Owner's Manual

Talon Auto-Loc

Onboard Systems International

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Equipment Part Numbers

210-300-00

528-048-00

232-739-00

212-049-00

Please check our web site www.onboardsystems.com for the latest revision of this manual

RECORD OF REVISIONS

Revision	Date	Page(s)	Reason for Revision
0	3/31/16	All	Initial Release
1	07/10/24	26, 35	Added alternate bolt (96) and instructions for its use, as well as how to use washers to fill gaps as needed.

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CONTENTS

1.0 Introduction

1.1 Scope

This owner's manual contains instructions for installation, operation, and maintenance of the Auto-Loc Cargo Hook (P/N 210-300-00) and mating Target (P/N 232-739-00).

1.2 Capability

The instructions contained in this document are provided for the benefit of experienced aircraft maintenance personnel and facilities that are capable of carrying out the procedures.

1.3 Safety labels

The following definitions apply to safety labels used in this manual.

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Draws the reader's attention to important or unusual information not directly related to safety.

Used to address practices not related to personal injury.

2.0 Referenced Documents

180-251-00 Acceptance Test Procedure – Talon Auto-Loc

3.0 System Overview

3.1 Auto-Loc Cargo Hook and Target

The system is made up of two components, the Auto-Loc Cargo Hook and Target. The system is a self-attaching, remote Cargo Hook that automatically latches on to a Target.

The Auto-Loc Cargo Hook is a remote hook that is suspended via a long line from the primary Cargo Hook on the bottom of the helicopter. The Target is pre-rigged to a load and left unattended (see Figure 5.4). Ground crew is not required to attach the load.

The helicopter pilot lowers the Auto-Loc Cargo Hook over the Target and the cone feature guides it as it latches on to the Target Stem.

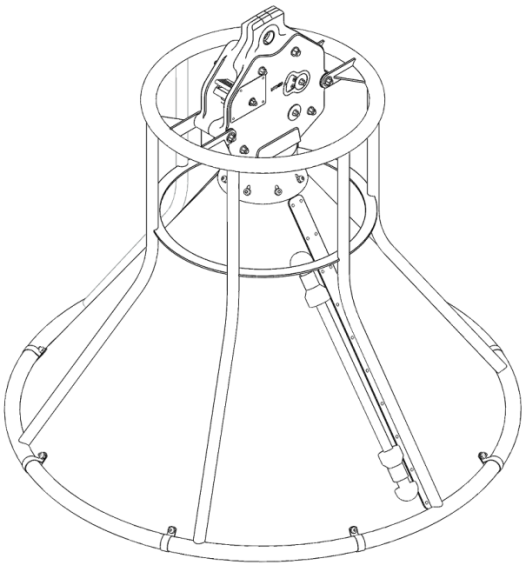


Figure 3.1 Auto-Loc Cargo Hook Assembly

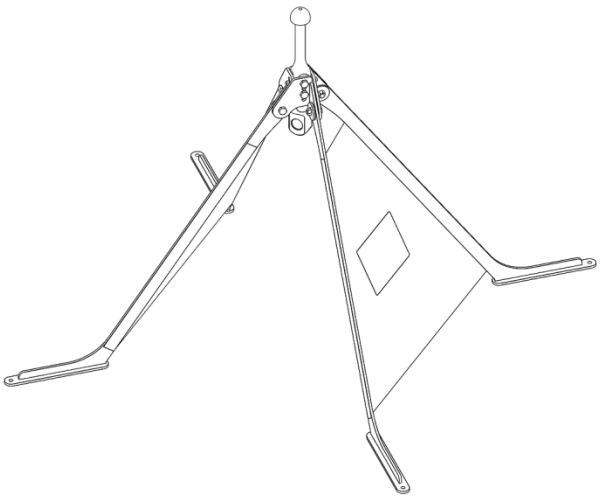


Figure 3.2 Auto-Loc Target - Folding

To release the Target, the Cargo Hook features an electrical release system, which is powered from the aircraft electrical system. The aircraft electrical release system required is typical of other remote cargo hooks.

The Target may also be released from the Cargo Hook by ground personnel by operating the Manual Release Lever.

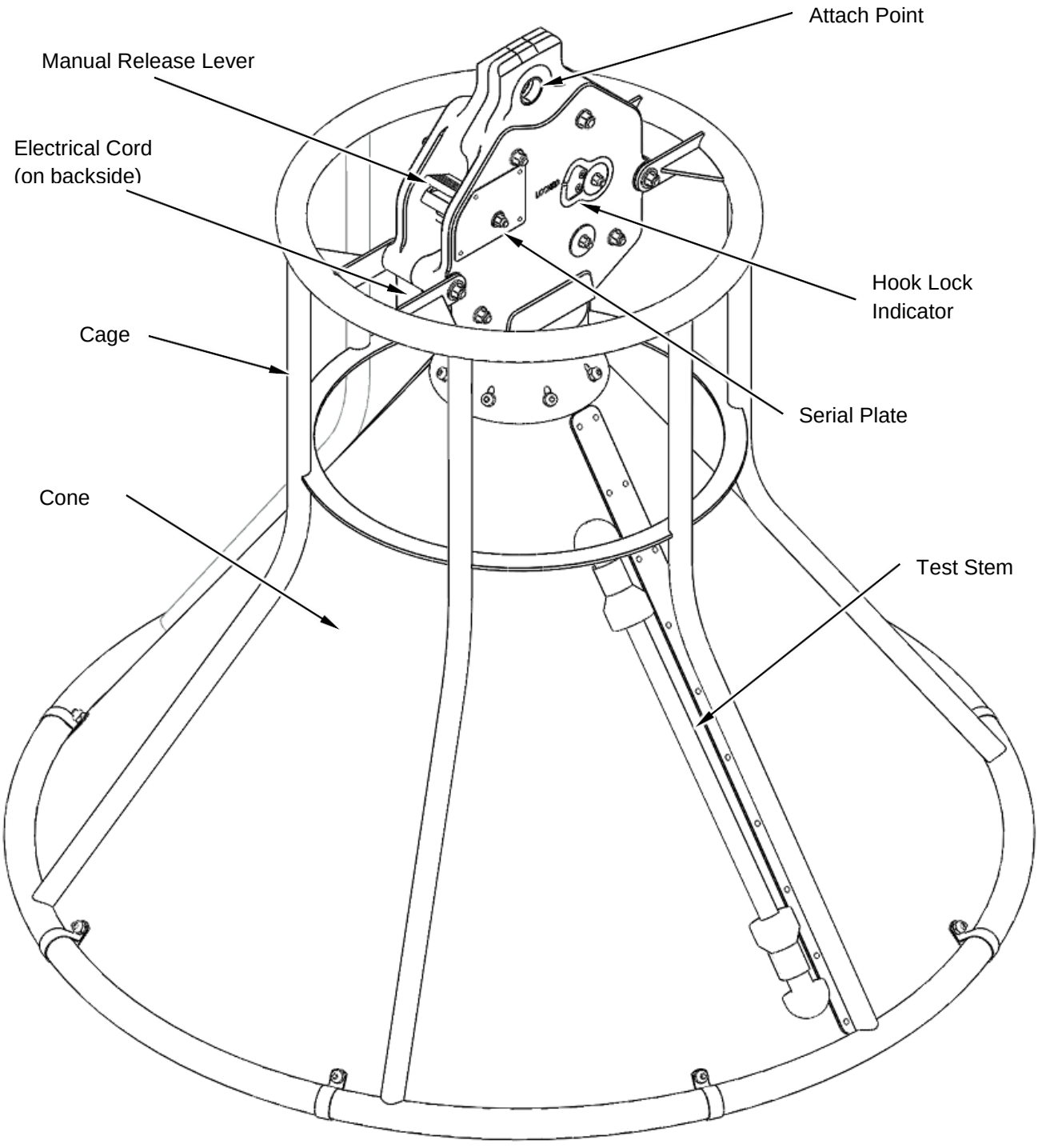


Figure 3.3 Auto-Loc Cargo Hook Details

3.2 Surefire Release

An additional feature for this system includes a short time delay circuit built into the Cargo Hook electrical release system. This system is a safety enhancement to protect against inadvertent load release due to accidental contact with the release switch or mistaken actuation of the Cargo Hook switch when another is intended. Surefire makes the electrical release a more deliberate pilot command.

The time delay feature requires that the release switch be depressed and held for more than 1/2 second to open the Cargo Hook. If the external load must be released immediately, use the primary hook release.

NOTICE

The Auto-Loc Cargo Hook includes an electronic delay of approximately ½ second. It is necessary to press and hold the Cargo Hook release button.

⚠ CAUTION

If the Surefire-equipped Cargo Hook must be released immediately without any delay, use the primary hook release.

In addition to the delay feature the circuit includes on-off cycling to limit the duty-cycle on the hook solenoid. If the release switch is held down, the solenoid will cycle on and off repeatedly in a "machine gun" fashion.

3.3 Specifications

Rated Load	6,000 lb
Release capacity	6,000 lb
Limit load	15,000 lb
Ultimate Load	24,000 lb
Ground crew release	Dual actuation lever
Power	15 A, 22-30 VDC
Operating temperature	-40°C - 70°C
Time Between Overhaul (TBO)	5 Years / 1500 hours
Weight: Auto-Loc Cargo Hook	46 lb
Weight: Target	15 lb

3.4 Electrical Schematic

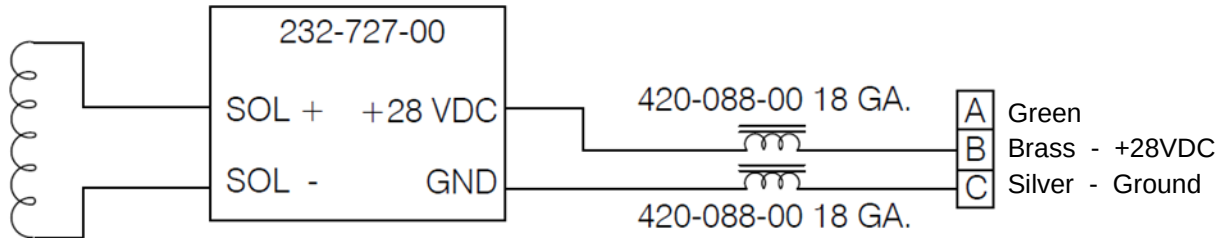


Figure 3.4 Electrical Schematic

4.0 Installation

As received from the factory, the cargo hook must be attached to the cage and funnel assembly before use. Follow steps 30 and 31 in section 12.0.

The Auto-Loc Cargo Hook is intended for attachment at the end of a long line. The top of the hook has a Ø7/8" hole to allow a simple structural connection to the long line with an anchor shackle or electric swivel. A standard NEMA 5-15P Duplex connector is pre-installed for electrical connection. This connection interface is typical of other remote hooks.

It is recommended that an electric swivel be included between the remote hook and the Cargo Hook on the belly of the helicopter to accommodate spinning sling loads. An optional 6K Electric Swivel Kit, P/N 200-373-00, is available for use with the Auto-Loc Cargo Hook. This Electrical Swivel provides a rotating electrical connection between the helicopter long line and the Auto-Loc Cargo Hook.

WARNING

Spinning sling loads may wind up the long line and then suddenly reverse, spinning the remote hook and causing an un-commanded load release.

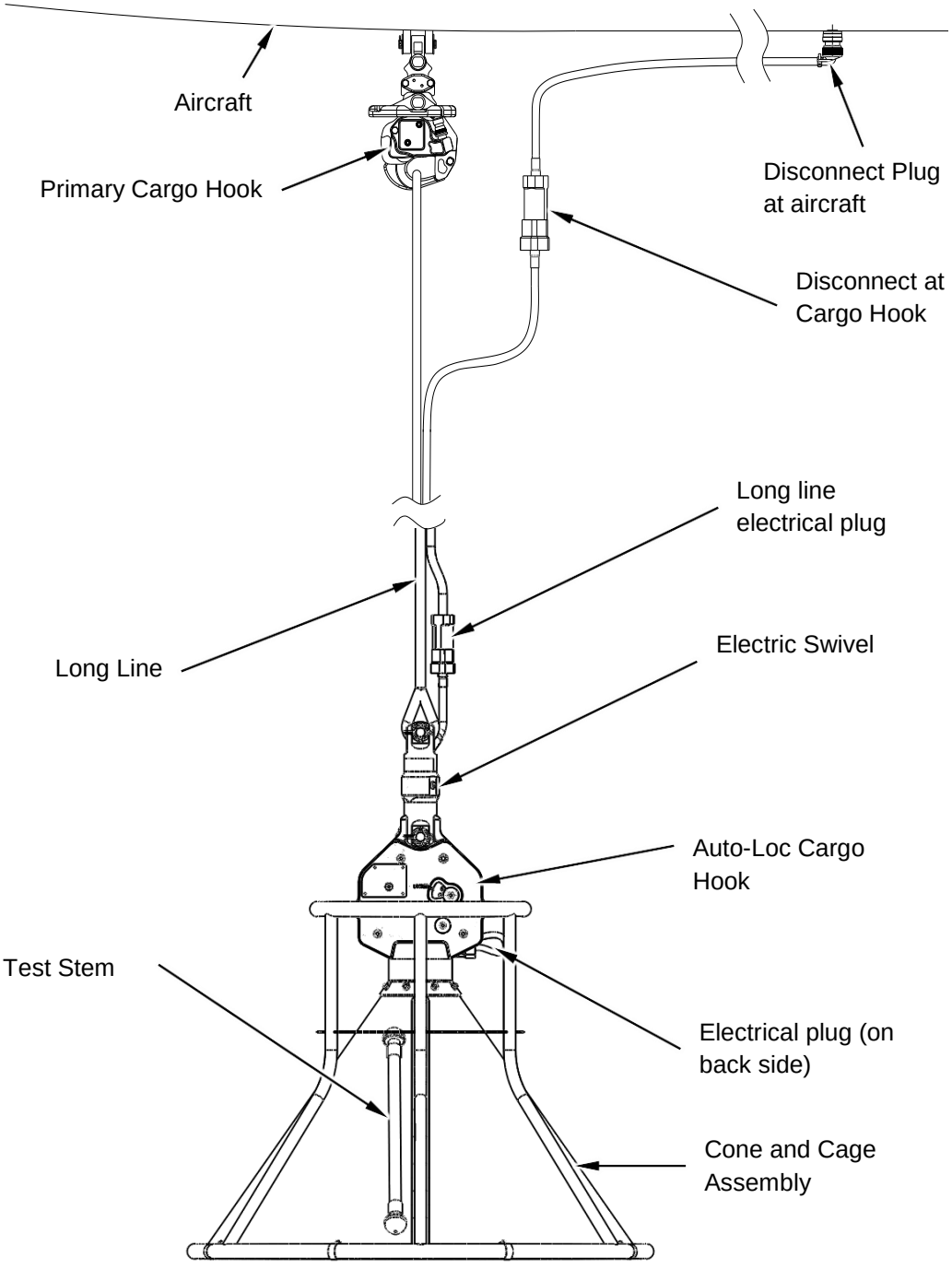


Figure 4.1 System Installation Overview

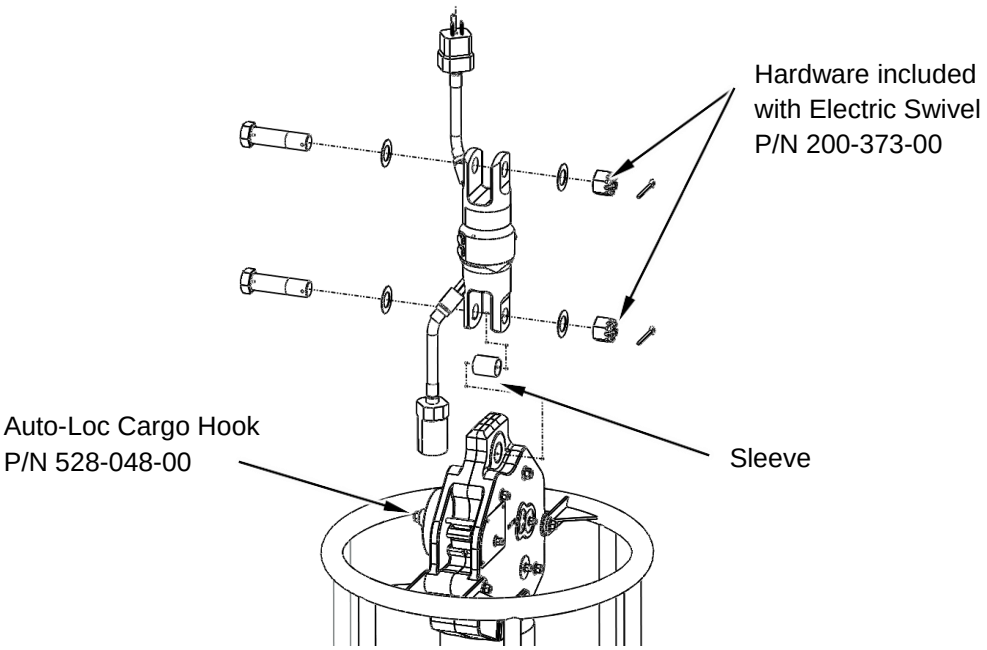


Figure 4.2 Installation with Electric Swivel Kit

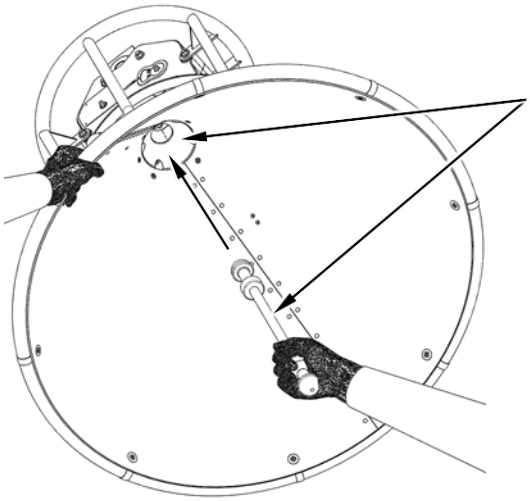
5.0 Operation Instructions

5.1 Pre-Flight Functional Checks

Before operating the Auto-Loc Cargo Hook, be completely familiar with the Rotorcraft Flight Manual Supplement for External Cargo Operation for your helicopter.

Prior to external load operations, perform the following functional checks of the Auto-Loc Cargo Hook. If these procedures are not successful, do not use the hook until the problem is resolved.

1. Ensure that the electrical harness has enough slack to accommodate movement of the remote hook; and is protected from chafing and snagging.
2. Tip the Auto-Loc Cargo Hook over on its side; and insert the Test Stem into the hook. Pull on the stem; and verify the hook has locked onto the Test Stem.



3. Verify that the hook is locked in the closed position by checking the hook lock indication on the side of the Cargo Hook. The diamond shaped feature (visible through the opening in the Side Plate) must be aligned with the line on the Side Plate (see Figure 5.1).

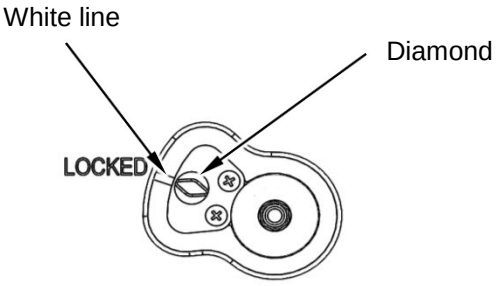


Figure 5.1 Hook Lock Indicator

4. Operate the Manual Release Lever (see Figure 5.2). The hook must release the Test Stem.
5. Repeat step 2; and release the Test Stem electrically by energizing the Cargo Hook electrical release circuit (the electrical release must be held longer than ½ second for the Sure-fire feature to operate). Re-stow the test stem.

⚠ WARNING

Accumulated dust, dirt and grime will cause unreliable re-latch of the hook. Remove immediately from service for disassembly and cleaning if re-latch performance is sluggish.

⚠ WARNING

Ensure the hook is in the locked position by checking that the diamond shaped indicator is aligned with the LOCKED line. If they are not aligned, the hook is not locked and an inadvertent load release can occur. Verify healthy re-latch performance as part of the pre-flight checks.

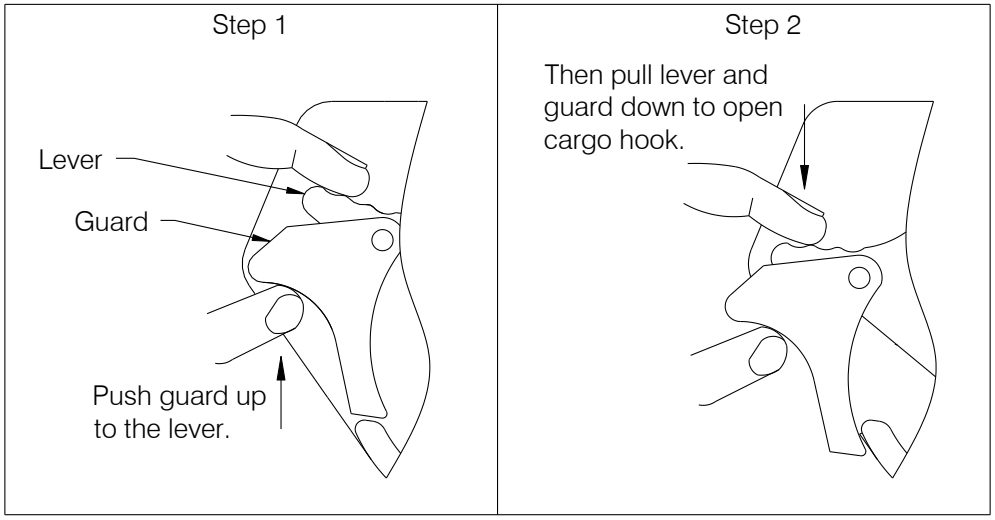


Figure 5.2 Manual Release Lever Operation

5.2 Target Rigging

The Auto-Loc Cargo Hook must only be used with the Onboard Systems design Auto-Loc Target. The stem on the target is designed to properly interface with the hook and safely bear the load. The stem of the target has a lug with a Ø 7/8" hole to allow attachment of a 3/4" anchor shackle (customer furnished).

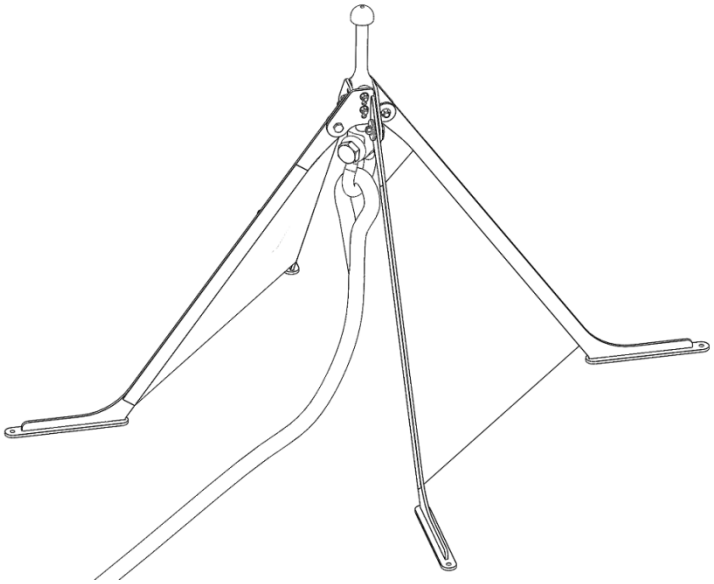


Figure 5.3 Target with anchor Shackle

⚠ CAUTION

Route the rigging lines in a manner to avoid fouling on the feet of the target as the load is lifted.

Figure 5.4 Example of Target and Load Rigging

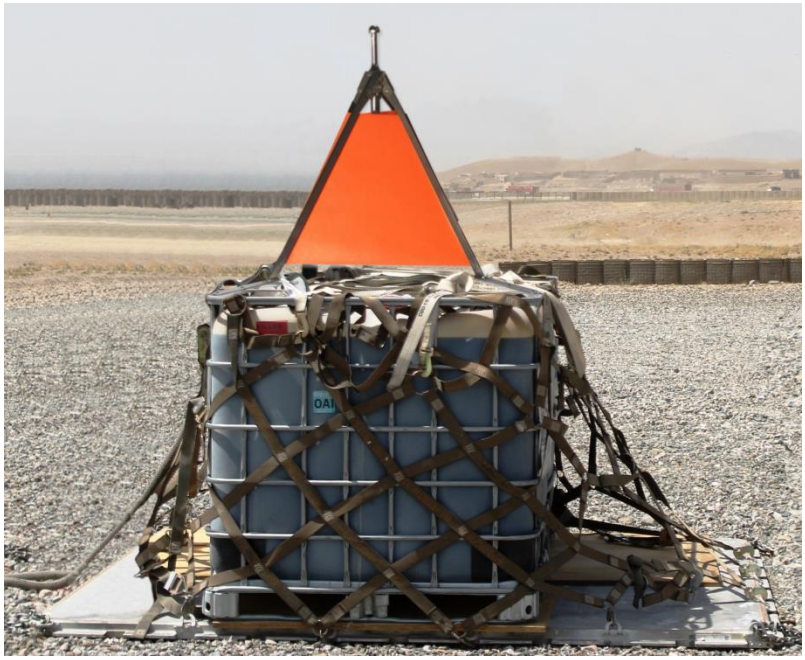


Figure 5.5 Example of Target Cable-tied to Load

Observe the instructions printed on the target:

Keep target level within 20° MAX in any direction.

Distance from ground to top of target: 29 inches (73 cm) MIN.

Keep area clear of debris within a 48 inch (122 cm) MIN diameter.

The feet of the target have holes to accommodate plastic cable ties for fastening the target to a load and ensure the target stays stationary while the hook acquires it. The cable ties will break as the load is lifted.

The target features folding legs for easier transport and storage, and to reduce the chance of snagging. Ensure that the legs are fully deployed during use.

5.3 Instructions for Use of the Auto-Loc Cargo Hook

- Pilot practice is needed to gain proficiency in placing the Auto-Loc Cargo Hook onto the target.
- Slow the swing of the Auto-Loc Cargo Hook before approaching the Target to avoid hitting it, moving it, or tipping it over.
- Anticipate when the Target will disappear directly under the Auto-Loc Cargo Hook; and rapidly lower the collective to drop the Auto-Loc Cargo Hook onto the Target. Rapid descent yields more consistent attachment than a slow / gentle descent. If the Auto-Loc Cargo Hook is tipping over during engagement, descend onto the target quicker.
- A jacketed / heavy long line may be helpful to stabilize the line.
- Verify that the target and rigging has been released from the Auto-Loc Cargo Hook before departing the area.
- After a Target has been released, the Auto-Loc Cargo Hook will remain open and ready to receive another Target. The Load Beam will only latch if a Target Stem is inserted in the hook.

Ensure that the Target is free before departing the drop-off area. Even a small up-and-down motion of the Auto-Loc Cargo Hook will re-latch the Target after it's been released.

6.0 Maintenance

6.1 Storage

The Auto-Loc Cargo Hook may be stored in its original factory packaging for up to 2 years from its date of manufacture or last factory overhaul. If stored in its original factory sealed bag and box for less than 2 years, it may be used without any additional activity. If the period of storage in its original packaging is greater than 2 years the Cargo Hook must be subjected to the acceptance test procedures (ATP) described herein before being used.

If the Cargo Hook is to be removed from service, store it in indoors. If it is to be stored longer than 6 months perform the following. Prepare the Cargo Hook for storage by thoroughly cleaning and drying the exterior, liberally applying ACF-50 corrosion preventative compound inside and out, sealing it in a plastic bag with a desiccant, and labeling it with the date of storage. If stored in this condition for less than 2 years, it may be used without any additional activity. If the period of storage exceeds 2 years the Cargo Hook must be subjected to the acceptance test procedures (ATP) described herein before being used.

The Time Between Overhaul criteria still apply regardless of storage conditions and time.

6.2 Daily

- Check all fasteners to ensure that they are in place and secure.
- Check the electrical cord and connection for damage and insecurity.
- Check the Cargo Hook case and covers for cracks and damage.

6.3 Monthly Preventive Maintenance

Remove accumulated soils from the exterior with a soft bristle brush and mild solvent/cleaner

In corrosive environments, apply a corrosion preventative compound such as ACF-50 to all exterior surfaces.

6.4 Annual Inspection

Annually or 100 hours of external load operations, whichever comes first, thoroughly clean the exterior with a soft bristle brush and mild solvent/cleaner and visually inspect for cracks, gouges, dents, nicks, corrosion, and missing or loose fasteners.

6.5 Overhaul

Overhaul the Auto-Loc Cargo Hook in accordance with the overhaul schedule and instructions contained here-in.

6.6 Repair

Repair the Auto-Loc Cargo Hook in accordance with the repair instructions contained here-in.

7.0 Repair Instructions

It is recommended that only minor repairs be attempted by anyone other than the factory. The following procedures and information are provided for the benefit of experienced aircraft maintenance facilities and trained maintenance and inspection personnel capable of carrying out the procedures. They must not be attempted by those lacking the necessary expertise and suitable equipment to acceptance test the Cargo Hook after maintenance. See Section 16.0 for instructions for returning equipment to the factory.

Item numbers throughout this manual shown in parentheses ( ) refer to Table 15.1 and Figure 15.1 through Figure 15.4.

Follow these steps to repair the Auto-Loc hook, referring to the applicable sections in this manual.

1. Disassemble as required.
2. Inspect disassembled parts.
3. Obtain required replacement parts.
4. Re-assemble.
5. Acceptance test.
6. Inspect for return to service.

8.0 Overhaul Schedule

The Cargo Hook shall be overhauled every 1500 hours of external load operations or 5 years, whichever comes first.

Hours of external load operations should be interpreted to be anything is attached to the Cargo Hook (whether or not a useful load is being transported); and the aircraft is flying. If these conditions are not met, time does not need to be tracked.

9.0 Overhaul Instructions

It is recommended that only minor repairs be attempted by anyone other than the factory. The following procedures and information are provided for the benefit of experienced aircraft maintenance facilities with trained maintenance and inspection personnel capable of carrying out the procedures. They must not be attempted by those lacking the necessary expertise and suitable equipment to acceptance test the Cargo Hook after overhaul. See Section 16.0 instructions for returning equipment to the factory.

Overhaul kit P/N 212-049-00 is recommended to complete the Auto-Loc Cargo Hook overhaul. The overhaul kit contains all recommended items to be replaced at time of overhaul. Table 15.1 lists detail parts contained in the overhaul kit.

Follow these steps to overhaul the Cargo Hook, referring to the applicable sections in this manual:

1. Obtain Overhaul kit P/N 212-049-00.
2. Completely disassemble the Cargo Hook.
3. Discard all items (bearings, roll pins, cotter pins, fasteners, nuts and washers) that are to be replaced by an item in Overhaul Kit P/N 212-049-00 listed in Table 15.1.
4. Inspect disassembled parts.
5. Obtain required replacement parts.
6. Reassemble.
7. Acceptance test.
8. Inspect for return to service.

10.0 Disassembly Instructions

For item numbers throughout this manual shown in parentheses ( ) refer to Table 15.1 and Figure 15.1 through Figure 15.4.

1. Remove the four 3/8-24 hex socket screws (72) inside the Cone Assembly (73) that hold the Cone Adapter (73) to the hook.
2. Remove the two sets of the nuts (71), washers (70), and bolts (69) that attach the hook to the cage, and then remove the hook from the Cone Assembly.
3. Remove the three ¼-28 nuts (23) and washers (22) from the Side Plates. Leave the bolt at the Manual Release Lever in place.
4. Remove the 3/8-24 nut (19). Leave the bolt in place.
5. Remove the four 5/16-24 nuts (17), washers (18), and bolts (35) from the Side Plates (6) & (7).
6. Insert the Test Stem (77); and lock the hook. The Side Plates cannot be separated without the hook in the locked position.
7. Separate the Side Plates. Avoid using screwdrivers to separate them. Use plastic wedges to separate them to avoid damaging the edges of the aluminum Side Plates.
8. Operate the Manual Release Lever. Keep thumb outside of the hook and out of the way of the Load Beam as it swings past the area by the Manual Release Lever. Pull the Load Beam spring (41) and the Lockout Re-latch device (10) spring (43) off their roll pins. The Load Beam may be pulled free; but it must not be in the fully released position or it will hang up on the lead-out feature on the Side Plate.
9. Unfasten the Cam spring (43) from the roll pin. Pull out the Cam (13) and Toggle (12) assemblies simultaneously.
10. The Manual Release Lever Assembly (5) and (11) may be removed if so desired.

11.0 Inspection Instructions

Thoroughly clean all parts to be inspected using a soft bristle brush and mild solvent/cleaner. Carefully inspect detail parts in accordance with the instructions in Table 11.1. Inspect the parts in a clean, well-lighted room using standard dimensional measuring tools and visual methods. Repair parts found within inspection limits. Replace any part found beyond limits.

If the Cargo Hook is being overhauled, perform non-destructive inspection as follows:

Perform magnetic particle inspection in accordance with ASTM E1444 and MIL-STD-1907, Grade A on the parts listed below. No cracks are permitted.

- Load Beam (9)

Perform penetrant inspection per ASTM E1417 and MIL-STD-1907, Grade A on the parts listed below. No cracks are permitted.

- Side Plate (8)
- Side Plate, Solenoid (7)
- Toggle (13)

Table 11.1 Cargo Hook Inspection Criteria

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
1.	Load Beam (8)	Corrosion – 0.010 in. (0.25 mm) deep.	Glass bead blast at less than 30 PSI (2.11 KGF/CM^2) to remove corrosion.	Passivate per AMS-QQ-P-35 or ASTM A967 AMS 2700 Method 2	No
2.	Load Beam Shaft (9)	Visible wear.	None. Replace.	N/A	No
3.	Bushings (48)	Wear – more than 50% bronze showing.	None. Replace.	N/A	Yes
4.	Lockout Relatch (10)	Excessive wear >.010" (more than surface marks) on stem contact face and Cam Roller interface surfaces.	None. Replace.	N/A	No
5.	Bushing (51)	Wear – more than 50% bronze showing.	None. Replace.	N/A	Yes
6.	Solenoid Restraint (14, 15)	Excessive wear >.010" (more than surface marks) on stem and Solenoid Actuator contact faces and pivot bores.	None. Replace.	N/A	No
7.	Dowel Pin (37)	Excessive wear >.003" (more than surface marks).	None. Replace.	N/A	No

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
8.	Side Plates (6),(7)	Dents, nicks, gouges, scratches, and corrosion – 0.060 in. (1.52 mm) deep. Excessive damage to stem lead-out feature.	Glass bead blast at less than 30 PSI (2.11 KGF/CM^2) to remove corrosion. Blend at 10:1 ratio as required to provide smooth transitions. Carefully file stem lead-out feature smooth and remove burrs.	Apply Alodine (MIL-DTL-5541) and zinc chromate primer (MIL-PRF-23377 or similar) to affected surfaces – see Note 1	No
9.	Bushings (52)	Wear – more than 50% bronze showing.	None. Replace.	N/A	Yes
10.	Manual Rel. Lever (5), (11)	Dents, nicks, cracks, gouges, scratches and corrosion – 0.050 in. (1.27 mm) deep. More than visible wear on gear to solenoid surface. Pivot bore no larger than .27".	Blend at 10:1 ratio as required to provide smooth transitions. If pivot bore worn outside limit; replace.	Apply Alodine (MIL-DTL-5541) and zinc chromate primer (MIL-PRF-23377 or similar) to affected surfaces – see Note 1.	No
11.	Bearings (49)	Roughness, binding, looseness, or corrosion.	None. Replace.	N/A	Yes
12.	Cam (13)	Visible wear or dents on Toggle interface bearing surface and pivot feature. Holes for Interlock Roller pin worn. Must measure <.260".	None. Replace.	N/A	No
13.	Cam Interlock Roller (2)	Roughness, binding or looseness of the Interlock Roller (2).	Replace Interlock Pin (28), Roller (2) and Bearings (47). Replace Cotter Pin 26).	N/A	No
14.	Bushings (47)	Wear – more than 50% bronze showing.	None. Replace.	N/A	Yes
15.	Pin (28)	Excessive wear >.003" (more than surface marks).	None. Replace.	N/A	Yes

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
16.	Load Beam Roller (3).	Roughness, binding or looseness of the Load Beam Roller (3).	Replace Pin (32), Roller (3), and Bearing (45).	N/A	No
17.	Bushings (45 & 46)	Wear – more than 50% bronze showing.	None. Replace.	N/A	Yes
18.	Roller Bearings (50)	Roughness, binding, looseness, or corrosion.	None. Replace.	N/A	Yes
19.	Dowel Pins (32)	Visible wear.	None. Replace.	N/A	No
20.	Serial Number Plate (1)	Damaged or opening instructions illegible.	None. Replace.	N/A	No
21.	Extension Springs (40, 41, 43)	Cracks or deformation (coils have spaces between them under no load). Evidence of wear on end loops.	None. Replace.	N/A	Yes
22.	Compression Spring (42)	Cracks or deformation. Free length less than .6"	None. Replace.	N/A	Yes
23.	Torsion Spring (44)	Cracks or deformation.	None. Replace.	N/A	Yes
24.	Solenoid Cover (56)	Dents, nicks, gouges, scratches, and corrosion – 0.060 in. (1.52 mm) deep..	Glass bead blast at less than 30 PSI (2.11 KGF/CM^2) to remove corrosion. Blend at 10:1 ratio as required to provide smooth transitions. Carefully file stem lead-out feature smooth and remove burrs.	Apply alodine (MIL-DTL-5541) and zinc chromate primer (MIL-PRF-23377 or similar) to affected surfaces – see Note 1	No
25.	Wedge Ring (54)	Cracks or deformation.	None. Replace.	N/A	Yes

Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
26.	Solenoid (60) and Surefire Module (53)	Apply power to the electrical release and verify operation. Surefire Module must make solenoid cycle if power is held for more than ½ second.	None. Replace.	N/A	No
27.	Electrical connector (58)	Loose, missing, or damaged prongs, cracked case.	None. Replace.	N/A	No
28.	Electrical cord (59), electrical wires.	Deterioration, exposed conductors.	None. Replace.	N/A	No
29.	Solenoid Actuator (55)	Excessive wear (more than surface marks) on gear surfaces (3 places.).	None. Replace.	N/A	No
30.	All remaining nuts, bolts, roll pins, cotter pins, washers, heli-coils	Wear, corrosion or deterioration.	None. Replace.	N/A	Yes
31.	Cage Weldment (74)	Tubes deformed such that access to Release Lever is obstructed or cone is badly distorted.	None. Replace.	N/A	No
32.	Cone Adapter (73)	Excessive wear on inside surface. Dents, nicks, gouges, scratches, and corrosion – 0.1 in. deep.	Blend at 10:1 ratio as required to provide smooth transitions Replace if depth of damage exceeds limit.	N/A	No

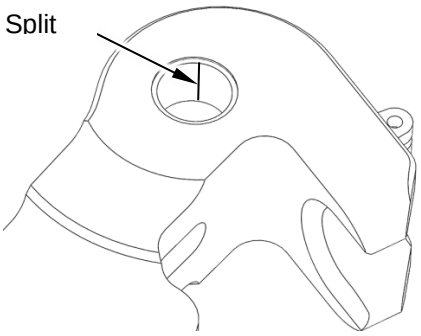
Seq	Component	Inspection Criteria & Limit	Repair Action	Finish	Recommended replacement at overhaul.
33.	Cone Half (75)	Excessive deformation, tears, or holes. Mounting screw or rivet heads pulled through. Insecurity or deformation of mounting loop clamps (78).	None. Replace.	N/A	No
34.	Stem, Target (83)	Dents, nicks, gouges, and scratches– 0.03 in. (.75m) deep. Bend in shaft portion.	None. Replace.	N/A	No
35.	Leg (84)	Bent. Loose.	Straighten. Tighten.	N/A	No
36.	Visibility Panel (85)	Torn, discolored, or fastening tape insecure.	None. Replace.	N/A	No
37.	Fastener Tape (86)	Peeling from leg. Insecure attachment to visibility pane.	None. Replace.	N/A	No
38.	Pivot Plate (88)	Bent.	Straighten.	N/A	No
39.	Washer (92)	Excessively degraded or torn.	None. Replace.	N/A	No

Note 1 – For service at Onboard Systems, optional finish: black anodize per MIL-A-8625 Type II, Class 2 after nondestructive inspection. Prepare for anodize by using standard methods.

12.0 Re-assembly Instructions

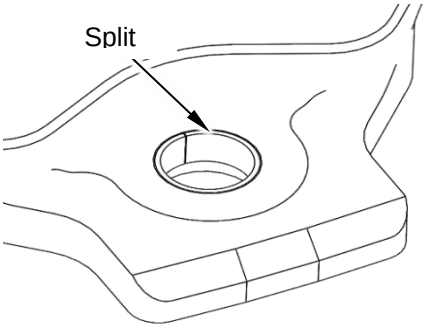
Reference numbers throughout this manual shown in parentheses ( ) refer to the Illustrated Parts in Table 15.1 and Figure 15.1 through Figure 15.4 at the end of this manual.

1. Remove grease from roller bearings (49) and (50) using solvent.
2. Assemble Cam: Apply zinc chromate primer to ID of Load Beam Roller (2) and press in two DU Bushings (47), one from each side, using an arbor press. Clean up excess primer.
3. Install Load Beam Roller into the Cam (13) and secure using clevis pin (28) and cotter pin (26). Install clevis pin from the side shown.
4. Install spring (43) on Cam using roll pin (34). Use arbor press to press in pin. Roll pin must not extend beyond the Cam from either side.
5. Assemble Toggle: Using an arbor press, plate, and press tool. Install two roller bearings (50) into the Toggle (12). Apply wet zinc chromate primer to Toggle bores prior to installing. Clean up excess primer.
6. Using an arbor press, install two DU bushings (46) into the Toggle (12), one from each side. Apply wet zinc chromate primer to Toggle bores prior to installing. Clean up excess primer.
7. Press the DU bushing (45) into the Load Beam Roller (3) using wet zinc chromate primer. Clean off excess primer.
8. Assemble Release Lever: Hook the loop of the spring (40) to the lug on the Manual Release Safety Device (5).
9. Assemble Load Beam: Using an arbor press, install spring (41) into the Load Beam (8) using roll pin (34).
10. Apply zinc chromate primer to two DU bushings (48) and press into Load Beam (8), one for each side, using an arbor press. Orient split in bushings as shown. Clean up excess primer.



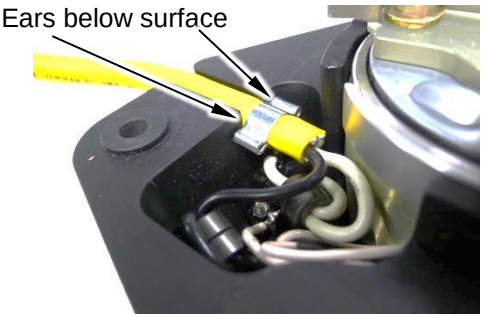
11. Assemble Side Plates: Using a flat blade screwdriver open up DU bushing (52) to 1.01" min OD.

    Orient DU bushing such that split is towards bottom of Side Plate (6 & 7) when installed (see lower right). Apply Loctite 680 retaining compound to ID of Side Plate hole; and install the bushing flush to outside surface of Side Plate using an arbor press.



12. Install roller bearings (49) flush to inside surface of Side Plates (6) & (7) using zinc chromate primer.
13. Assemble Relatch Lockout: Install DU bushing (51) using Loctite 680 retaining compound, into the Relatch Lockout (10). Press in using an arbor press. Ensure bushing does not extend past either side of the Relatch Lockout.

    Install spring (43) onto Relatch Lockout using roll pin (33). Place a 3/32" thick spacer in the gap to prevent bending the clevis feature.
14. Pack Mobilgrease 28 in Cam roller bearing of each of the Side Plates; and both roller bearings of the Toggle Assembly.
15. Apply a light coat of Mobilgrease 28 to Side Plates at Load Beam and Toggle lateral thrust surfaces and pockets where the Toggle dowel pins slide.
16. Install Solenoid Assembly: Install Solenoid Assembly to Solenoid Side Plate Assembly using bolt (36) with washer (16). Position the harness in the groove so that neither of the ears of the metal crimp protrudes above the surface of the Solenoid Housing. Do not tighten bolt all the way at this time.



17. Insert three bolts (33) through Solenoid Assembly and Side Plate.
18. Install the Manual Release Lever Assembly over the bolt while hooking the return spring loop over the roll pin. Make sure the spring goes over the top of the bolt.
19. Install the Toggle and Cam: Insert the bolt (29) through the Solenoid Side Plate. With the Cam positioned in the fork of the Toggle slide the Toggle over the bolt and at the same time fit the Cam into the roller bearing in the Side Plate.
20. Hook the loop of the Cam spring over the roll pin.
21. Place the Load Beam Roller into the fork of the Toggle Assembly and install a dowel pin (32). Insert a second dowel pin (32) into the Toggle at the Cam.
22. Position the Relatch Lockout Actuator assembly in the cavity in the Load Beam, and then slide them together over the Load Beam Shaft. Hook the loops of the springs over the roll pins as shown.
23. Press in the bumper (39) into the Solenoid Side Plate.
24. Mate the Side Plate Assembly to the Solenoid Side Plate: Before joining them the Load Beam must be in the latched position. To do this, operate the Manual Release Lever first, and then push up on the Load Beam and the Relatch Lockout at the same time. While the two halves are coming together, the Cam must be aligned with the roller bearing.
25. Install three bolts (35), washers (18), and nuts (17) in Side Plates. Torque nuts to 100-140 in-lb.
26. Install washer (20) and nut (19) on bolt and torque to 160-190 in-lb.

27. Install washer (22) and nut (23) on bolt at Manual Release Lever. Torque to 50-70 in-lb.
28. Install washer (25) and nut (23) on remaining two bolts. Press on the head of the bolt so the gap under the nut can be observed. Tighten to remove free-play only; do not over-torque or the washer will be deformed.
29. Torque the solenoid attach bolt to 50-70 in-lb.
30. Secure Cargo Hook to Cage using two bolts (69), four washers (70), and two nuts (71).

    Tighten until snug - do not torque nuts yet.

    NOTE: Use alternate bolts (96) if provided. Use washers (70) to fill gaps larger than .06" between brackets and cargo hook as needed. Alternate bolts are necessary if gap between brackets is greater than 2.9".
31. Attach Cargo Hook to Cone Assembly using four screws (72). Torque to 160-190 in-lb.
32. Go back to the Cage bolts; and torque the nuts to 100-140 in-lb.

13.0 Acceptance Test Procedure

After the Cargo Hook has been overhauled, repaired or stored for an extended period of time (see section 6.0) it must be subjected to the Acceptance Test Procedure (ATP) as follows. Examine the Cargo Hook externally for security of the fasteners. There must be no sign of FOD in or around the hook. Suspend the Cargo Hook from a test rig capable of applying a load of 12,000 pounds (5443 kg). Use a Target Stem and shackle to apply the load to the Load Beam.

13.1 Manual Release Test

Measure the force required to operate Manual Release Lever. Insert the Test Stem into the Cargo Hook receiver hole. Lift the guard and use a force gauge to apply a downward force to the outer tip of the Manual Release Lever until the hook opens. Steady the hook with one hand; and hold the force gauge with the other. Apply the force gauge and record the required force. The measurement should be between 5.5 and 8.5 lb.

The Load Beam should fall open, releasing the Test Stem; and stay open. Close the Load Beam using the Test Stem. Ensure that each time the hook is closed the hook locked engraving lines up with the indicator on the Cam. Also ensure the Release Lever Guard fully locks with each release cycle.

13.2 No Load Release Test

Verify the electrical release of the hook. Insert the Test Stem (77) into the Cargo Hook receiver hole. Connect the yellow (NEMA 15-5) connector to the Cargo Hook; and set the voltage to 22.0 ± 0.5 VCD.

- Actuate the release switch very *briefly* without holding it down (less than ½ second). The Load Beam should remain closed; and the mechanism should *not* audibly cycle.
- Actuate and hold the release switch for a few seconds. The Load Beam should fall to the open position, releasing the Test Stem; and then should continue to audibly cycle repeatedly. Close the Load Beam by pushing the Test Stem into the receiver hole. *Repeat step for 2 cycles.*

13.3 Proof Load Test

⚠ WARNING

Do not release the proof test load electrically or manually. Decrease the load gradually, using the test machine, after completion of the proof load test.

Disconnect the electrical cable. Load the Target Stem (83) onto the Load Beam. Use a 3/4" shackle with a Ø7/8" bolt to rig the stem to the test stand. Gradually apply a proof load of 12,000 pounds. ENSURE THAT THE PROOF LOAD IS NOT EXCEEDED. Hold the load for 30 seconds. The Load Beam shall hold the load without unlatching. DO NOT RELEASE THE LOAD. Reduce the load back to zero.

13.4 Electrical Release Test

CAUTION

The Cargo Hook must be attached to the Cone Adapter to prevent damage to the hook.

Connect the electrical cable. Set the voltage to 22.0 ±.5 VDC. Release the Cargo Hook electrically at 2,000 lbs., 4,000 lbs, and 6,000 lbs. Verify the current draw during electrical release operation does not exceed 15A.

Remove the hook from the test stand.

14.0 Trouble Shooting

Table 14.1 Trouble Shooting

Symptom	Probable Cause	Remedy
Cargo Hook does not open electrically, Cargo Hook opens normally with Manual Release Lever.	Open electrical circuit, faulty wiring, circuit breaker, switch, Surefire module, or solenoid.	Hold the release switch for a longer time. The time delay circuit incorporates an electronic delay of approximately ½ second after which time the hook solenoid will activate repeatedly. If the release switch is not held down long enough the hook solenoid will not activate. Check the aircraft circuit for opens and shorts by using a multi-meter on the hook connector. When the release switch is pressed 28V aircraft voltage should be present on the connector pins. Check the aircraft connector polarity. The time delay circuit is polarity sensitive and protected against reverse polarity. Check the power pins on the hook itself. A multi-meter set to the kilo-ohms range should read between 2-8Kohms. Some auto-ranging meters will not read properly so be sure to try a manual kilo-ohms range. If the meter reads open or short there is a problem with the solenoid module itself and the hook should be replaced or repaired.
Cargo Hook cannot be opened electrically or manually.	Jammed internal mechanism, bearings seized from corrosion.	Disassemble Cargo Hook and inspect internal mechanism for foreign objects. Check each pivot point for freedom of rotation. Repair as necessary.
Lock Indicator fails to align when closed.	Accumulated dust, dirt and grime. Corrosion on pivot bushings.	Remove immediately from service for disassembly, inspection and cleaning.
Circuit breaker opens when Cargo Hook is energized.	Short in the system, faulty wiring, circuit breaker or solenoid.	Check for shorts to ground. Remove Solenoid Cover and check wiring, check solenoid resistance, repair or replace defective parts.
Cargo Hook does not latch on to Target.	Not lowered down far enough. Damaged Target. Accumulated dust, dirt and grime. Jammed internal mechanism.	Ensure Target is level, surrounding area is clear and stem is at proper height. Inspect internal mechanism for binding, jamming, and worn or broken parts. Check each pivot point for freedom of rotation. Repair as necessary.

15.0 Illustrated Parts List

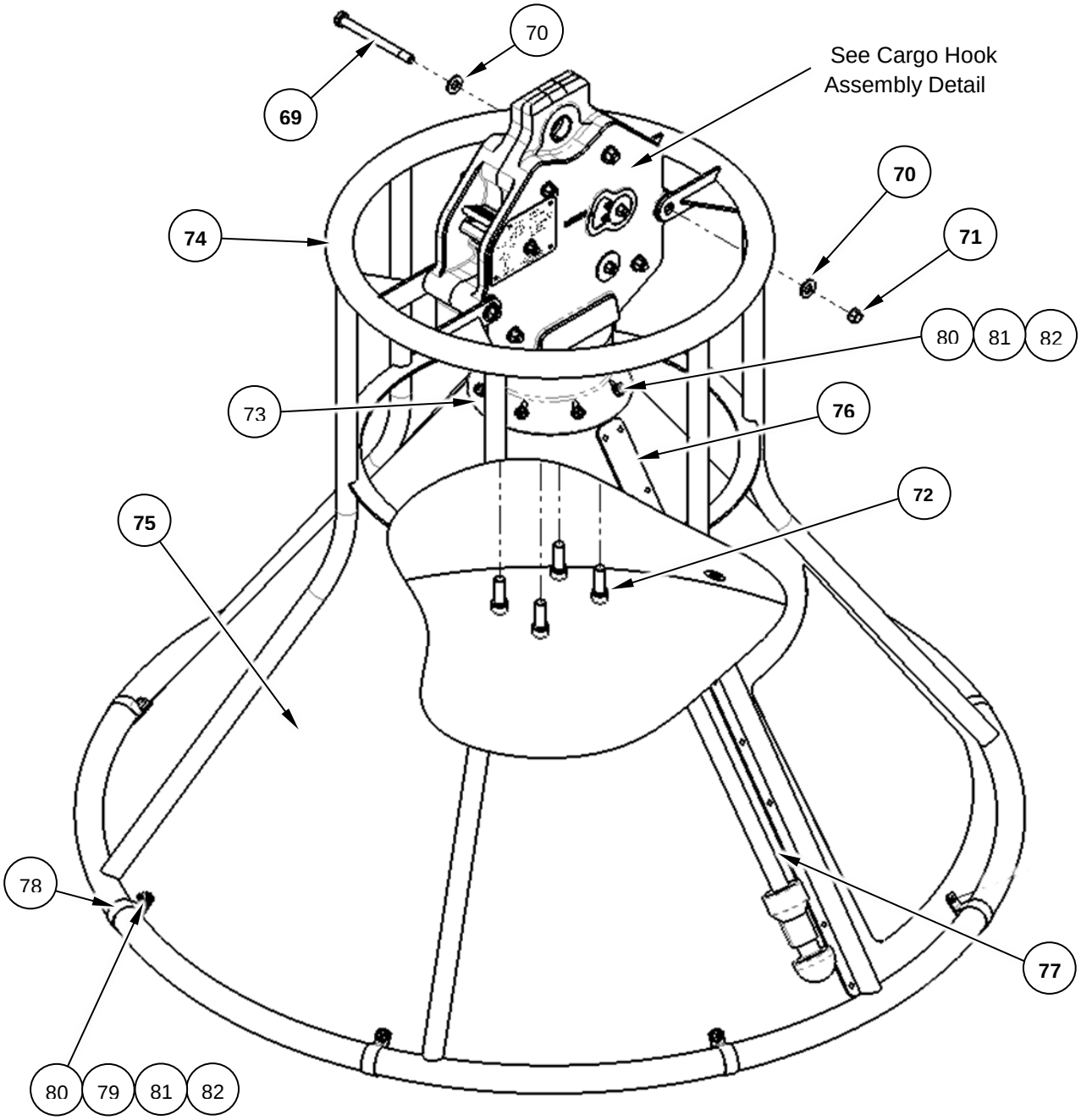
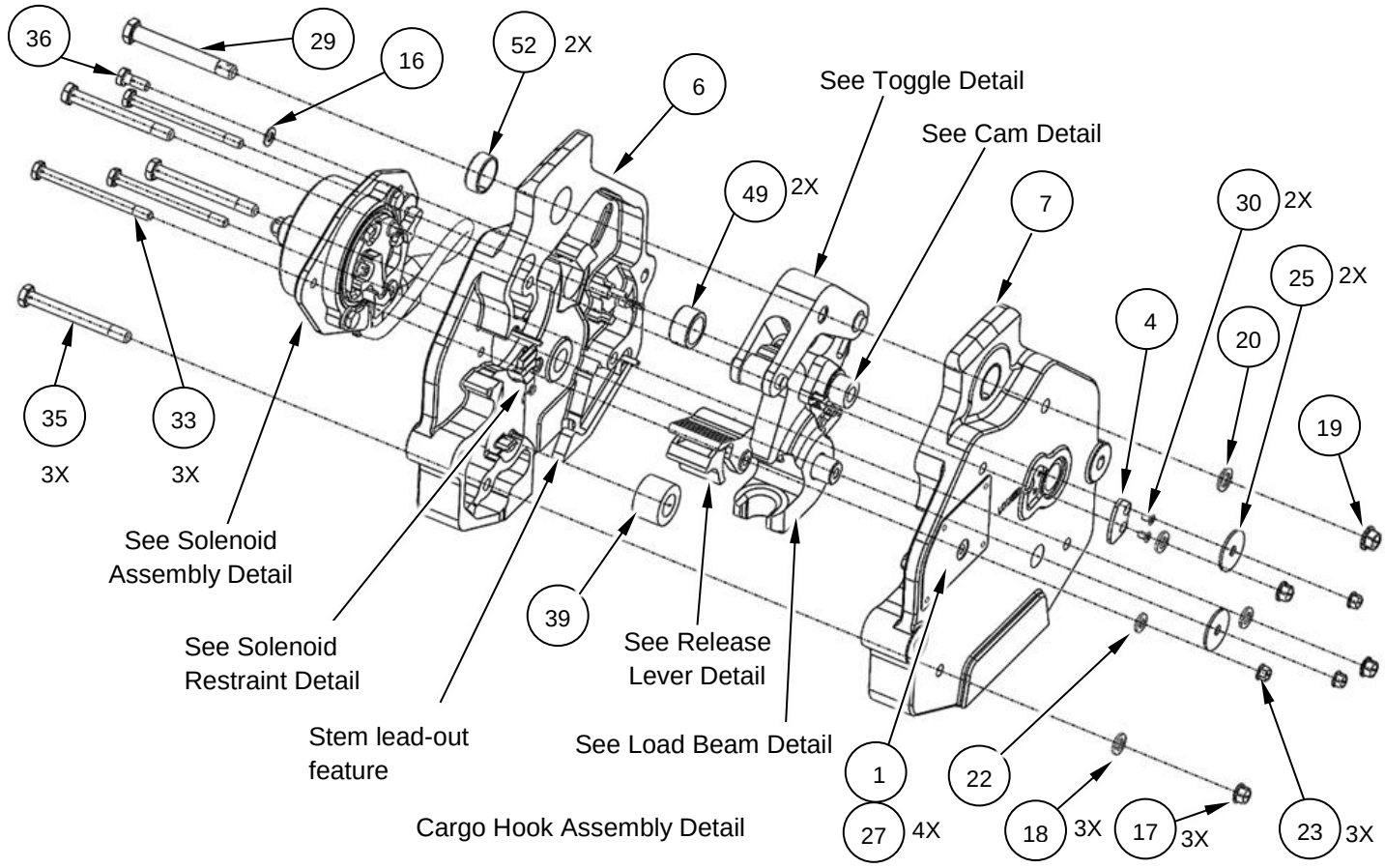


Figure 15.1 Auto-Loc Cargo Hook Assembly



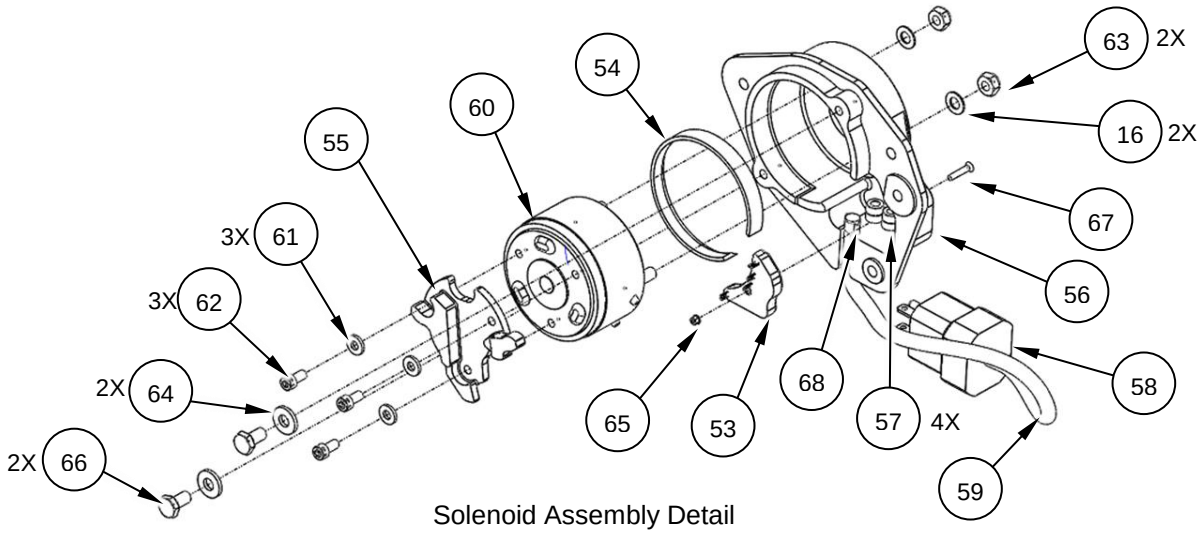


Figure 15.2 Auto-Loc Cargo Hook Parts

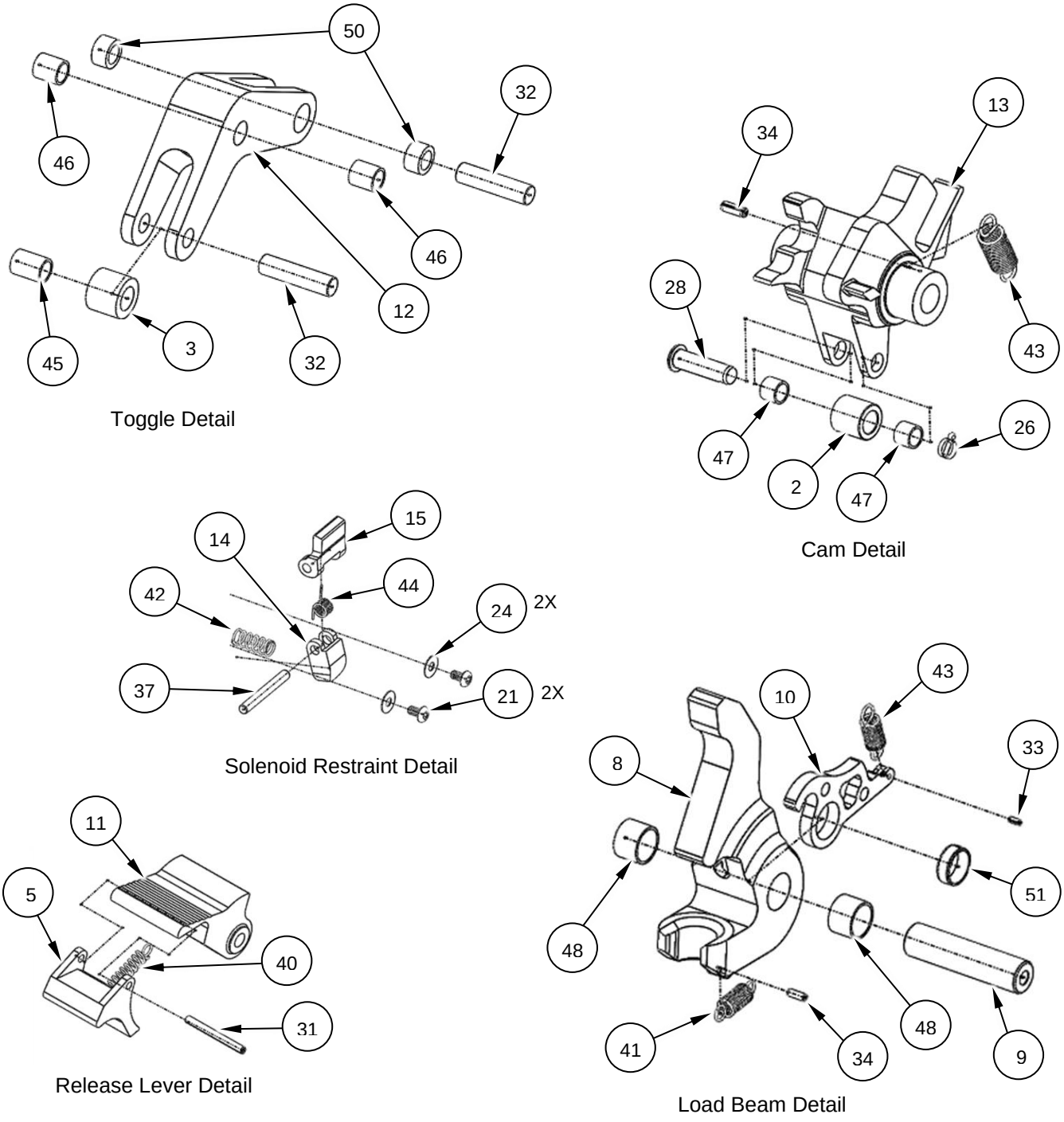


Figure 15.3 Auto-Loc Cargo Hook Subassembly Parts

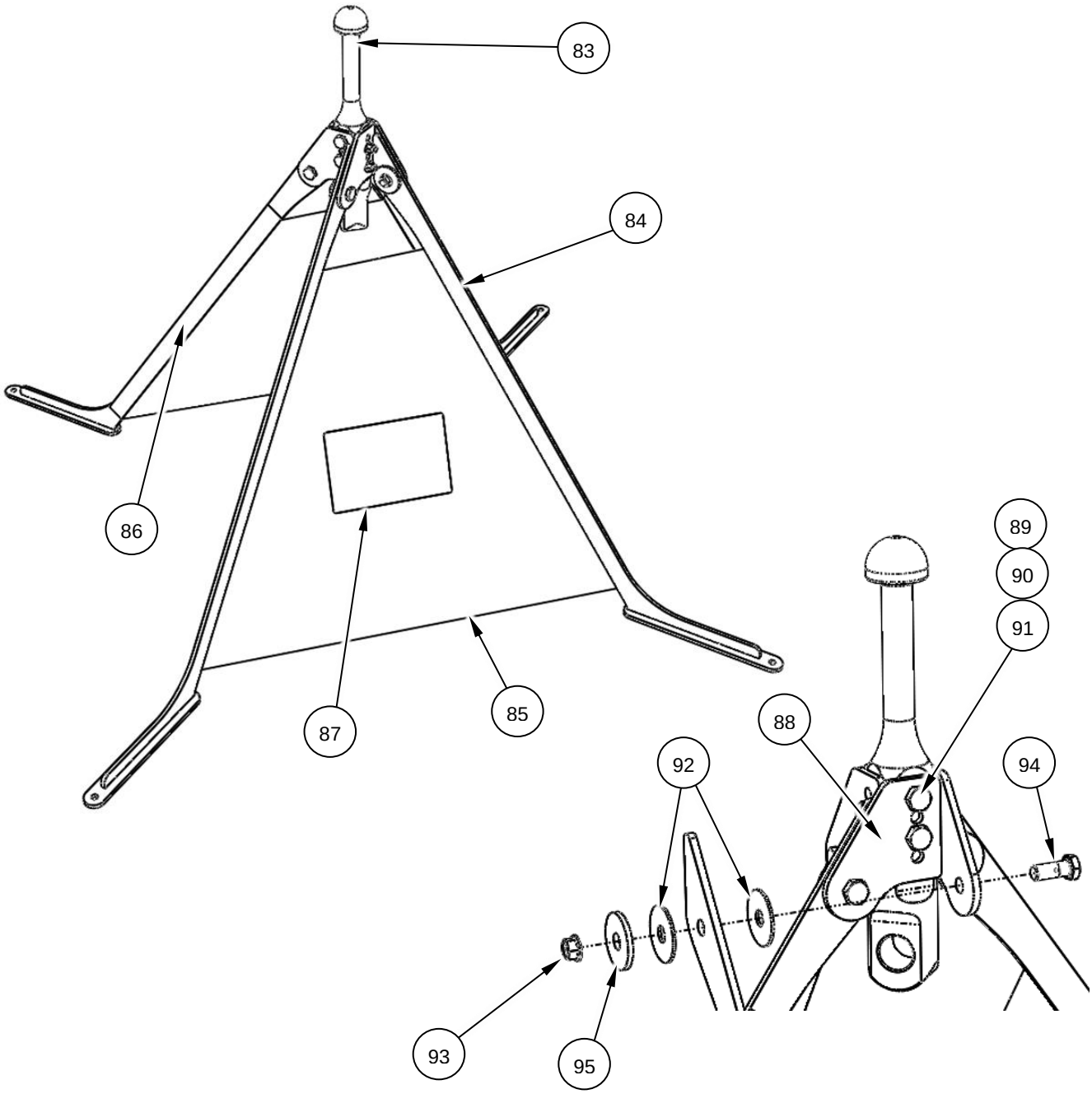


Figure 15.4 Target Assembly Parts

Table 15.1 Auto-Loc Parts List

ITEM	P/N	DESCRIPTION	QTY	QTY IN OVERHAUL KIT
1	235-268-00	SERIAL PLATE BLANK	1	-
2	290-438-00	ROLLER - LOAD BEAM	1	-
3	290-721-00	LOAD BEAM ROLLER	1	-
4	291-750-00	WINDOW	1	-
5	291-769-00	RELEASE LEVER SAFETY	1	-
6	291-918-00	SIDEPLATE - SOLENOID	1	-
7	291-919-00	SIDE PLATE	1	-
8	291-922-00	LOAD BEAM	1	-
9	291-923-00	LOAD BEAM SHAFT	1	-
10	291-924-00	RELATCH LOCKOUT	1	-
11	291-925-00	MANUAL RELEASE LEVER	1	-
12	291-929-00	TOGGLE	1	-
13	291-930-00	CAM	1	-
14	291-933-00	SOLENOID RESTRAINT ACTUATOR	1	-
15	291-934-00	SOLENOID RESTRAINT LATCH	1	-
16	510-100-00	WASHER	3	3
17	510-104-00	NUT	3	3
18	510-105-00	WASHER	3	3
19	510-129-00	NUT	1	1
20	510-174-00	WASHER	1	1
21	510-211-00	SCREW	2	2
22	510-219-00	WASHER	1	1
23	510-227-00	NUT	3	3
24	510-278-00	WASHER	2	2
25	510-336-00	WASHER	2	2
26	510-417-00	COTTER PIN	1	1
27	510-429-00	DRIVE SCREW	4	-
28	510-494-00	PIN	1	1
29	510-546-00	BOLT	1	1
30	510-706-00	SCREW	2	2
31	510-960-00	ROLL PIN	1	1

32	511-134-00	DOWEL PIN SS .375D X 1.375L	2	2
33	511-138-00	BOLT	3	3
34	510-428-00	ROLL PIN	2	2
35	511-141-00	BOLT	3	3
36	511-142-00	BOLT	1	1
37	511-143-00	DOWEL PIN	1	-
39	514-010-00	BUMPER	1	1
40	514-015-00	SPRING	1	1
41	514-021-00	SPRING	1	1
42	514-126-00	COMPRESSION SPRING	1	1
43	514-124-00	SPRING	2	2
44	514-125-00	TORSION SPRING 270 DEGREE	1	1
45	517-015-00	DU BUSHING	1	1
46	517-016-00	DU BUSHING	2	2
47	517-021-00	DU BUSHING	2	2
48	517-025-00	DU BUSHING	2	2
49	517-026-00	BEARING	2	2
50	517-038-00	ROLLER BEARING	2	2
51	517-130-00	DU BUSHING	1	1
52	517-095-00	DU BUSHING	2	2
53	232-727-00	SUREFIRE MODULE	1	-
54	290-727-00	WEDGE RING	1	-
55	291-927-00	SOLENOID ACTUATOR	1	-
56	291-928-00	SOLENOID COVER	1	-
57	320-014-00	FERRITE TOROID	4	-
58	410-300-00	PLUG, 15A, 125V, 15-5P, 2P, 3W	1	-
59	420-117-00	CABLE 18 AWG 3 COND.	AR	-
60	455-004-00	SOLENOID	1	-
61	510-042-00	WASHER	3	3
62	510-156-00	SCREW	3	3
63	510-114-00	NUT	2	2
64	510-436-00	WASHER	2	2
65	510-922-00	NUT	1	1
66	511-061-00	BOLT	2	2

67	511-118-00	SCREW	1	1
68	512-060-00	DOUBLE PINCH HOSE CLAMP	1	-
69	511-139-00	BOLT	2	2
70	511-140-00	WASHER	2	2
71	510-104-00	NUT	2	2
72	511-137-00	SCREW	4	4
73	291-920-00	CONE ADAPTER	1	-
74	235-265-00	CAGE WELDMENT	1	-
75	235-261-00	CONE HALF	2	-
76	235-263-00	JOINT PLATE	2	-
77	232-755-00	TEST STEM	1	-
78	512-063-00	LOOP CLAMP	8	-
79	511-150-00	TINNERMAN WASHER	8	8
80	511-129-00	SCREW	16	16
81	511-149-00	NUT	16	16
82	510-095-00	WASHER	16	16
83	291-921-00	STEM - TARGET	1	-
84	235-266-00	LEG - FOLDING TARGET	4	-
85	491-012-00	VISIBILITY PANEL	2	-
86	511-146-00	HOOK FASTENER	AR	-
87	215-347-00	NOTICE DECAL	1	-
88	235-267-00	PIVOT PLATE - TARGET	4	-
89	510-104-00	NUT	4	-
90	510-953-00	BOLT	4	-
91	510-239-00	WASHER	4	-
92	511-131-00	WASHER PTFE	8	-
93	510-129-00	NUT	4	-
94	511-133-00	BOLT	4	-
95	511-132-00	WASHER	4	-
96	511-333-00	ALTERNATE BOLT	2	2

16.0 Instructions for Returning Equipment to the Factory

If an Onboard Systems product must be returned to the factory for any reason (including returns, service, repairs, overhaul, etc.) obtain an RMA number before shipping your return.

NOTICE

An RMA number is required for all equipment returns.

To obtain an RMA, please use one of the listed methods.

- Contact Technical Support by phone or e-mail (Techhelp@OnboardSystems.com).
- Generate an RMA number at our website: http://www.onboardsystems.com/rma.php

After you have obtained the RMA number, please be sure to:

- Package the component carefully to ensure safe transit.
- Write the RMA number on the outside of the box or on the mailing label.
- Include the RMA number and reason for the return on your purchase or work order.
- Include your name, address, phone and fax number and email (as applicable).
- Return the components freight, cartage, insurance and customs prepaid to:

  Onboard Systems
  13915 NW 3rd Court
  Vancouver, Washington 98685
  USA
  Phone: 360-546-3072