procedures for CARGO HOOK ASSEMBLY, Model No. 301, manufactured by MECHANICAL SPECIALTIES, LLC, OLYMPIA, WA 98501.

2.0 GENERAL

The Model 301 cargo hook is designed for use as a remote or long line hook attached to the helicopter by means of a certified belly hook. The 301 hook is never to be attached to the helicopter unless it is attached to a certified belly hook. The 301 hook is not certified for any aircraft, and is never to be used as a primary or belly hook.

The hook is designed to provide a means to engage, lift and transport and unload external loads from a long line suspended below the helicopter. The hook assembly has an electrical release system, in order to allow releases to be conducted by the pilot in the cockpit. A manual release knob located on the side of the hook assembly allows cargo releases to be conducted by ground crew personnel.

The load beam is equipped with a return spring, to provide automatic re-latching of the load beam after release of a load.

BECOME FAMILIAR WITH YOUR FLIGHT MANUAL REGARDING EXTERNAL LOAD OPERATIONS.

3.0 LOAD LIMIT

The Model 301 Cargo Hook has a working load limit of 3,000lb/1361kg. A minimum load of 15lb/7kg must be applied to load beam to ensure opening either electrically or manually.

4.0 OPERATION

4.1 DAILY FUNCTION CHECK

A pre-flight visual check shall be performed prior to conducting sling operations, on at least a daily basis. Unless the cargo hook passes the following minimum inspection, it should not be used.

1. Check hook for secure attachment to suspending line.
2. Check hook electrical connectors and wiring for frayed wire or loose connections.
3. Functionally check electrical release.
4. Functionally check manual release.
5. Check load beam for binding.
6. Visually check the load beam and hook frame for cracks, unusual wear and latch engagement.
7. Inspect keeper on hook. If damaged beyond repair, replace.
8. Check return springs and arms for serviceability.
9. Check hook body for loose or missing hardware. Except as noted in section 6.0, tighten or replace as necessary before use.
10. Check hook load beam bumper for serviceable condition. Replace if necessary before lift operations. VERY IMPORTANT!

4.2 LOADING

The load sling member or ring is guided into place on the load beam (8). The keeper (9) is spring loaded to close after loading to retain load.

4.3 GROUND CREW RELEASE

Manual release of the load beam may be accomplished by turning the manual release knob (20) in the counter-clockwise direction. The load beam return spring (24) returns the load beam to the latched position.

4.4 ELECTRICAL RELEASE

By use of a push button switch located in the cockpit, the pilot may release the load electrically.

NOTE

ALWAYS ENSURE LOAD BEAM IS LATCHED AND LOCKED PRIOR TO FLIGHT.

5.0 ELECTRICAL SYSTEM

5.1 The two solenoid wires are connected to approximately 24" of 14/3 electrical cable, which is then connected to the operator's connector for use with their long line/electrical set up. The circuit is closed at the push button switch located in the cockpit (usually on the collective control). Actuating the switch energizes the solenoid and allows the load beam to open.

NOTE
SOLENOID IS NOT POLARITY SENSITIVE.

6.0 MAINTENANCE INSTRUCTIONS

Time Between Overhaul (TBO) shall not exceed 5 years.

6.1 TOOLS AND EQUIPMENT
No special tools are required to disassemble or reassemble the cargo hook. However the following test equipment is required:

A. 28 VDC 14 Amp power supply
B. Pull test fixture
C. Volt Ohmmeter

6.2 DISASSEMBLY

1. Remove the three bolts, nuts and washers from the guard
2. Pull hook out of guard.
3. Remove the four screws (47) and remove the solenoid cover (16).
4. Remove the set screw (35) from the manual release knob (126) and remove knob.
5. Remove spring (30), remove the spring pin from the return arm (23), then pull the return arm off the trunnion (11).
6. Remove all the remaining bolts, nuts and screws.
7. Place the hook on a bench with the solenoid facing down.
8. The front cover may now be lifted off to service the internal parts.

7.0 SERVICE AND INSPECTION

- Clean all parts in cleaning solvent and dry with compressed air not to exceed 35 PSI.
- Inspect the cargo hook parts in accordance with Table 1.
- If bare aluminum exists, prevent corrosion by using anodize pen or Rust-oleum Professional or equivalent spray paint as needed.

TABLE 1 – Component Inspection Methods

ITEM	METHOD OF INSPECTION	REMARKS
Bolts, Screws	Visual	Check for cross, deformed, or broken threads.
Springs (23, 30, 32)	Visual	Check for broken coils, deformed ends.
Bearings (45, 46)	Visual	Check for freedom of rotation, binding, excessive wear.
Bushings (10, 14, 18)	Visual	Check for excessive wear.
Load Beam (8)	Visual	Check for wear, twisting, and bending. Check for burrs where load beam contacts roller (4).
Latch & Roller (4)	Visual	Check for excessive wear, and burrs where latch (4) contacts bearing 46), and where roller (4) contacts load beam (8), Ensure the roller (4) rotates freely.
Lever (13)	Visual	Check for wear or bending.
Shaft & Arm Assy. (12)	Visual	Check for wear or bending.
Pins (2, 26, 27, 28, 29, 33, 34)	Visual	Check for wear or bending.
Trunnion (11)	Visual	Check for wear or bending.
Link (5)	Visual	Check for wear in holes.

8.0 REASSEMBLY

Reassemble the hook in the reverse order of disassembly, noting the following procedures:

- Assemble all moving parts with LUBRIPLATE 130AA (or equivalent).
- Ensure that the heads of screws (49) are flush or slightly below the surface of the side plates (6, 7).
- Use Loctite RC/609 to secure the bushings (10, 14, 18).
- If bearing (45) is to be replaced, press out. Press in new bearing using Loctite RC/609 and press on the outer race only. It must be staked using new locations for staking.

CAUTION

- Tighten bolts (41) (42) so that the nut just touches the side plate and the bolt can easily be turned in the side plates using a short wrench. Over tightening of these bolts will cause the latch or lever to drag on the side plates, thus causing improper opening and closing.

WARNING

IMPROPER ASSEMBLY OF THE CARGO HOOK CAN RESULT IN INJURY OR DEATH OF PERSONNEL.

9.0 TESTING

9.1 ELECTRICAL CHECK

Place the leads of a volt-ohmmeter across the leads of the solenoid (25). Verify that electrical continuity exists. Attach one lead of a volt-ohmmeter to one of the solenoid leads, and the other ohm meter lead on side plate (6 or 7) and ensure that continuity **does not** exist. Ensure the other solenoid lead is not touching the hook.

9.2 LOAD TESTING

Place hook in test cell. Perform the following load tests:

LOAD	RELEASE METHOD	REMARKS
10lb/4.5kg	22 VDC	Hold 5 seconds.
10lb/4.5kg	Manually	Hold 5 seconds.
1,000lb/454kg	22 VDC	Hold 2 Min.
1,500lb/680kg	22 VDC	Hold 2 Min.
2,000lb/907kg	22 VDC	Hold 2 Min.
3,000lb/1,361kg	28 VDC	Hold 2 Min.
3,000lb/1,361kg	Manually	Hold 2 Min.
6,000lb/2,721kg	DO NOT RELEASE AT THIS LOAD	Hold one minute. Relieve pressure gradually then release at zero load.

NOTE

Some hooks may not have washers under bolt heads. The Ø1/4 and Ø3/8 inch AN960 / NAS1149 .063 thick washers under the nuts may be replaced with two .032 thick washers as specified in the table below (#54 & #55), one each under each nut and bolt head.

PARTS BREAKDOWN, CARGO HOOK ASSEMBLY

ITEM NO.	QTY	PART NUMBER	ALT. / LEGACY P/N	DESCRIPTION
1	1	14_3 CABLE	--	14/3 CABLE, 2 FT LG.
2	1	202-103-4	117	PIN
3	1	301-010-002-001	102	SPACER
4	1	301-010-022-005	103	LATCH ASSY
5	1	301-010-110-005	110	LINK
6	1	301-010-201-001	108	SIDE PLATE, SOLENOID SIDE
7	1	301-010-202-001	106	SIDE PLATE, NON-SOLENOID SIDE
8	1	301-020-030-001	104	LOAD BEAM, 301 CARGO HOOK
9	1	301-020-049-005	114	KEEPER ASSY
10	2	301-020-121-001	121	BUSHING, LOAD BEAM
11	1	301-020-122-001	122	TRUNNION
12	1	301-040-004-005	101	SHAFT & ARM ASSY
13	1	301-040-008-005	100	LEVER
14	1	301-040-014-001	125	BUSHING
15	2	301-040-098-001	98	BEARING SPACER
16	1	301-050-010-001	105	SOLENOID COVER
17	1	301-050-100-001	--	DATA PLATE, 301
18	1	301-050-107-001	107	BUSHING
19	1	301-050-112-005	112	ARM, LOAD BEAM RETURN
20	1	301-050-126-001	126	RELEASE KNOB
21	2	301-050-130-005	130	BUSHING, KEEPER STOP

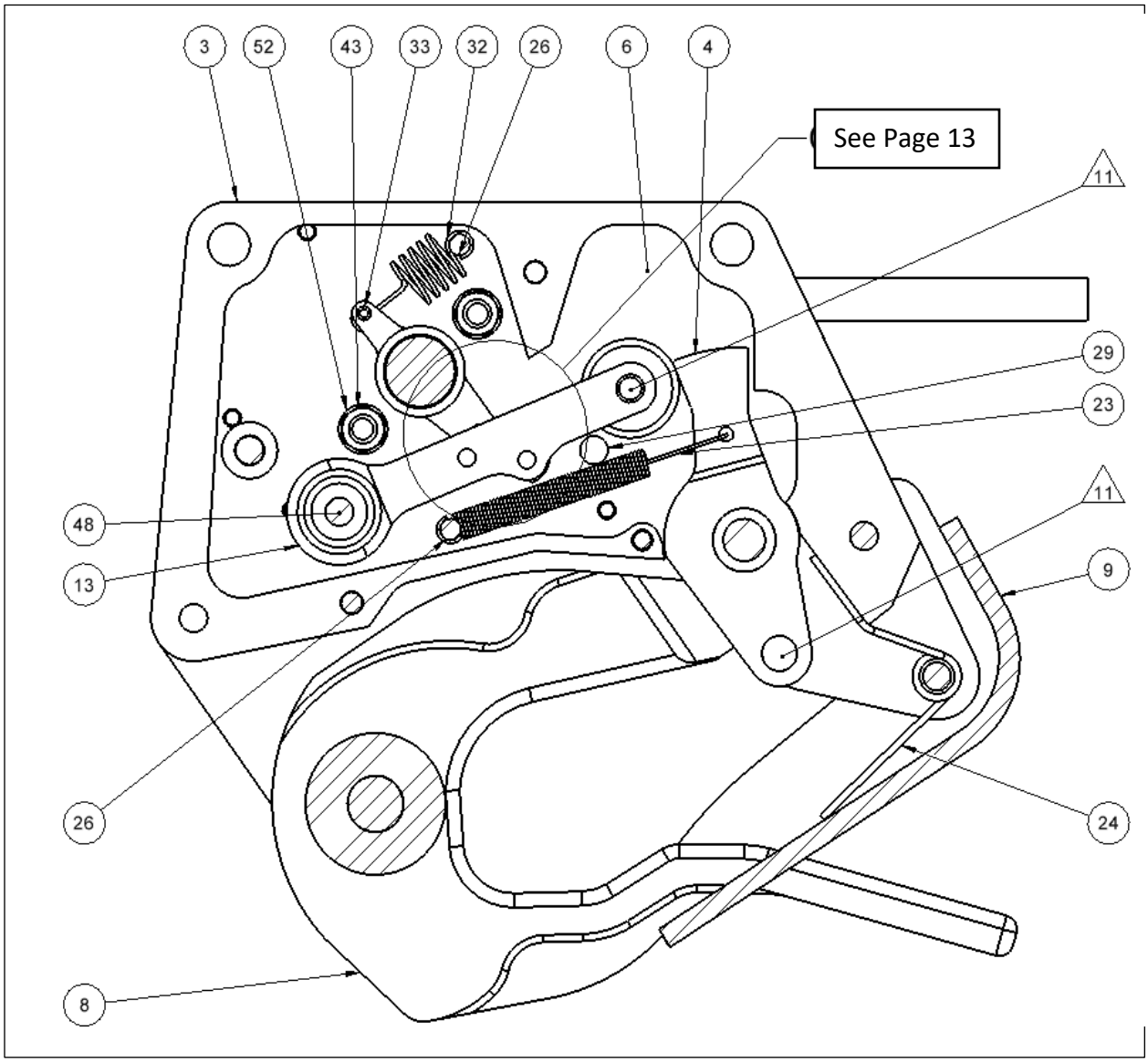
PARTS BREAKDOWN, CARGO HOOK ASSEMBLY

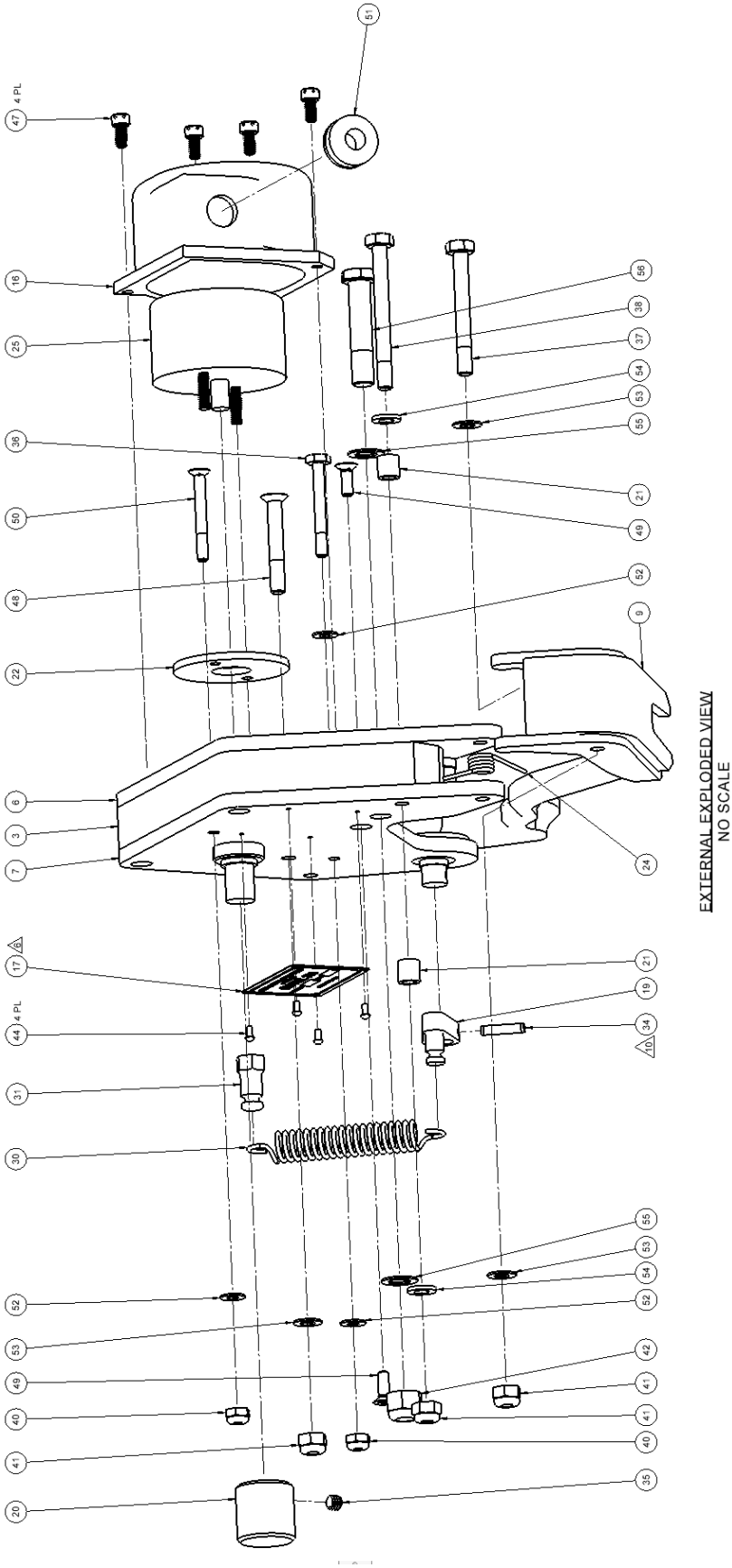
ITEM NO.	QTY	PART NUMBER	ALT. / LEGACY P/N	DESCRIPTION
22	1	301-050-142-001	142	SOLENOID SPACER
23	1	301-060-097-001	97	SPRING
24	1	301-060-144-005	144	SPRING, KEEPER
25	1	301-070-141-001	141	SOLENOID, MODIFIED
26	2	301-080-099-001	99	PIN
27	1	301-080-111-001	111	PIN, LINK
28	2	301-080-118-001	118	PIN
29	1	301-080-120-001	120	PIN
30	1	5178	--	SPRING
31	1	606-050-085-005	3085-1/85	POST, LOAD BEAM RETURN
32	1	611-060-031-001	3031-1/31	SPRING
33	1	92373A174	--	SPRING PIN, Ø1/8 X 5/16
34	1	92383A713	--	SPRING PIN, Ø5/32 X 3/4
35	1	92785A433	--	SET SCREW
36	1	AN3-15A	--	BOLT
37	1	AN4-21A	--	BOLT
38	1	AN4-24A	--	BOLT
39	1	AN4-5A	--	BOLT
40	2	MS21044N3	--	NUT, SELF LOCKING
41	3	MS21044N4	--	NUT, SELF LOCKING
42	1	MS21044N6	--	NUT, SELF LOCKING
43	2	MS21083N3	--	NUT
44	4	MS21318-14	--	DRIVE SCREW
45	1	MS24461-4	--	BEARING
46	1	MS24465-4	--	BEARING
47	4	MS24673-1	--	SCREW

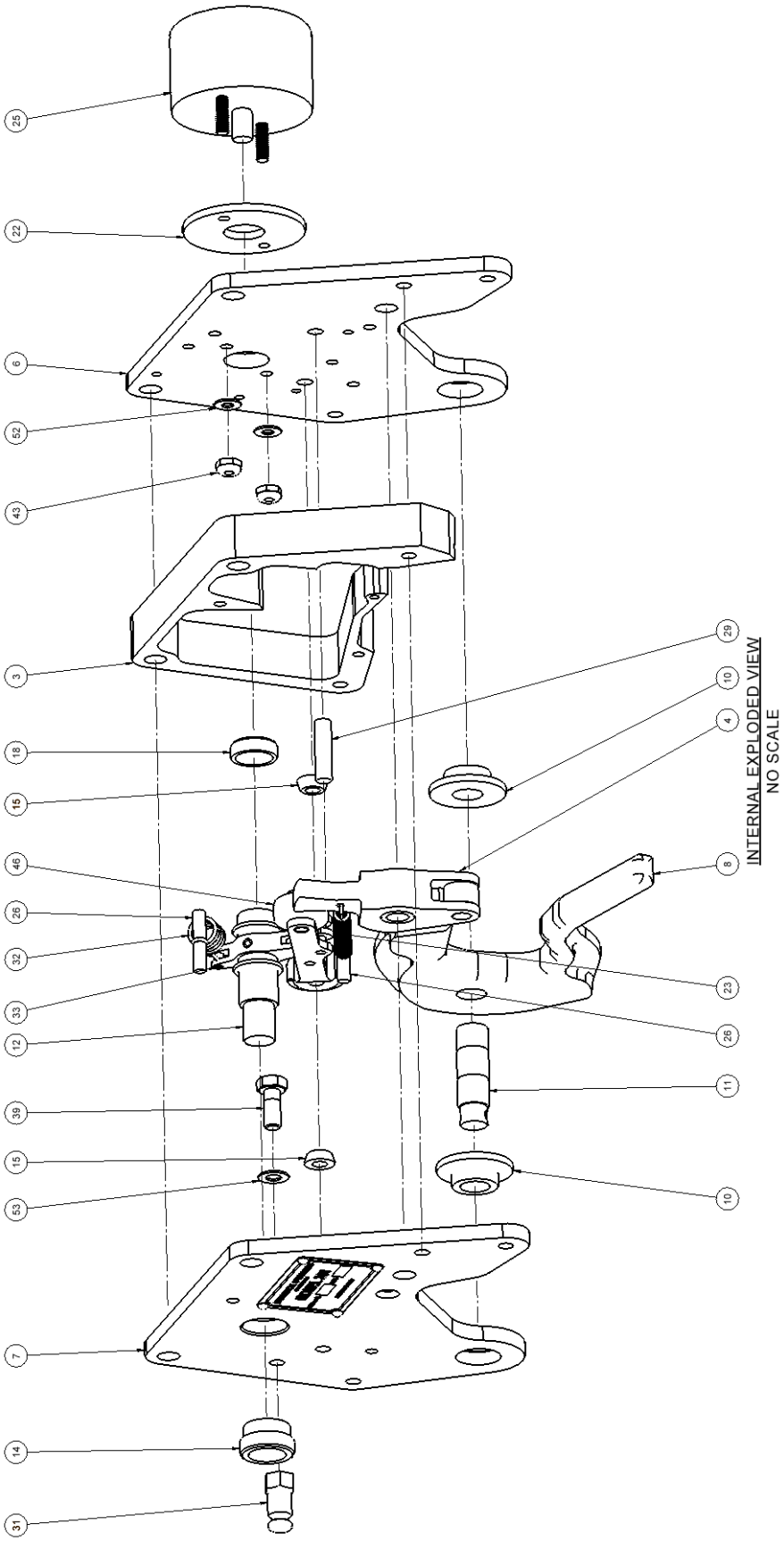
PARTS BREAKDOWN, CARGO HOOK ASSEMBLY

ITEM NO.	QTY	PART NUMBER	ALT. / LEGACY P/N	DESCRIPTION
48	1	MS24694-S114	--	SCREW, CSK
49	2	MS24694-S50	--	SCREW
50	1	MS24694-S67	--	SCREW
51	1	MS35489-69	--	GROMMET
52	5	NAS1149F0332P	--	WASHER
53	4	NAS1149F0432P	--	WASHER
54	2	NAS1149F0463P	--	WASHER
55	2	NAS1149F0632P	--	WASHER
56	1	NAS1306-20	--	BOLT
80	A/R	MIL-G-81322	--	GREASE

INTERNAL DETAIL




EXTERNAL EXPLODED VIEW
NO SCALE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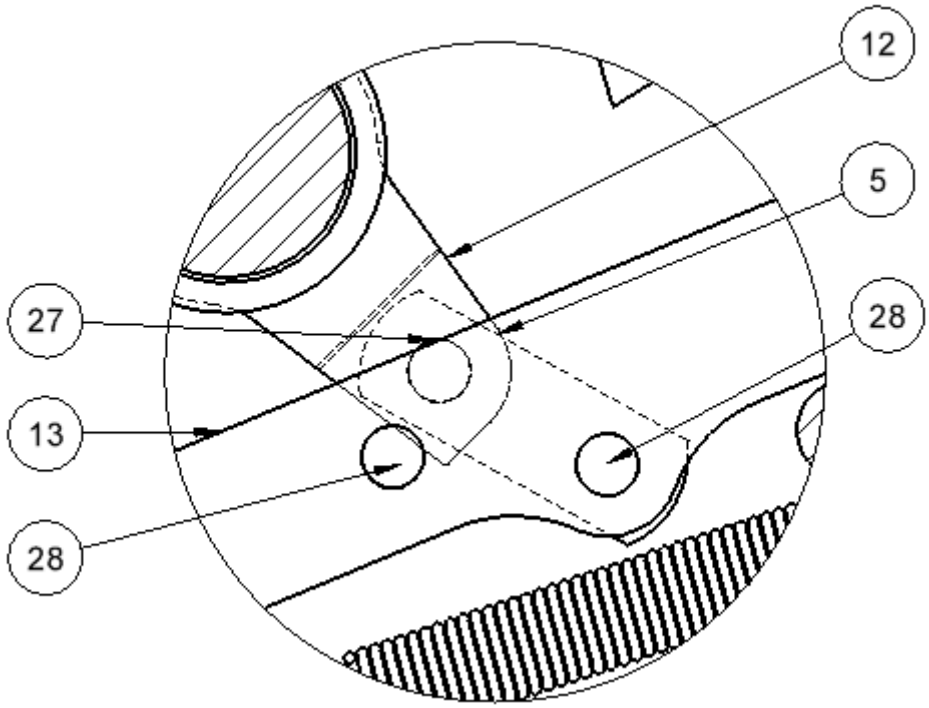
INTERNAL EXPLODED VIEW
NO SCALE

SHAFT & ARM DETAIL



PARTS BREAKDOWN, SHAFT, ARM & LEVER ASSEMBLY

ITEM NO.	QTY.	PART NUMBER	ALT. / LEGACY P/N	DESCRIPTION
5	1	301-010-110-005	110	LINK
12	1	301-040-004-005	101	SHAFT & ARM ASSY
13	1	301-040-008-005	100	LEVER
27	1	301-080-111-001	111	PIN, LINK
28	2	301-080-118-001	118	PIN

OPTIONAL HOOK GUARDS

Standard Guard
P/N: 301-050-200-002

Extended Guard
P/N: 301-050-300-002

LIMITED WARRANTY

MECHANICAL SPECIALTIES, LLC MAKES EVERY EFFORT TO ENSURE THAT ITS PRODUCTS MEET HIGH QUALITY AND DURABILITY STANDARDS AND WARRANTS TO THE PURCHASER OF OUR PRODUCTS THAT EACH PRODUCT BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR 12 MONTHS FROM DATE OF PURCHASE TO ORIGINAL PURCHASER ONLY.

WARRANTY DOES NOT APPLY TO DEFECTS DUE TO MISUSE, ABUSE, FAULTY ELECTRICAL SYSTEMS, NEGLIGENCE, ACCIDENTS, PRODUCTS BROKEN OR WORN IN THE COURSE OR NORMAL HOOK OPERATIONS, REPAIRS OR ALTERATIONS OUTSIDE OUR FACILITY OR TO A LACK OF MAINTENANCE. THIS WARRANTY DOES NOT COVER CONSEQUENTIAL DAMAGE OR INJURY.

TO TAKE ADVANTAGE OF THIS WARRANTY, THE PRODUCT OR PART MUST BE RETURNED TO THE FACTORY FOR EXAMINATION, AT WHICH TIME AN EVALUATION WILL BE MADE AS TO WHETHER OR NOT A WARRANTY REPLACEMENT IS JUSTIFIED.

MECHANICAL SPECIALTIES, LLC RESERVES THE RIGHT TO DECIDE WHAT IS WORTHY OF WARRANTY REPAIR OR REPLACEMENT.