

Cargo Hook Suspension System w/ Keeperless Cargo Hook STC SR00713SE

System Part Numbers

200-088-10	200-089-10
200-088-11	200-089-11
	200-089-20
	200-089-21
	200-089-22
	200-089-23
	200-089-24
	200-089-25
	200-089-26
	200-089-27

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RECORD OF REVISIONS

Revision	Date	Page(s)	Reason for Revision
0	12/07/21	All	Initial Release
1	11/06/24	12, 21	Added instruction to return the Load Cell Assembly to the factory at cargo hook suspension system overhaul (section 5.2), added C-40 Indicator P/N 210-293-01.

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Section 0 Introduction

0.4 Scope

The following information is necessary to carry out the service, maintenance, and inspection of Cargo Hook Suspension System P/N's 200-088 series and 200-089 series.

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The Cargo Hook Suspension Systems provide a means for Bell 205, 212, 412, UH-1 rotorcraft to transport jettisonable external loads. They are direct replacements for the Bell P/N 204-072-915-025 and 204-072-915-103 suspension systems. These systems interface with the helicopter's existing fixed provisions and include the cargo hook and bumper, the suspension assembly which serves as the structure to connect the cargo hook to the helicopter's structure and incorporates the electrical slip-ring assembly, the electrical release system which interfaces with the helicopter's existing internal cargo hook release wiring, and a manual release cable which interfaces with the helicopter's existing internal cargo hook manual release system.







0.5 Arrangement

The manual is arranged in the general order that maintenance personnel would use to maintain and operate the Cargo Hook Suspension System in service.

The arrangement is:

Section 0 Introduction

Section 4 Airworthiness Limitations (None apply to this System.)

Section 5 Inspection and Overhaul Schedule

Section 11 Placards and Markings

Section 12 Servicing

Section 25 Equipment and Furnishings

Section 98 Wiring Diagrams

0.6 Applicability

These Instructions for Continued Airworthiness are applicable to the following Cargo Hook Suspension System P/Ns.

200-088-10	200-089-22
200-088-11	200-089-23
200-089-10	200-089-24
200-089-11	200-089-25
200-089-20	200-089-26
200-089-21	200-089-27

0.9 Abbreviations

CMM Component Maintenance Manual

- ICA Instructions for Continued Airworthiness
- FAA Federal Aviation Administration



0.12 Safety labels

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





ACAUTION



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

Indicates a hazardous situation which, if not avoided, <u>could</u> 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.

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0.19 Distribution of Instructions for Continued Airworthiness

Before performing maintenance ensure that the Instructions for Continued Airworthiness (ICA) in your possession is the most recent revision. Current revision levels of all manuals are posted on Onboard Systems Int'l web site at <u>www.onboardsystems.com</u>.

Onboard Systems offers a free notification service via fax or e-mail for product alerts and documentation updates. By registering Onboard Systems products on the web site, we will be able to contact you if a service bulletin is issued, or if the documentation is updated.

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Section 4 Airworthiness Limitations

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

No airworthiness limitations are associated with this type design change.

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Section 5 Inspection and Overhaul Schedule

The scheduled inspection intervals noted below are maximums and are not to be exceeded. If the cargo hook is subjected to unusual circumstances, extreme environmental conditions, etc., it is the responsibility of the operator to perform the inspections more frequently to ensure proper operation.

There is no maintenance to be performed on the Load Weigh Indicator. Do not open the enclosure, if repair is needed return it to the factory.

5.1 Annual/100 Hour Inspection

Annually or 100 hours of external load operations, whichever comes first, inspect the cargo hook suspension system per the following.



Hours of external load operations should be interpreted to be (1) anything is attached to the primary cargo hook (whether or not a useful load is being transported) and (2) the aircraft is flying. If these conditions are NOT met, time does NOT need to be tracked.



The C-40 Indicator also records and displays external load time accumulated on the cargo hook to facilitate timely inspection and overhaul of the cargo hook suspension. Refer to the Owner's Manual for the Indicator for details and using this function.

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- 1. Check the function of the cargo hook's <u>primary</u> (electrical) release system per the following.
 - Press the release switch on the cyclic. With no load on it, the cargo hook load beam should fall to the open position.
 - Push up on the load beam and verify that it latches and the hook lock indicator is aligned with the engraved lines on the outside of the cargo hook (see Figure 5.1).

Figure 5.1 Hook Lock Indicator



The following instructions are applicable to optional cargo hook P/N 528-020-12. In addition to the P/N, this cargo hook can also be identified by its gold anodized solenoid cover. This cargo hook P/N has a time-delay circuit which provides an approximate $\frac{1}{2}$ second delay between the time the release switch is pushed and the cargo hook opens to protect against inadvertent release.

- Press and <u>release</u> the Cargo Release switch very briefly without holding it down. The load beam should remain *closed*.
- Press and <u>hold</u> the Cargo Release switch for a few seconds. The load beam should fall to the open position and the cargo hook solenoid should continue to cycle repeatedly.
- Reset the load beam by hand and verify the hook lock indicator returns to the fully locked position.

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- 2. Check the function of the cargo hook's <u>backup</u> (manual) release system per the following.
 - Actuate the manual release system using the cockpit control. With no load on the cargo hook, the load beam should fall open.
 - Push up on the load beam and verify that it latches and the hook lock indicator is aligned with the engraved lines on the outside of the cargo hook.
- At the Cargo Hook, rotate the manual release lever (present on cargo hook P/N 528-020-10 and 528-010-12 and can be retrofitted to earlier cargo hook P/Ns) in the counterclockwise direction. The lever should rotate smoothly and the cargo hook load beam should fall open.
- 4. Inspect and verify that the manual release lever (if present) cannot be inadvertently snagged/opened by adjacent rigging, electrical cord, etc.
- 5. Move the cargo hook suspension throughout its range of motion within the hook well and ensure that it swings freely in all directions and has clearance with surrounding equipment on the aircraft.
- 6. Visually inspect cargo hook and suspension for presence and security of fasteners.
- 7. Visually inspect the cargo hook housing and load beam for cracks and damage. If damage is observed refer to the cargo hook CMM for limits.
- 8. If the Load Weigh Indicator is installed, inspect it for security of attachment.

5.2 Cargo Hook Suspension System Overhaul

Time Between Overhaul (TBO) for the cargo hook and the suspension: 1500 hours of external load operations or 6 years, whichever comes first.

Overhaul instructions for the cargo hook are contained in CMM 122-004-00 and overhaul instructions for the suspension are contained in CMM 122-028-00. Contact Onboard Systems for guidance to locate authorized overhaul facilities.

If the load weigh system is installed, at overhaul of the cargo hook suspension, return the Load Cell Assembly (P/N 210-088-01 or 210-088-02) to the factory for inspection and calibration. The factory will inspect the condition of the load cell and perform acceptance test procedures including calibration and zero balance, repairing as necessary.



Section 11 Placards and Markings

The following placards are included with the cargo hook kit.

Placard part number (P/N) and appearance	Location
P/N 215-343-00 CARGO RELEASE: HOLD FOR > 1 SECOND	Located adjacent to the cargo hook release switch on the cyclic if cargo hook P/N 528- 020-12 is installed.
P/N 215-336-00	Mounted on the solenoid housing on cargo hook P/N 528-020-12.
P/N 215-318-00 WARNING Keep all cables and rigging clear of manual release lever	Mounted adjacent to and forward of the manual release lever on the side of the cargo hook frame.
P/N 215-240-00	Mounted on the top side of the cargo hook
A WARNING Inadvertent loss of load can result from improper cable adjustment. See manual for complete instructions.	frame.



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Section 12 Servicing

12.2 Lubrication Information



Some combinations of load weight and airspeed may cause the bumper to bind against the inside of the airframe hell-hole and the sling load to rotate independently of the suspension system. This situation can lead to inadvertent loss of load. The outside diameter surface of the bumper should be lubricated with grease such as AeroShell 7 or Mobilgrease 28 to prevent seizure from occurring.



Section 25 Equipment and Furnishings

25.5 Component Weights and CG

The weights and CGs of the cargo hook suspension and load weigh indicator are listed in the table below.

Item	Weight	Station	
Cargo Hook Suspension	29.0 lbs. (13.1 kg)	138.0	
Load Weigh Indicator	0.55 lbs (.24 kg)	*	

Location is optional within the cockpit.

25.12 Storage Instructions

Refer to CMMs 122-004-00 and 122-028-00 for storage instructions for the cargo hook and the suspension system.

25.15 Trouble Shooting

Table 25.1 is provided with the intention of isolating the cause of malfunctions within the system. Sections 25.16 and 25.17 include instructions for removing and replacing defective components.

Table	25.1	Trouble	Shooting
-------	------	---------	----------

Malfunction	Probable Cause	Corrective Action
Cargo hook does not	Defective internal	Remove and replace cargo hook (see sections 25.16
open with primary	mechanism.	and 25.17) or repair per CMM 122-004-00.
release or backup		
manual release or the		
manual release lever.		
Cargo hook (all P/Ns	Open electrical circuit,	Using multi-meter, check for 1.6 to 2.2 ohms between
except 528-020-12) does	faulty wiring,	pins B and C of electrical connector. If open indication is
not operate electrically,	fuse/circuit breaker,	obtained, remove and replace cargo hook (see sections
manual release operates	switch or solenoid.	25.16 and 25.17) or repair per CMM 122-004-00.
normally.		Check the aircraft circuit for opens and shorts by using a
		multi-meter on the cargo hook connector. When the
		release switch is pressed, aircraft voltage (28V) should
		be on the connector pins.
		Check continuity through the slip-ring assembly.
		Cargo hook uses aircraft's existing circuit breaker, relay,
		switches, and internal wiring. Refer to the maintenance
		manual for the aircraft for these items.
Cargo hook P/N 528-020-	Release switch not	Hold the release switch for a longer time. The primary
12 (includes Surefire time	held down long	electrical release includes a time delay circuit which
delay circuit) does not	enough.	incorporates an electronic delay of approximately 1/2
manual release operates		second after which time the cargo hook solenoid will
normally.		activate repeatedly. If the release switch is not held
		down long enough the solenoid will not activate.



Malfunction	Probable Cause	Corrective Action
Cargo hook P/N 528-020- 12 (includes Surefire time delay circuit) does not operate electrically, manual release operates	Open electrical circuit, faulty wiring, circuit breaker, relay, switch or solenoid.	Check the aircraft circuit for opens and shorts by using a multi-meter on the primary release connector (on the side of the hook). When the release switch is pressed 28V aircraft voltage should be present on the connector pins.
normally.		Check the aircraft connector polarity. The time delay circuit is polarity sensitive and protected against reverse polarity. +28V should be on pin B and ground on pin C.
		Check the power pins on the hook itself. A multi-meter set to the kilo-ohms range should read between 2 and 8 kilo-ohms. 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 per CMM 122-004-00.
		Cargo hook uses aircraft's existing circuit breaker, relay, switches, and internal wiring. Refer to the maintenance manual for the aircraft for these items.
Cargo hook does not	Broken manual release	Check manual release cable routing from cargo hook to
CARGO RELEASE pedal	disconnected or	Adjust rigging if necessary or remove and replace the
is depressed.	improper adjustment.	manual release cable per Section 25. Cargo hook uses
		the aircraft internal manual release cable system from the
		top of suspension to the foot pedal in the cockpit, refer to
		the aircraft's maintenance manual for this system.
Slip-ring accessories do	Faulty wiring, circuit	Check continuity through slip-ring assembly. Repair or
receptacle	ring contacts	Teplace delective parts per Civili 122-020-00.
The displayed load on	Incorrect calibration	Ensure the correct calibration code has been entered.
the Indicator is incorrect.	code.	refer to applicable Owner's Manual for the Indicator
		model (C-39 or C-40) installed.
C-39 Indicator displayed	Dampening level is too	Adjust the dampening level to a larger number. Refer to
load is not stable.	small.	Owner's Manual for instructions.
C-39 Indicator displayed	Dampening level is too	Adjust the dampening level to a smaller number. Refer to
load takes too long to	large.	Owner's Manual for instructions.
change the reading when		
the load is changed.	Defective lead call	Oberely for demonstrative terrare and here are
change with changing	Defective load cell,	Check for damaged internal Wire harness and harness
book loads		for load weigh schematics), remove and replace wire
HOUR IDAUS.	harness	harness or load cell (see sections 25.16 and 25.17 for
		load cell removal and replacement).



Malfunction	Probable Cause	Corrective Action
Indicator displays large negative load.	Indicator was zeroed under load.	Un-zero indicator. Refer to the applicable Owner's Manual for the Indicator for instructions.
C-40 Indicator analog bar not in sync with displayed load.	Indicator is zeroed; analog bar always displays un-zeroed load.	Un-zero indicator. Refer to the Owner's Manual for the C- 40 Indicator for instructions.

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25.16 Component Removal

25.16.1 Suspension System Removal

1. Disconnect the electrical release harness connector, load weigh harness (if installed) and any accessory connectors from their respective connectors mounted to the airframe (near the top of the suspension).

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- 2. Remove the screw securing the ground strap to airframe ground.
- 3. Disconnect the suspension's manual release cable from the fixed manual release cable at the lift beam near the upper end of the suspension.
- 4. Remove the cotter pin, nut, washer, and bolt securing the suspension clevis to the aircraft hard point and remove the suspension from the aircraft.

25.16.2 Cargo Hook Removal

- 1. Remove the sealant over the screw and remove the screw securing the ground strap to the side plate adjacent to the lower manual release cable.
- 2. Disconnect the electrical release harness connector from the cargo hook connector.
- 3. At the end of the Swing Arm, remove the cotter pin which captures the cable from the cargo hook and slide the cable out of the slot in the Swing Arm.



Figure 25.1 Cable Connection to Cargo Hook

4. Remove the cotter pins, nuts, washers and bolts securing the cargo hook to the suspension links and separate the cargo hook from the suspension.

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25.16.3 Manual Release Cable Removal

- 1. At the top of the Cargo Hook, remove the cotter pin at the swing arm, remove the nylon bushing, move the release cable to the large end of the slot and pull the cable up through.
- 2. At the top of the suspension's bell housing, remove the screw securing the clamp over the manual release cable conduit and then pull the manual release cable down through the suspension to remove it.

25.16.4 Load Indicator Removal

The load indicator location in the cockpit is optional. Remove it per the following.

- 1. Disconnect the electrical connector at the back of the indicator.
- 2. Remove the four screws securing the Indicator to its mounting location and remove the indicator.

25.16.5 Load Cell Removal

The load cell is part of the optional Load Weigh System and serves as part of the suspension linkage between the cargo hook and the aircraft hardpoint (it is located at the upper end of the suspension).

- 1. Remove the suspension assembly from the aircraft.
- 2. Remove the cotter pins, nuts and washers from the bolts securing each end of the load cell assembly to the mating parts of the suspension assembly.

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25.17 Component Re-installation

25.17.1 Cargo Hook Re-installation

- Slide the Bumper over the cargo hook from the bottom side of the cargo hook and align its holes with the holes in the cargo hook frame. For Cargo Hook P/Ns 528-020-10 and 528-020-12 or one that has been retrofitted with the same manual release lever, rotate the lever to allow the bumper to be slid up over the cargo hook.
- 2. Insert four spacers into the bumper as shown below and insert the bolts through and secure with nuts. Tighten nuts to 60-85 in-lbs.
- 3. Attach the cargo hook with bumper to the suspension links by sliding it within the pairs of links and inserting a bolt through each cargo hook lug and adjacent links.
- 4. Secure each bolt with washer and nut. Tighten nuts until fully seated, then rotate to previous castellation if necessary to insert cotter pin.



Figure 25.2 Cargo Hook and Bumper Hardware

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- 5. Connect the electrical connector from the Suspension to the Cargo Hook connector.
- Slide the cable ball end of the manual release cable from the cargo hook through the slot in the Swing Arm and capture it by inserting cotter pin. Adjustment of the cable will be checked at suspension re-installation onto the helicopter.

25.17.2 Load Indicator Re-installation

The load indicator (C-40 model (P/N 210-293-00 or P/N 210-293-01) or C-39 model (P/N 210-095-00 or P/N 210-095-02)) installation position is optional in the cockpit. These indicators are designed to fit a standard 2 ¼" instrument panel hole.

- 1. Connect the connector from the internal electrical harness to the indicator's connector.
- Position the load indicator within its mounting hole and secure with four screws. The C-40 Indicator features 6-32 threaded inserts to accept MS35214-26 screws or length as needed to accommodate the thickness of the mounting surface. The C-39 Indicator has four Ø.170 clearance holes.

25.17.3 Load Cell Re-installation

- 1. Apply grease (Mobilgrease 28 (MIL-PRF-81322) is recommended grease) to outside diameter of the bolts (P/N 232-011-00).
- 2. Position either end of the load cell within the lugs of the adjacent parts and secure with hardware as shown below. The direction of the load cell electrical harness is not critical but may depend on where the connector bracket is installed.
- 3. Tighten each nut finger tight, and then rotate to previous castellation if necessary to install cotter pin. After tightening ensure each joint rotates freely.

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Figure 25.3 Load Cell Re-installation



25.17.4 Manual Release Cable Re-installation

- 1. Insert the manual release cable up through the center of the suspension system and feed it out through the hole in the top of the bell housing and loosely through the clamp at the top of the bell housing (ref. Figure 25.4
- Insert the lower housing of the manual release cable conduit into the Cable Support, positioning its flange .03/08 below the Cable Support as shown in Figure 25.4. Secure the manual release cable conduit in position by tightening the clamp at the top of the bell housing.
- 3. Slide the inner cable through the slot in the Swing Arm and capture it with the cotter pin.
- 4. Insert the Nylon Bushing over the inner cable.

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25.17.5 Suspension Re-installation

1. Position the suspension system with the slip-ring assembly oriented as shown below and secure it to the hard point with the bolt, washer, nut and cotter pin from the Bell provisions kit.

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Figure 25.5 Suspension System Installation

- 2. Connect the electrical connector from the suspension system to the existing fixed provisions connector near the hard point.
- 3. At the top of the suspension system route the free end of the manual release cable to the right of the hard point (see Figure 25.6).
- Engage the cable ball end of the manual release cable into the existing cable connector (Bell P/N 204-070-995) and secure with cotter pin (P/N MS24665-155).
- Remove the existing screw and washer from the clamp (Bell P/N 204-070-996-001).
- 6. Place outer conduit of manual release cable into the clamp and locate the end approximately .42" (10.7 mm) past the edge of the clamp as shown. Place the ring terminal of the ground strap from the Suspension System under the screw head and washer and tighten screw to secure the clamp around the conduit.
- Adjust the Connector (Bell P/N 204-070-995) to obtain .10" (2.5 mm) of clearance between the underside of the swing arm and the cable ball end of



the manual release cable (see Cable Setting Detail). The adjustment bolt of the swing arm should be in contact with the top of the cargo hook case and the swing arm should be approximately parallel to the top of the cargo hook case when the .10" measurement is taken.

8. Pull the lower manual release cable outwards from the hook to remove all of its slack and measure the clearance between its cable ball end and the swing arm. This measurement shall be .12/.18" (see Cable Setting Detail) when the load beam is closed and locked.



When rigging the manual release cable, the cargo hook load beam must be in the closed and locked position.

9. If adjustment is made to the adjustment bolt in order to obtain proper clearance, re-check adjustment of both the upper and lower manual release cables.

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