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Cargo Hook Suspension System

for the

Robinson R22 Series With Talon LC Keeperless Cargo Hook

Kit Part Number 200-262-01

Owner's Manual

Owner's Manual Number 120-095-01
Revision 2
06/18/19

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Record of Revisions

Revision	*Date*	*Page(s)*	*Reason for Revision*
0	07/25/11	All	Initial Release
1	02/28/14	1-2, 2-11, 2-13, -3-5	Updated Bill Of Materials and installation instructions to replace switch housing, cap, and switch (P/N 232-052-00, 400-054-00 and 400-053-00) with switch housing and switch (P/N 232-052-01 and 400-059-00). Updated cargo hook load rigging figure.
2	06/18/19	2-21, 4-1, 4-6	Clarified instructions for safety wiring of connector, updated definition of "hours of external load operations".

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Section 1
General Information

Introduction

The 200-262-01 Cargo Hook Kit is approved for the Robinson R22 Series Helicopters.

Safety Labels

The following definitions apply to the symbols used throughout this manual to draw the reader's attention to safety instructions as well as other important messages.

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.

Bill of Materials

The following items are included with the Cargo Hook Suspension System. If shortages are found contact the company from whom the system was purchased.

Table 1-1 Bill of Materials

Part No.	Description	Qty
120-095-01	System Owners Manual	1
121-004-01	RFM Supplement	1
122-017-00	Component Maintenance Manual	1
215-113-00	External Load Limit 400 Decal	1
215-118-00	R22/44 Multiple Decal Sheet	1
232-049-00	Gimbal Assembly	1
232-050-00	Link Assembly	1
232-051-01	Mount Block Assembly	1
232-052-01	Cyclic Switch Housing Assembly	1
232-114-01	Cyclic Switch Housing Assembly	1
268-013-02	Release Cable Assembly	1
270-088-00	Wire Bundle	1
270-089-00	Wire Assembly	1
290-332-00	Attach Bolt	1
290-461-01	Pillow Block	1
290-476-02	Doubler	1
290-478-01	Switch Guard	1
400-059-00	Switch	2
410-162-00	Ring Terminal	2
440-006-00	Circuit Breaker	1
445-002-00	Relay	1
500-065-00	Grommet	1
500-066-00	Spacer	1
505-011-00	Grommet	1
505-012-00	Grommet	2
510-095-00	Washer	8
510-100-00	Washer	2
510-102-00	Nut	3
510-115-00	Cotter Pin	2
510-117-00	Nut	3

Bill of Materials, continued

Table 1-1 Bill of Materials continued

Part No.	Description	Qty
510-170-00	Nut	1
510-174-00	Washer	1
510-178-00	Cotter Pin	1
510-183-00	Washer	2
510-209-00	Washer	1
510-253-00	Bolt	2
510-273-00	Nut	2
510-274-00	Bolt	1
510-275-00	Bolt	1
510-277-00	Screw	2
510-278-00	Washer	2
510-279-00	Nut	2
510-280-00	Bolt	2
510-281-00	Rivet	3
510-282-00	Rivet, Aluminum	3
510-286-00	Nut	1
510-287-00	Screw	1
510-288-00	Bolt	3
510-292-00	Cap Head Screw	1
510-297-00	Screw	1
512-010-00	Clamp	1
512-018-00	Adel Clamp	2
528-029-01	Cargo Hook	1

Inspection

Inspect the kit items for evidence of damage, corrosion and security of lock wire and fasteners. If damage is evident, do not use the items until they are repaired.

Specifications

Table 1-2 Suspension System Specifications

Design load	400 lb. (181 kg.)
Design ultimate strength	1,500 lb. (680 kg.)
Total System Weight (including cargo hook)	5.0 lb. (2.26 kg.)

Table 1-3 P/N 528-029-01 Cargo Hook Specifications

Design load	3,600 lb. (1,633 kg.)
Design ultimate strength	13,500 lb. (6,123 kg.)
Electrical release capacity	9,000 lb. (4,082 kg.)
Mechanical release capacity	9,000 lb. (4,082 kg.)
Force required for mechanical release at 3,600 lb.	8 lb. Max.(.600" travel)
Electrical requirements	10-15 VDC 7.7-11.5 amps
Minimum release load	0 pounds
Unit weight	3.0 pounds (1.35 kg.)
Mating electrical connector	PC06A8-2S SR

Load capacities given are for the equipment described only. Loading limits for your particular helicopter model still apply. Consult your flight manual.

Theory of Operation

The primary elements of the Cargo Hook are the load beam, the internal mechanism, and a DC solenoid. The load beam supports the load and is latched through the internal mechanism. The DC solenoid, an external manual release cable and a manual release lever provide the means for unlatching the load beam.

The load is attached to the load beam by passing the cargo sling ring into the throat of the load beam and pushing the ring against the upper portion of the load beam throat, which will initiate the hook to close. In the closed position, a latch engages the load beam and latches it in this position.

To release the load, the latch is disengaged from the load beam. With the latch disengaged, the weight of the load causes the load beam to swing to its open position, and the cargo sling slides off the load beam. The load beam then remains in the open position awaiting the next load.

A load release can be initiated by three different methods. Normal release is achieved by pilot actuation of the push-button switch in the cockpit. When the push-button switch is pressed, it energizes the DC solenoid in the Cargo Hook, and the solenoid opens the latch in the internal mechanism. A secondary release button is also provided on the left seat lower outboard support. In an emergency, release can be achieved by operating a mechanical release cable. The release cable actuates the internal mechanism of the Cargo Hook to unlatch the load beam. The load can also be released by the actuation of a lever located on the side of the Cargo Hook

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Section 2
Installation Instructions

These procedures are provided for the benefit of experienced aircraft maintenance facilities capable of carrying out the procedures. They must not be attempted by those lacking the necessary expertise.

The R22 maintenance and parts manuals should be available throughout the installation as various R22 components will be referred to by name and part number. The part numbers for Robinson components are provided for reference and may be changed at a later time by Robinson.

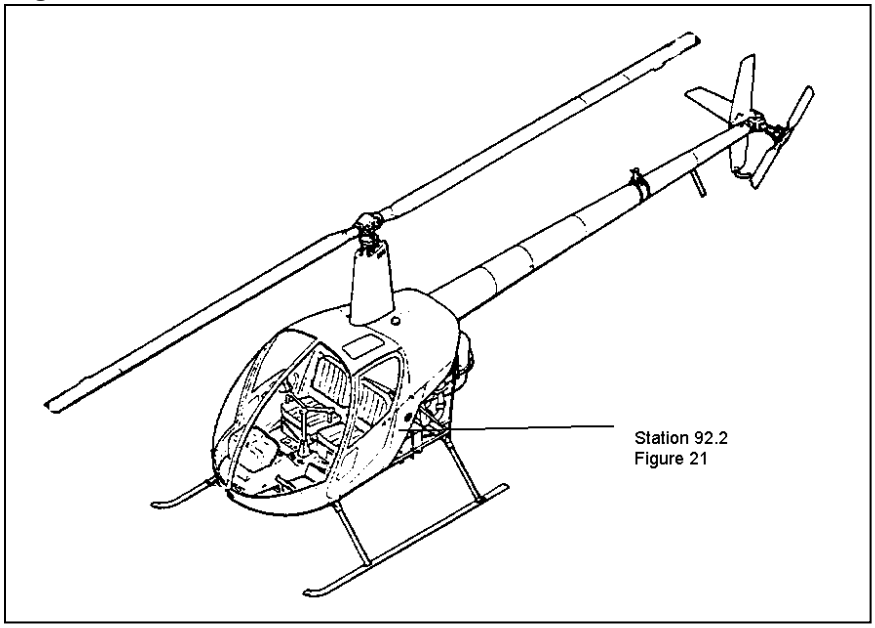
All equipment removed and replaced shall be done in accordance with the R22 maintenance manual. All installed hardware shall be torqued in accordance with standard torques of AC43.13 unless noted otherwise. Apply torque stripe where applicable.

1. Disconnect the battery.

Mount Block and Doubler Installation

1. Remove the A445-2 horizontal tunnel panel between the seats. Remove the A794-2 belly panel. Remove the A606-1 fiberglass throttle cover under the left seat.
2. Disconnect the forward end of the A336-1 throttle push/pull rod and the lower end of the A327-1 overtravel spring. Observe the washer stack up on the throttle push/pull rod for proper re-assembly later. Remove the four attaching screws from the A605-1 housing and six screws from the A607-1 support and rotate the support and housing forward.

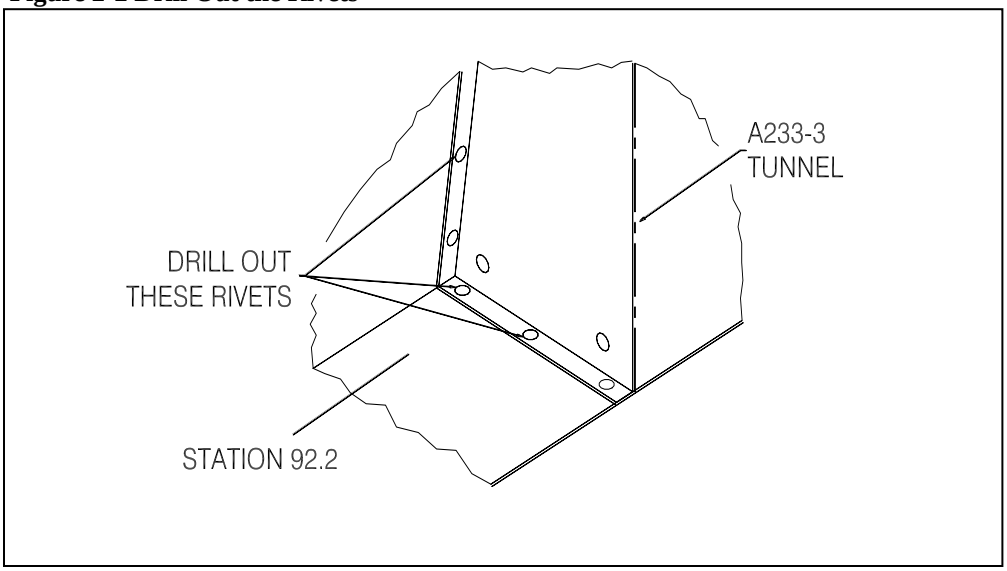
Figure 2-1 Robinson R22



Mount Block and Doubler Installation, continued

3. Remove the A729-6 manifold pressure tube along with the 10-4-2-N-O connector, 0253-2-4 bulkhead adapter and the AN894D4-3 bushing to provide clearance in the aft tunnel area to install the doubler.
4. Remove the B134-2 Block, Doubler and "TIE DOWN ONLY" decal, if present. They will not be used for this installation.
5. Drill out the three rivets identified in Figure 2-2 using a .098 inch #40 drill bit. This will enable the 232-051-01 Mount Block to fit flush against the surface of the firewall and belly skin. Note the two relief spotfaces on the Mount Block enable it to fit over the heads of the other rivets.

Figure 2-2 Drill Out the Rivets



6. Position the Mount Block tight in the corner against the aft side of the firewall (A233-1) and the left side of the tunnel (A233-3). Ensure that the upper hole in the Mount Block is aligned with the existing hole* in the tunnel. Drill out the existing upper hole in the tunnel to 0.189 with a #12 drill (reference Figure 2-3).

** If upper hole is not in tunnel, drill tunnel to match Mount Block.*

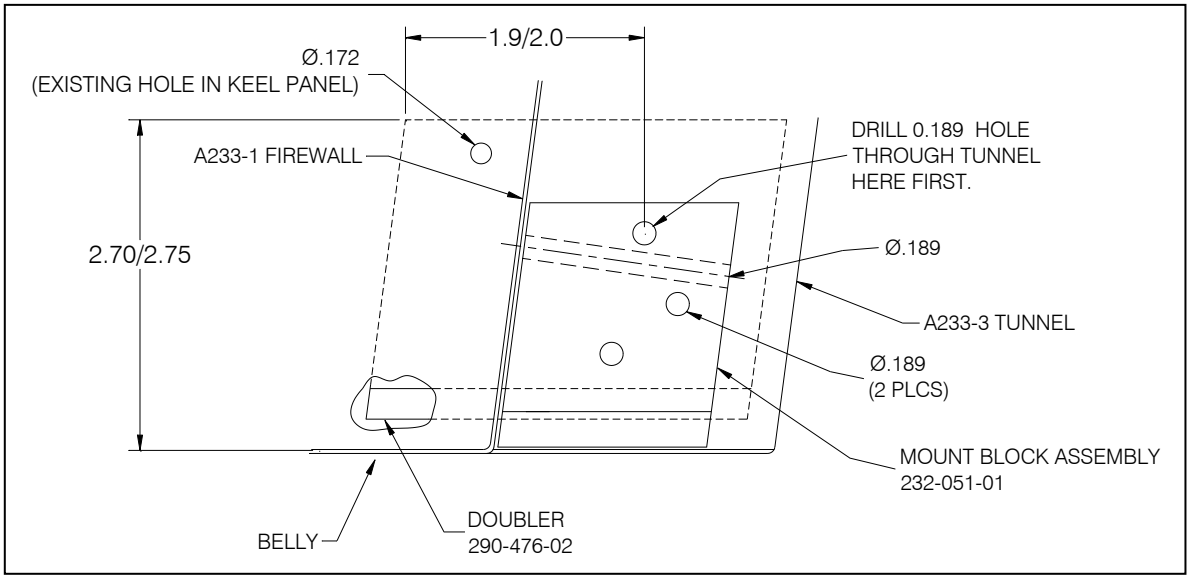
NOTICE

The 232-051-01 Mount Block is supplied with three 0.152 diameter holes. These are pilot holes, and are meant to be an aid in transferring hole locations to the tunnel in helicopters without an existing Robinson hard point kit installed. The 0.152 holes must eventually be drilled out to 0.189.

Mount Block and Doubler Installation, continued

7. Position the Doubler, P/N 290-476-02, against the inside wall of the tunnel orienting it such that the machined step is at the bottom and overlapping the flange in the tunnel. Locate the upper edge of the doubler 2.70/2.75 inches up from the lower skin (see Figure 2-3). Locate the upper forward corner of the Doubler 1.9/2.0 inches forward of the hole drilled on previous step (see below). Clamp the Doubler to the tunnel.
8. Transfer the previously drilled upper tunnel hole location to the Doubler. Drill a 0.189 hole in the Doubler.
9. Secure the Mount Block and Doubler using 510-288-00 (NAS6603-7) bolt, 510-095-00 (AN960-10L) washers and 510-117-00 (NAS679A3) nut. Tighten the bolt and nut snugly.

Figure 2-3 Mount Block and Doubler Installation



10. Using the 0.189 longitudinal hole through the Mount Block as a drill guide, enlarge the hole through the firewall. Temporarily install 510-292-00 Bolt and 510-102-00 Nut.
11. Using the existing A607-1 support mount hole in the keel panel as a drill guide, drill through the 290-476-02 Doubler with a .172 inch drill bit. Ensure that the Doubler is level before drilling this hole. Temporarily re-install the support mount screw and nut through the keel panel and doubler.

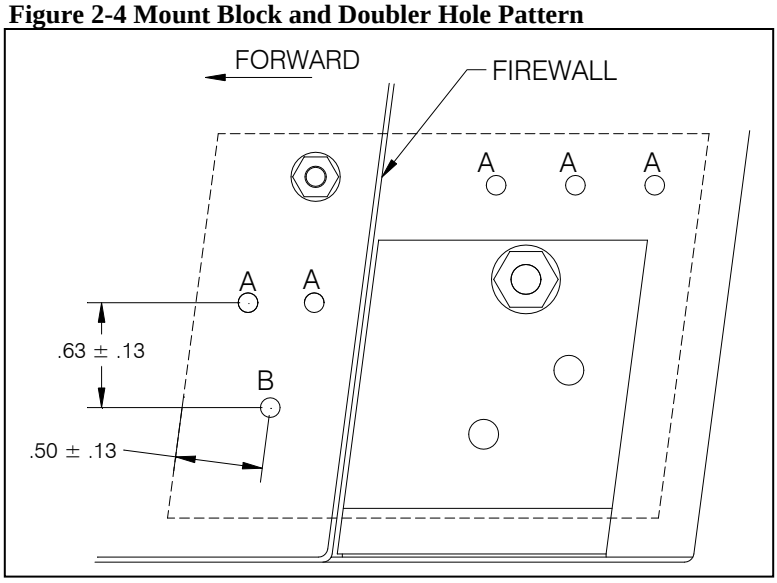
Mount Block and Doubler Installation, continued

12. Transfer the existing hole locations in the tunnel and keel panel (indicated by "A" in Figure 2-4) to the Doubler. Drill 0.1285 holes (quantity 5) in the Doubler at these locations and drill a sixth .1285 hole through the keel panel and Doubler (forward of the firewall), at location "B".

NOTICE

If existing holes are not present, layout six holes, three aft of the firewall and above the Mount Block, and three forward of the firewall. Edge distances should not be less than 2 times the diameter of the rivet and spacing between any fastener should not be less than 3 times the diameter of the larger fastener.

Figure 2-4 Mount Block and Doubler Hole Pattern



13. Drill the remaining two holes in the Mount Block and tunnel through the doubler with a .189 inch (#12) drill bit.

Mount Block and Doubler Installation, continued

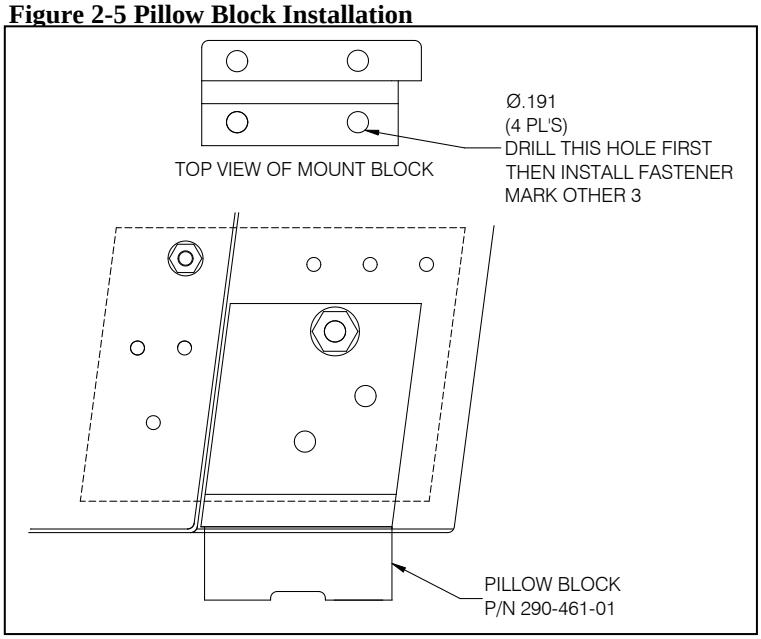
14. Using the Mount Block as a drill guide, drill the aft outboard vertical hole for the pillow block mounting fastener using a .191 inch drill bit (see Figure 2-5).

15. Temporarily install the 290-461-01 pillow block using a 510-280-00 (NAS6603H17) bolt, 510-095-00 (AN960-10L) washer, and 510-102-00 (MS21042-3) nut.

16. Align the pillow block to be parallel with the aircraft centerline using the rivet line on the inboard side. Using the pillow block as a guide and a .1875 inch drill or smaller, spot mark the hole locations without going through the skin. Optional procedure is to punch mark the drill hole locations.

17. Remove the pillow block, mounting block and doubler. Drill the three marked holes, starting with the .1875 inch drill and then a .234 inch (#A) drill, being careful not to penetrate the vertical firewall. Also oversize the aft outboard hole used for the temporary fastener installation with the .234 inch drill. Place the 232-051-01 Mount Block and the 290-461-01 Pillow Block in place and verify that the clearance holes align with the fastener holes in the blocks.

Figure 2-5 Pillow Block Installation



18. De-burr all the drilled holes.

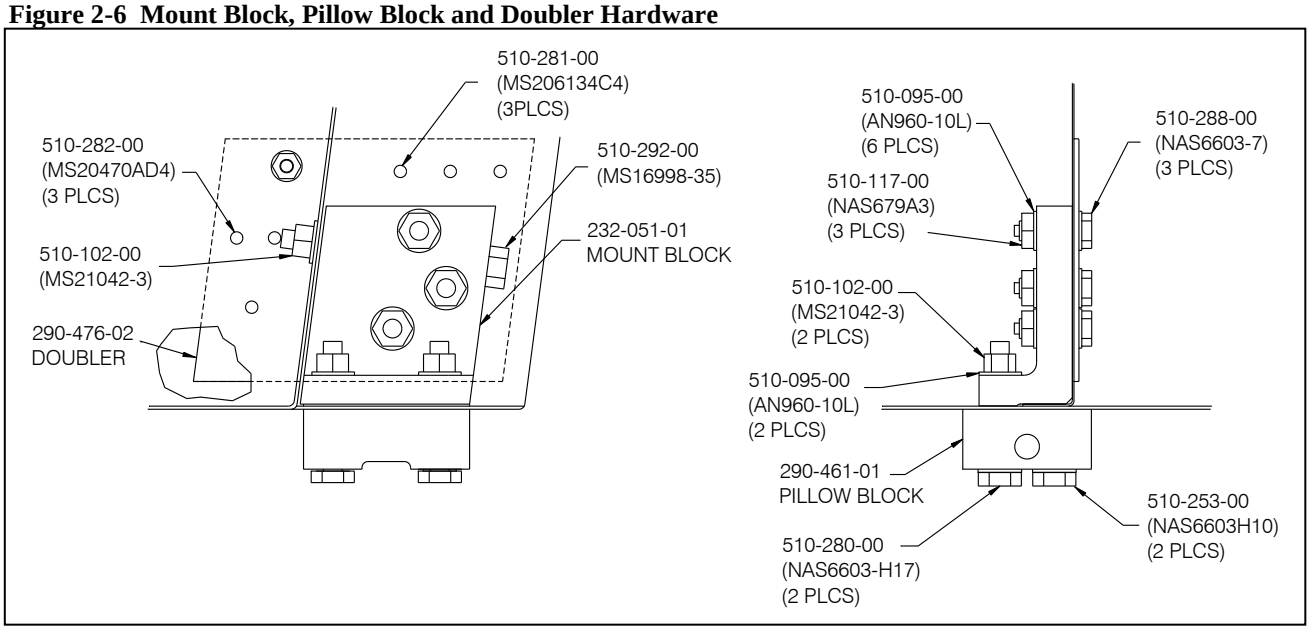
19. Re-install the 290-476-02 Doubler.

20. Install the 232-051-01 Mount Block with hardware as shown in Figure 2-6 and zinc chromate primer (or equivalent) on the forward and inboard surfaces. Torque the 510-117-00 nuts to 18-25 in-lbs. and the 510-102-00 nut to 34-45 in-lbs. Apply torque stripe where applicable.

Mount Block and Doubler Installation, continued

21. Use three 510-282-00 aluminum rivets to rivet the Doubler onto the left keel panel through the three forward holes. Use three 510-281-00 stainless steel rivets to rivet the Doubler to the firewall through the three top aft holes.

Figure 2-6 Mount Block, Pillow Block and Doubler Hardware

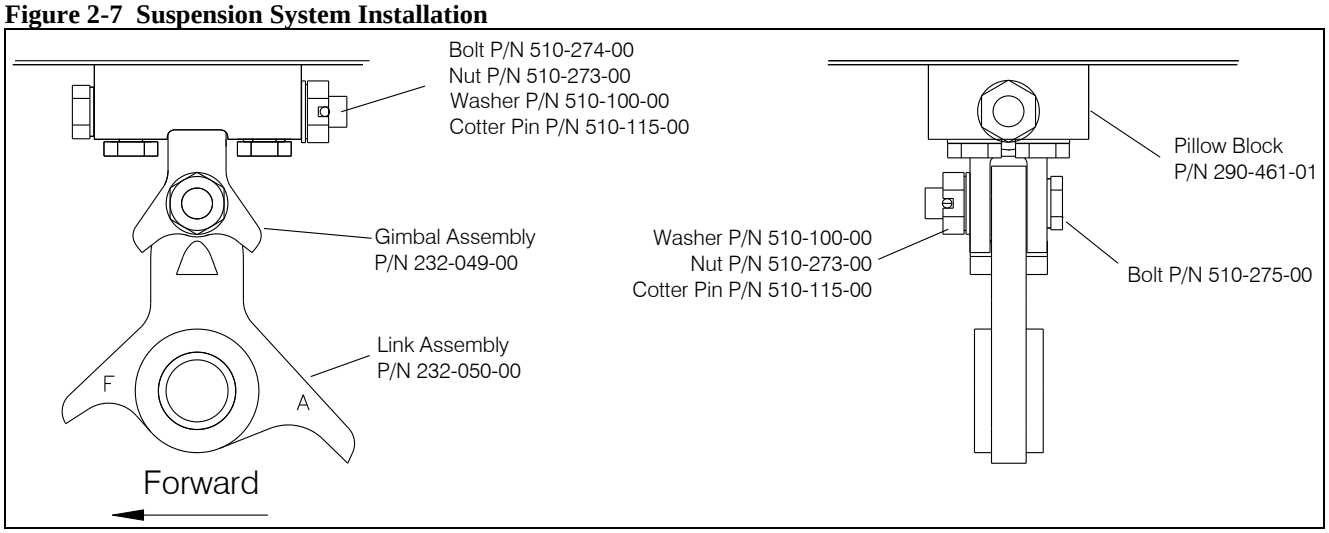


22. Install the pillow block using the hardware shown in Figure 2-6. Safety wire the drilled head bolts in place.
23. Re-install the A605-1 housing and the A607-1 support.
24. Re-install the A0580-4 manifold pressure tubing at the firewall.
25. Re-connect the A36-1 throttle push/pull rod and the lower end of the overtravel spring.
26. Re-install the A606-1 throttle cover, the horizontal tunnel panel and the belly panel.
27. Install the 215-112-00 maximum cargo weight decal on the belly of the helicopter next to the pillow block installation.

Gimbal and Link Installation

1. Install the P/N 232-049-00 gimbal assembly in the P/N 290-461-01 pillow block using the hardware shown in Figure 2-7. Grease the bushing with Aeroshell 7, MIL-G-23827 or equivalent before assembly.
2. Install the P/N 232-050-00 link assembly to the P/N 232-049-00 gimbal assembly using the hardware shown in Figure 2-7. Install the load cell link so that the travel limiter identified with the F is facing forward and the travel limiter identified with the A is oriented aft. Grease the bushings with Aeroshell 7 or MIL-G-23827 before assembly.

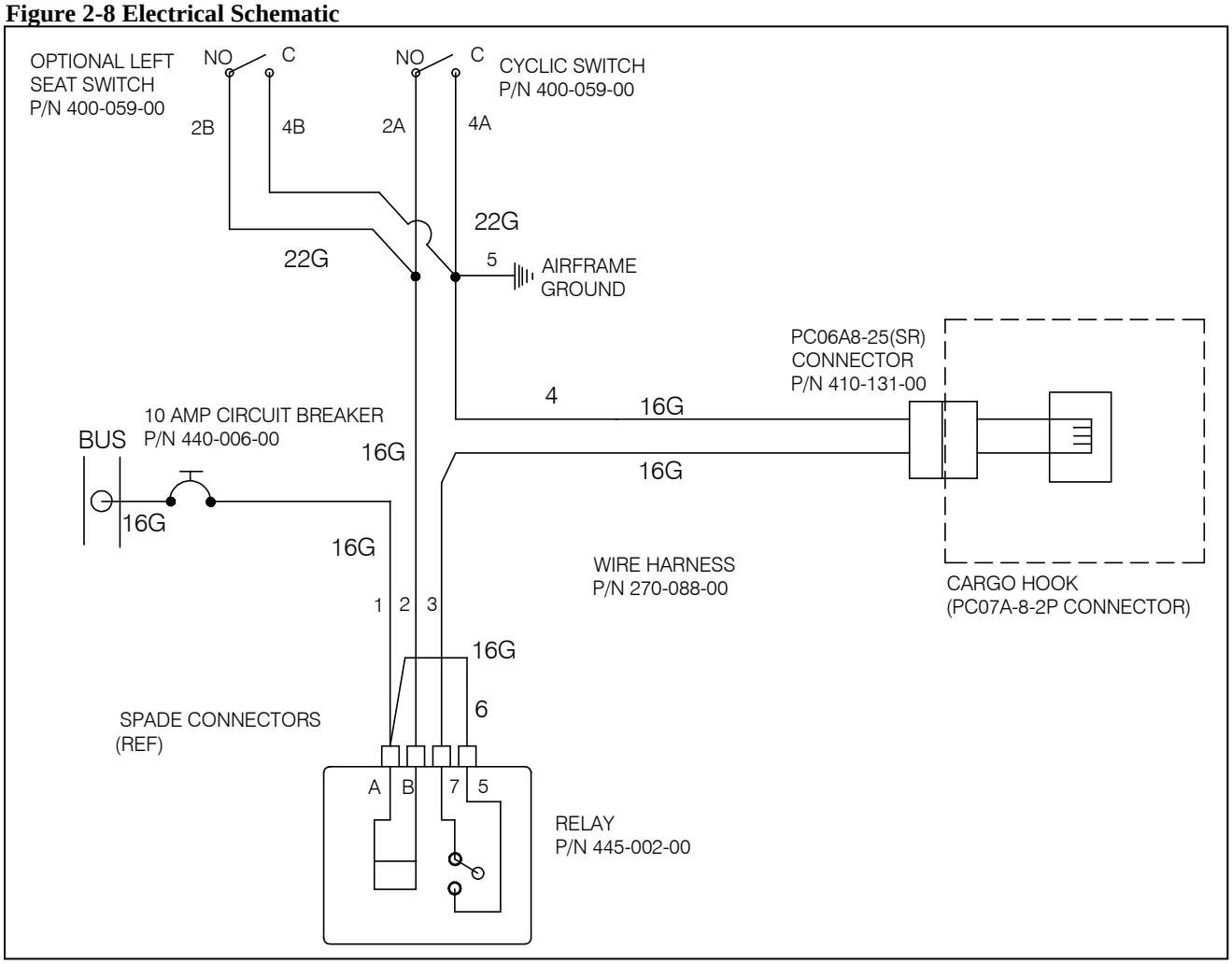
Figure 2-7 Suspension System Installation



Electrical Schematic

The electrical release system is powered from the bus through a 10 amp circuit breaker to a relay in the center tunnel. Switches on the cyclic and co-pilots seat support control the relay and energize the DC solenoid in the Cargo Hook, opening the hook and releasing the cargo. A schematic for the electrical system is shown below in Figure 2-8.

Figure 2-8 Electrical Schematic

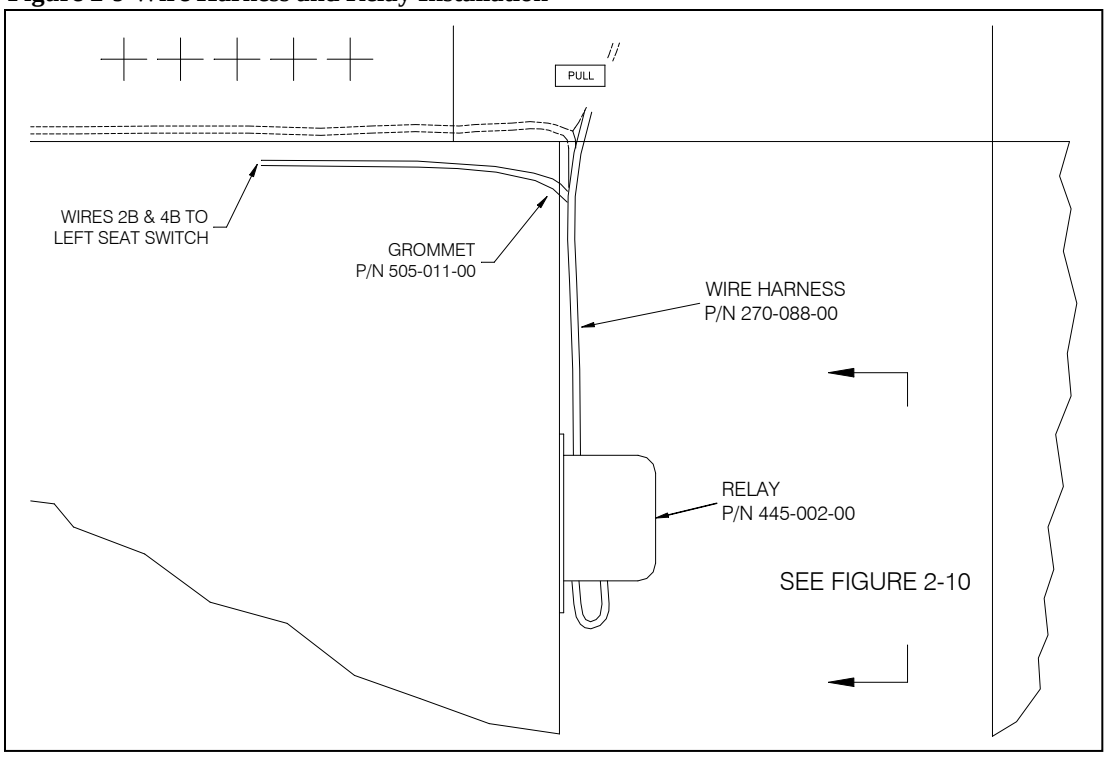


Wire Harness and Relay

Install the P/N 445-002-00 relay on the keel panel below the existing relay installation using the hardware as shown in Figure 2-9 and 2-10.

Place the P/N 270-088-00 main wire harness into the tunnel on top of the existing wire bundle.

Figure 2-9 Wire Harness and Relay Installation



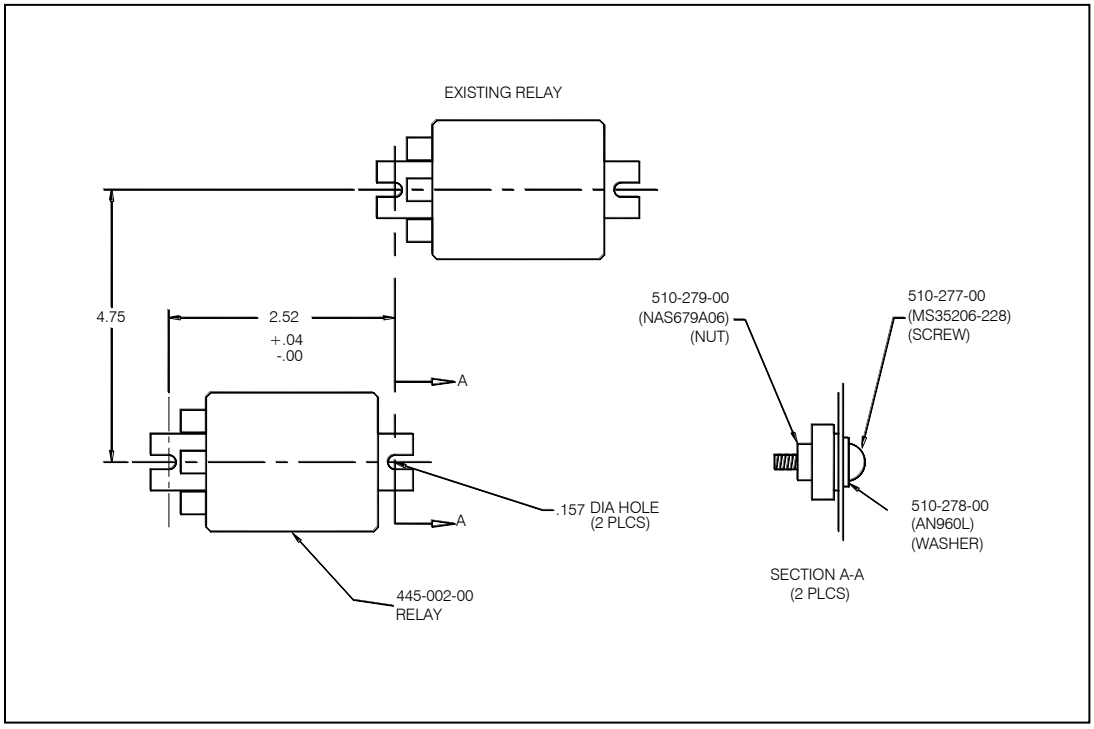
Wire Harness and Relay, continued

Connect wire numbers 1, 2 and 3 from the main bundle to the relay terminals A, B and 7 as shown in the Figure 2-8 electrical system schematic. Connect jumper wire 6 to relay terminal 5.

Connect the ground lead of wire number 5 to any convenient existing ground location in the tunnel.

Secure the wire bundle with wire ties as required.

Figure 2-10 Relay Installation



Wiring to Circuit Breaker Panel and Circuit Breaker Installation

1. Remove the circuit breaker cover panel and install the P/N 440-006-00 10 amp circuit breaker in an available location. On some early models, it may be necessary to remove the panel and make a hole for the additional circuit breaker.
2. Open the circuit breaker to disarm the cargo hook release circuit.
3. Use the P/N 270-089-00 wire assembly and a P/N 410-162-00 ring terminal as a jumper to power the input side of the circuit breaker in compliance with AC 43.13.
4. Feed the number 1 wire of the main wire bundle from the tunnel into the circuit breaker bay using the existing wire bundle access hole. Connect the wire to the output side of the P/N 440-006-00 circuit breaker using the other P/N 410-162-00 ring terminal provided. Secure the power wire to the existing wire bundles with tie wraps.

Release Switches Installation

To account for the different Robinson cyclic configurations there are two Cyclic Release Switch Housing assemblies (P/N 232-052-01 and P/N 232-114-01) included with the R-22 kits. The P/N 232-052-01 assembly is for use with the original Robinson R-22 cyclic and the P/N 232-114-01 assembly is for use with the C058 style cyclic grip (reference following pages for identification and installation instructions). In addition an optional left seat switch and housing is included.

Install the P/N 232-052-01 Cyclic Release Switch Housing Assembly per the following instructions.

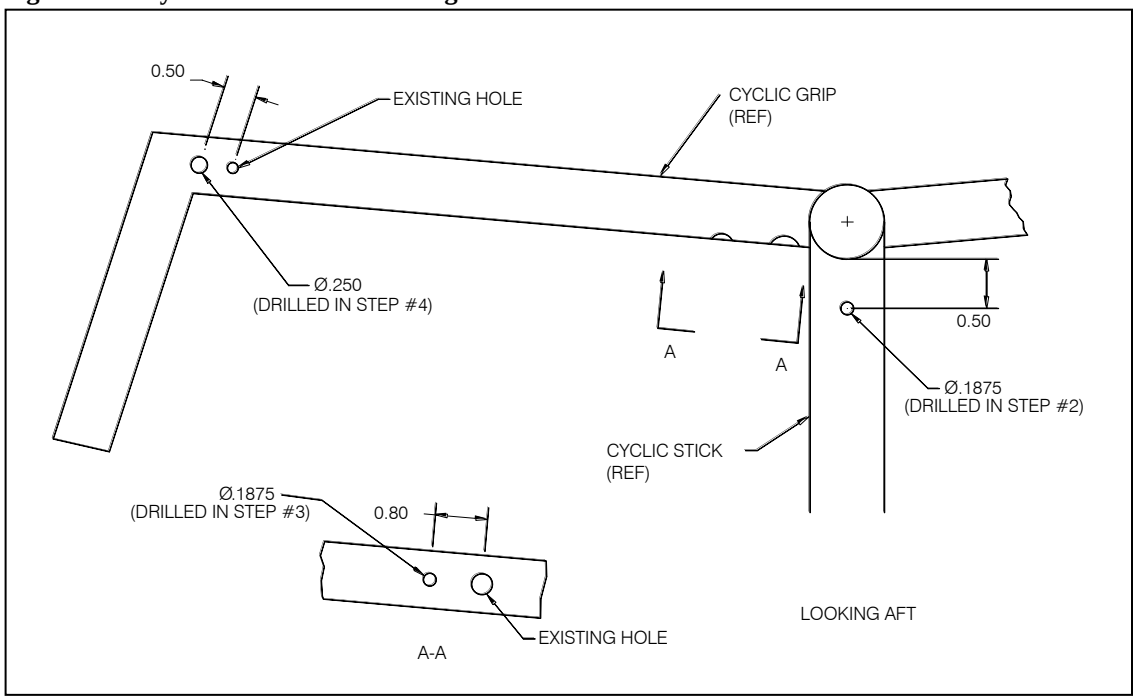
1. Disconnect the A216-1 housing and ensure its wires are clear of the areas to be drilled on the horizontal cyclic control handle and stick.

   If there is enough room through the existing Robinson cyclic wire routing grommets, use them for routing the cyclic release switch wiring. Otherwise create additional cyclic release switch wiring routing holes in steps 2 and 3.
2. Drill a 0.1875 inch diameter hole on the forward side of the cyclic stick as shown in Figure 2-11.
3. Drill a 0.1875 inch hole on the bottom side of the cyclic grip near the existing wire routing hole as shown in Figure 2-11.
4. Drill a 0.250 inch diameter hole on the forward side of the cyclic grip near the existing fastener hole for the A216-1 housing as shown in Figure 2-11.

Release Switches Installation, continued

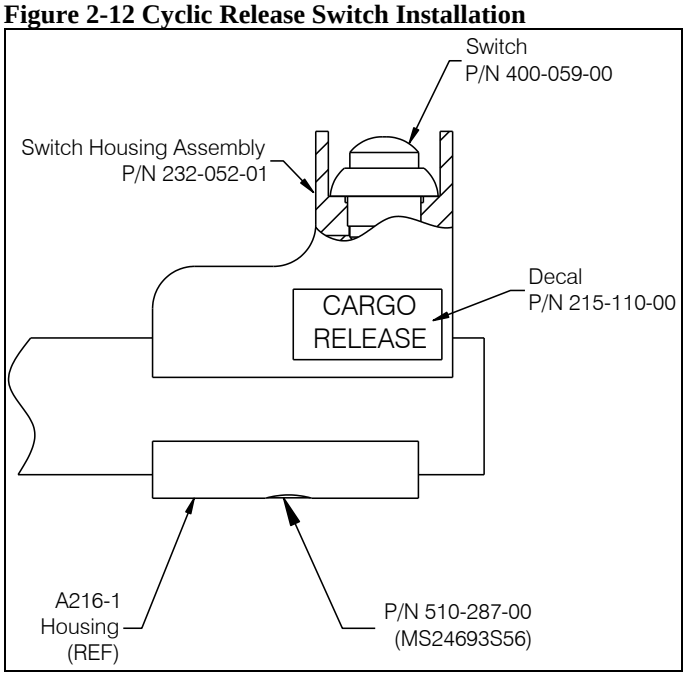
5. Insert a lead wire in the hole at the top of the cyclic stick, pushing it down and out the bottom. Pull the number 2A and 4A wire bare switch ends up through the cyclic stick and out the hole. Place a P/N 505-012-00 grommet over the wires and into the cyclic stick hole. Slide another P/N 505-012-00 grommet over the wires to be installed on the cyclic grip hole. Place heat shrink over the portion of both wires that will be exposed between the grommets.
6. Using a lead wire, pull the number 2A and 4A wires up through the cyclic grip and out the hole on the front of the cyclic grip.
7. Place a 1 inch length of heat shrink over each wire to the cyclic switch. Prepare each wire end and solder them to the appropriate switch terminals as shown in the Figure 2-8 wiring schematic. Leave enough slack in the wire to re-install the cyclic switch housing assembly. Using a heat gun, shrink the covering material to final size.

Figure 2-11 Cyclic Switch Wire Routing



Release Switches Installation, continued

Figure 2-12 Cyclic Release Switch Installation



8. Install the P/N 400-059-00 switch in the P/N 232-052-01 cyclic switch housing assembly using needle nose pliers to hold the switch. Install the completed switch housing assembly with the hardware as shown in Figure 2-12, by removing the existing A216-1 housing screw and replacing it with the longer P/N 510-287-00 screw. Re-install the A216-1 housing and wires.
9. Check the cyclic for freedom of motion throughout its complete travel range and ensure the wires are not chafing on any components.

Release Switches Installation, continued

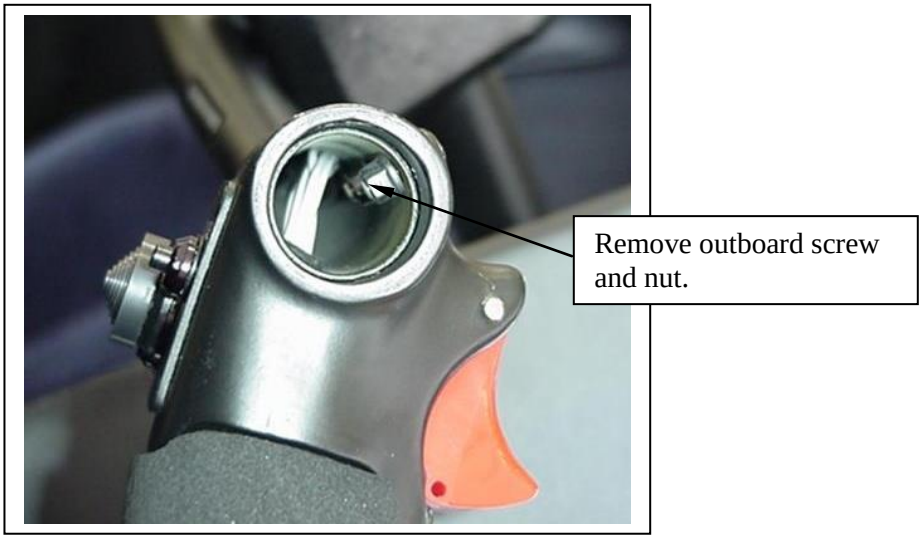
Install the P/N 232-114-01 Cyclic Release Switch Housing Assembly per the following instructions (for use with Robinson Grip Assembly C058).

1. Remove Plug (Robinson P/N DP-875) and discard as shown in Figure 2-13.

Figure 2-13 Grip Assembly C058, Plug Removal

2. Remove outboard screw (MS27039C0806) and nut (MS21042L08) as shown in Figure 2-14.

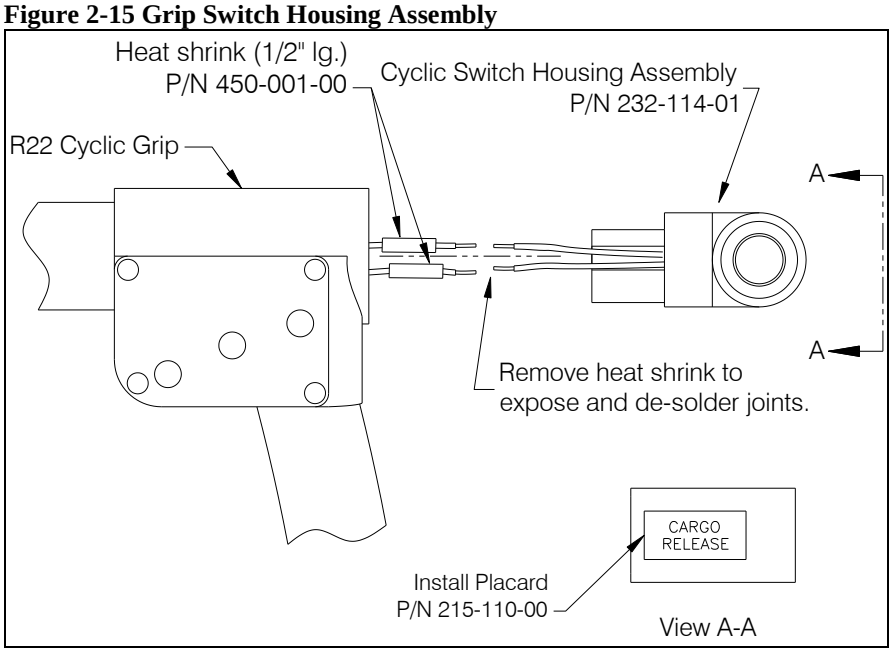
Figure 2-14 Grip Assembly C058, Screw and Nut Removal



Release Switches Installation, continued

3. Using a lead wire, pull the number 2A and 4A wires from wire harness P/N 270-090-00 up through the horizontal tube and out the end of the grip assembly.
4. Slide a piece of heat shrink (P/N 450-001-00) over the 2A and 4A wires (ref. Figure 2.15).
5. Prep and solder, using a lap splice, the 2A wire from up through the cyclic to one of the wires from the switch and the 4A wire from the cyclic to the other wire from the switch.
6. Slide the heat shrink over the respective solder joints and shrink in place using a heat gun.

Figure 2-15 Grip Switch Housing Assembly



7. Install the Switch Housing Assembly into the end of the grip assembly and secure with the Screw (P/N MS27039C0806) removed earlier. The Nut (P/N MS21042L08) removed earlier will not be re-used for this installation and can be discarded.
8. Check the cyclic for freedom of motion throughout its complete travel range and ensure the wires are not chafing on any components.

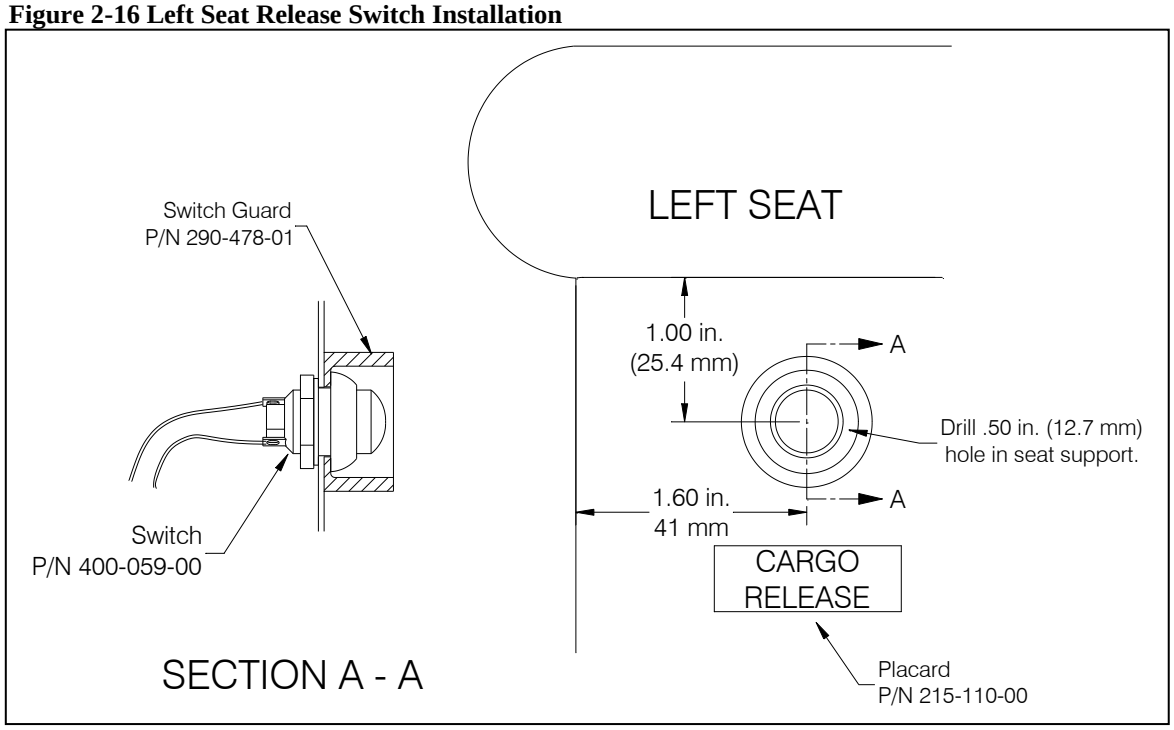
Release Switches Installation, continued

Left Seat Release Switch Installation

If the left seat release switch installation is not desired, cap and stow wires 2B and 4B per AC 43.13 and skip this section.

1. Drill a .250 inch hole in the left side of the tunnel wall above the main wire bundle in a convenient location or use an existing unused hole in the tunnel wall. Install Grommet (P/N 505-011-00).
2. Drill a .50 inch hole in the outboard side of the left seat support as shown in Figure 2.16.
3. Route the number 2B and 4B wires through the grommeted hole and through the left baggage area to the .50 inch hole on the outboard seat support. Secure the wires to the forward seat hinge fasteners with two clamps (P/N 512-018-00).
4. Slide the nut (provided with the switch P/N 400-059-00) over the wires from inside the seat support and feed the wires through the .50 inch hole and through the switch guard (P/N 290-478-01).
5. Place a .50 inch length of heat shrink over each wire to the switch. Solder the wires to the switch as shown in the Figure 2-8 wiring schematic. Use a heat gun and shrink the covering material to final size. Place the switch (P/N 400-059-00) into the switch guard and through the seat as shown in Figure 2-16 and secure with nut.

Figure 2-16 Left Seat Release Switch Installation



Manual Release Cable Installation

NOTICE

Due to possible minor configuration changes incorporated by Robinson Helicopters, install the manual release cable per Figure 2-17 or as near as possible. Ensure adequate clearance between the release cable and push/pull control rods and electrical components in the tunnel.

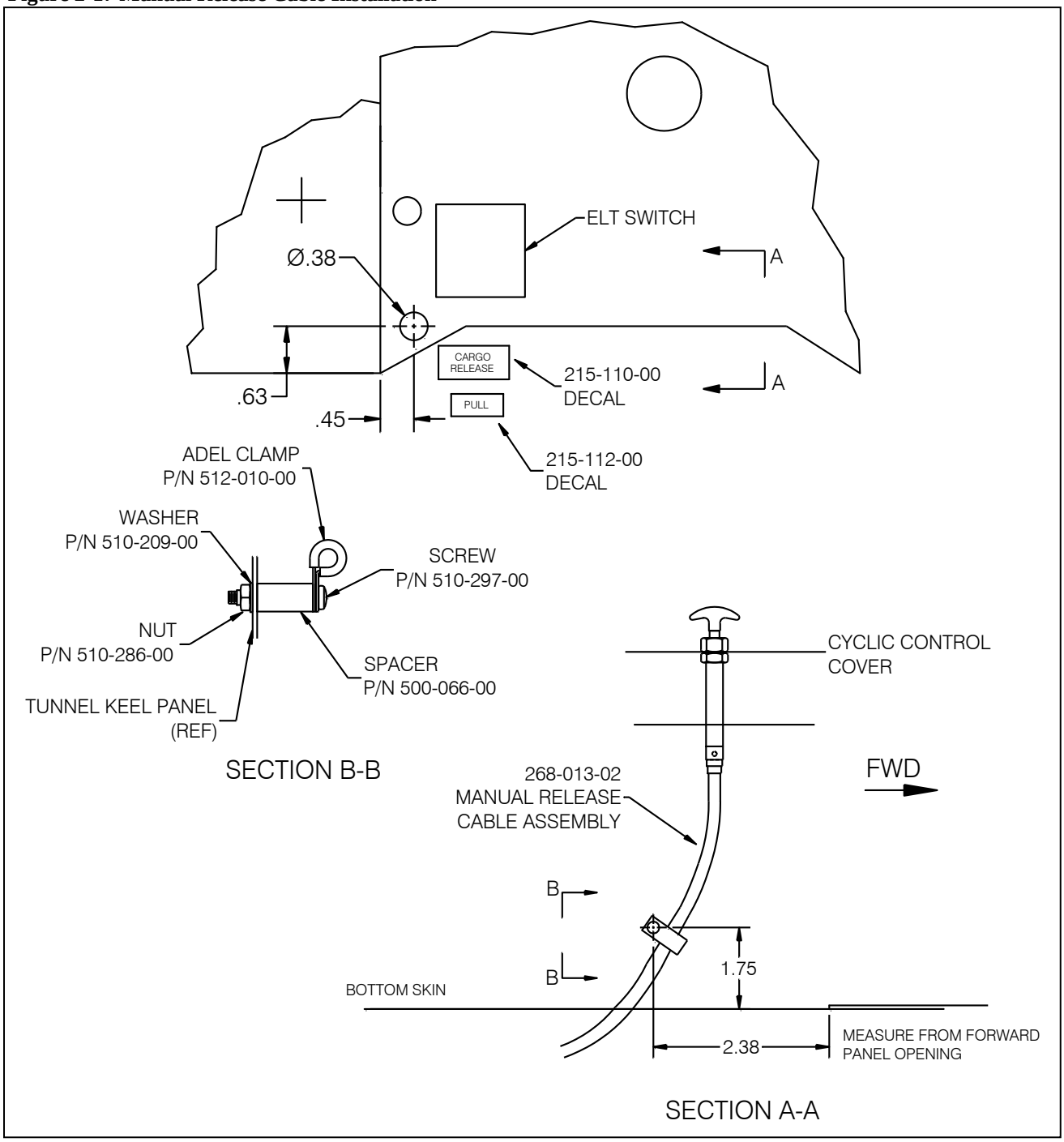
1. Drill a .375 inch diameter hole through the left aft corner of the A444-1 cyclic control cover and 338-1 box assembly as shown in Figure 2-17. Locate and drill the hole for the cable clamp in the tunnel keel panel as shown in Figure 2-17.
2. Place the P/N 268-013-02 manual release cable assembly inside the tunnel and route the output end of the cable out the bottom of the helicopter. Install the cable clamp as shown in Figure 2-17. Insert the head end of the cable into the cover plate and install the face nut and tee handle as shown in Figure 2-17.
3. Make a cutout in the A794-2 belly panel as shown in Figure 2-18 and install the P/N 500-065-00 edge grommet using locally obtained adhesive (it is helpful to hold the panel up under the helicopter and verify the cutout location). Install the A794-2 belly panel.
4. Install the cable through the P/N 510-010-00 clamp as shown in Figure 2-18 and secure the clamp with the existing screw.

Electrical Release Wire Routing to the Hook

1. Route the #3 and #4 electrical release wires out the same hole in the A794-2 panel as the mechanical release cable as shown in Figure 2-18. Secure the two release wires to the mechanical release cable with wire ties as necessary and route through the same adel clamp as shown in Figure 2-18.

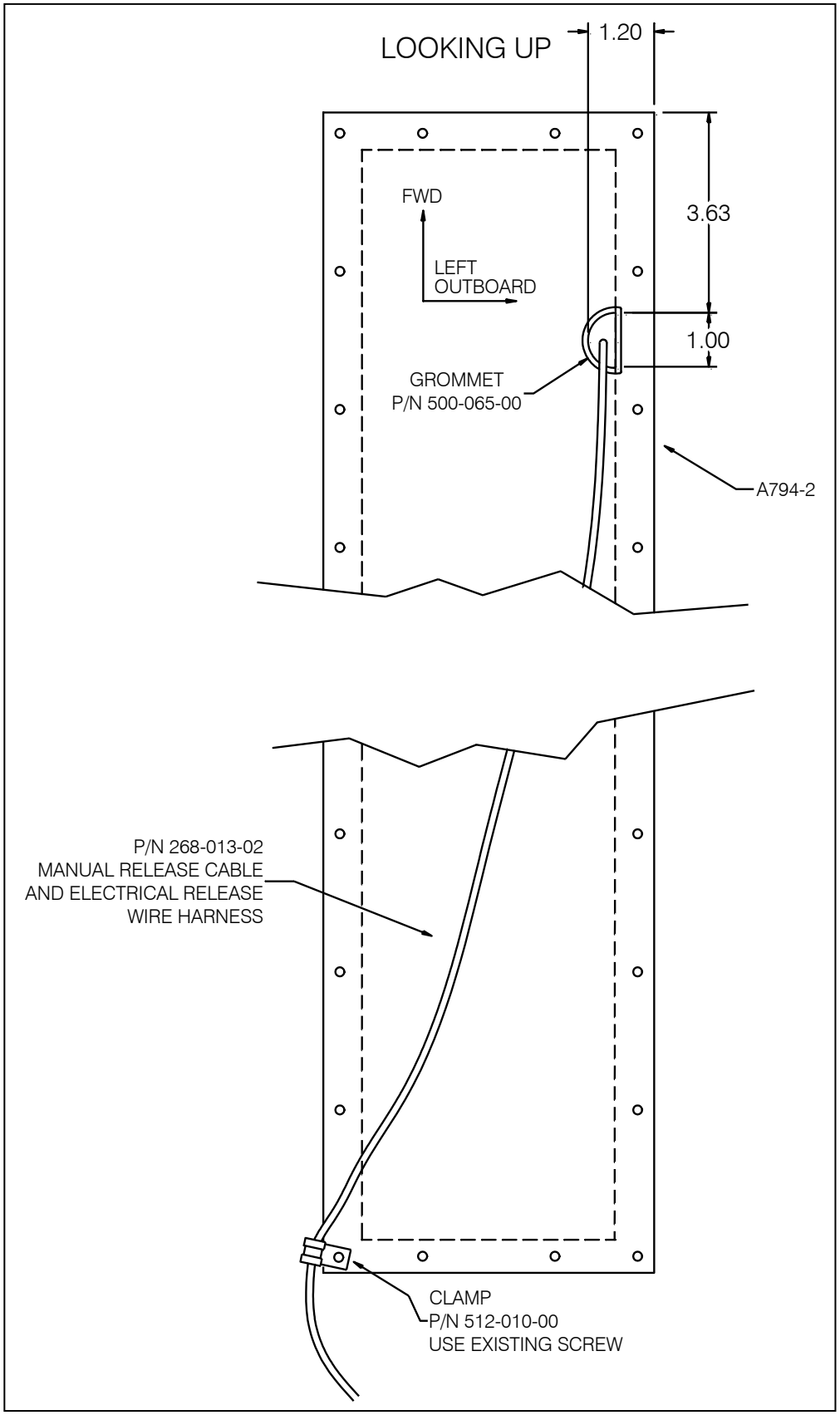
Electrical Release Wire Routing to the Hook, continued

Figure 2-17 Manual Release Cable Installation



Electrical Release Wire Routing to the Hook, continued

Figure 2-18 Manual Release Cable Routing



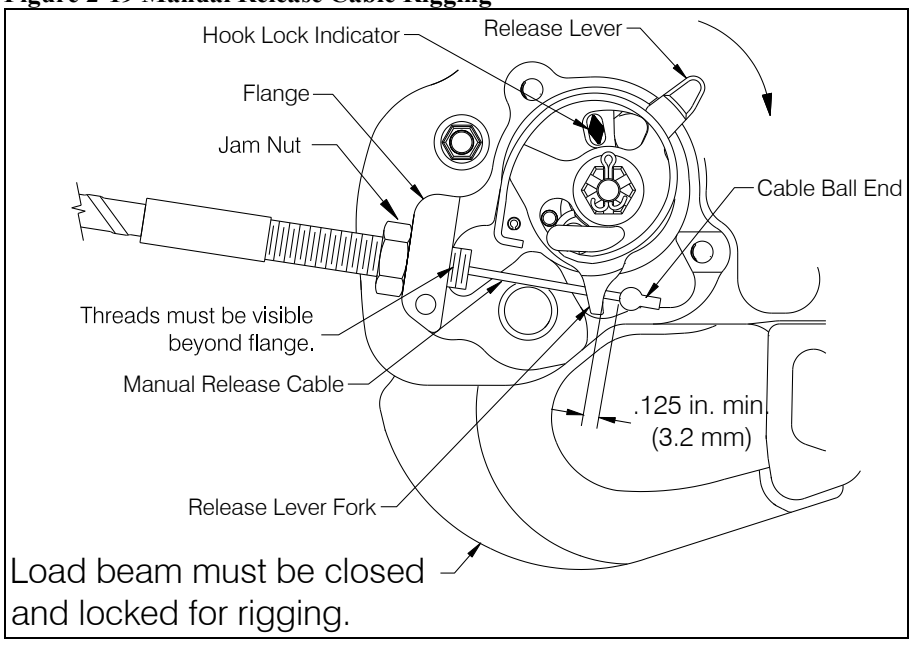
Attaching the Manual Release Cable to Cargo Hook

1. Remove the manual release cover from the cargo hook.
2. Screw the manual release cable into the cargo hook by holding the cable and turning the cargo hook.
3. Place the cable ball end fitting into the hook manual release fork fitting as illustrated below.
4. Temporarily place the cargo hook onto the Link Assembly (see Figure 2-20) but don't secure until cable setting is verified (see following steps).
5. With the cargo hook closed and locked, rotate the release lever in the clockwise direction to remove free play (the free play is taken up when the hook lock indicator begins to move, this is also felt as the lever rotates relatively easily for several degrees as the free play is taken up) and measure the gap between the cable ball end and the release lever fork with the manual release lever in the cockpit in the non-release position. This gap should be a minimum of .125 inches (3.2 mm) as shown in Figure 2-19. Adjust by threading the manual release cable in or out of the cargo hook as necessary. Be sure to maintain full thread engagement on the cargo hook side plate flange.
6. Replace the manual release cover and tighten the jam nut against the hook.

⚠ CAUTION

Manual release cable rigging must be done with the cargo hook in the closed and locked position.

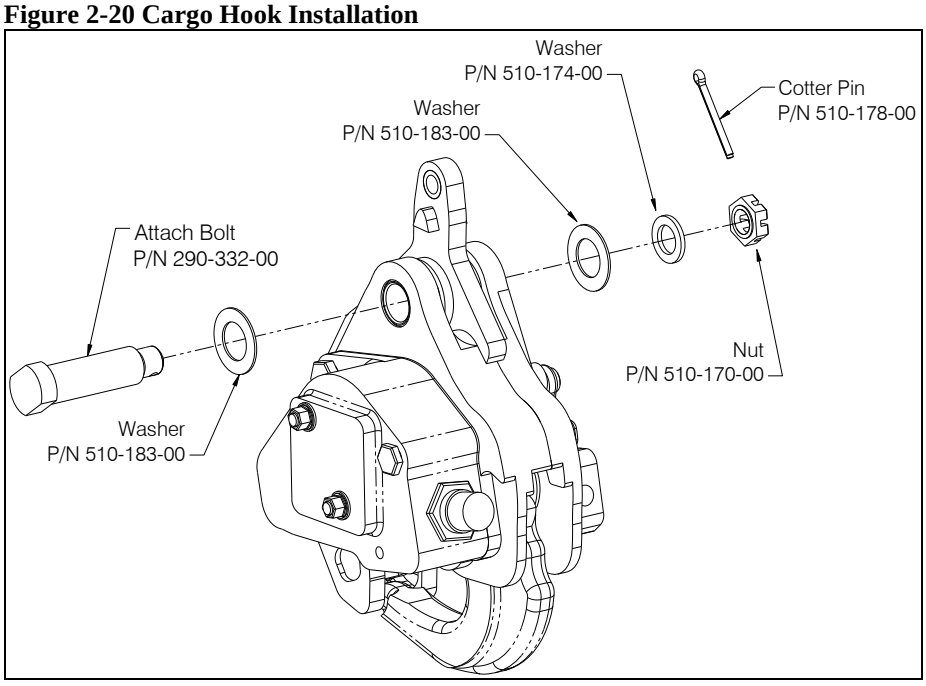
Figure 2-19 Manual Release Cable Rigging



Cargo Hook Installation

Install the P/N 528-029-01 Cargo Hook to the link using the hardware as shown in Figure 2-20. The cargo hook load beam must point forward.

Figure 2-20 Cargo Hook Installation



Tighten nut P/N 510-170-00 on bolt P/N 290-332-00 to finger tight until seated, then rotate nut back to previous castellation if needed to insert cotter pin. Install and secure cotter pin P/N 510-178-00.

Wiring Connector

Connect the cargo hook electrical release cable connector to the Cargo Hook. Listed below is the pin out for the cargo hook connector. Safety-wire the connector from the electrical release cable to the jam nut of the cargo hook mounted connector.

Table 2-1 Cargo Hook Connector

Pin	*Function*
A	Ground
B	Power

CAUTION

The Cargo Hook is equipped with a suppression diode that will be damaged if the Cargo Hook electrical connections are reversed. Do not attach the electrical connector until the polarity of the aircraft connector is determined to be compatible with the Cargo Hook connector listed in Table 2-1.

Decals and Placards

Install the following decals:

Table 2-2 Decals

DECAL NUMBER (DECAL DESCRIPTION)	LOCATION
P/N 215-110-00 (CARGO RELEASE)	Mounted adjacent to the cyclic release switch in clear view of the pilot.
P/N 215-110-00 (CARGO RELEASE)	Mounted adjacent to the left seat release switch in clear view of the pilot. (See Figure 2-16)
P/N 215-110-00 (CARGO RELEASE)	Mounted adjacent to the mechanical release in clear view of the pilot. (See Figure 2-17).
P/N 215-111-00 (PULL)	Mounted adjacent to the mechanical release in clear view of the pilot. (See Figure 2-17).
P/N 215-112-00 (CARGO)	Mounted adjacent to the cargo hook circuit breaker in clear view of the pilot
P/N 215-113-00 (EXTERNAL LOAD LIMIT = 400 LBS (181 KGS))	Mounted on the belly of the aircraft adjacent to the cargo hook attachment point in clear view of the ground support personnel.
P/N 215-114-00 (CLASS B ROTORCRAFT..)	Mounted on the instrument panel in clear view of the pilot.
P/N 215-115-00 (FAR PART 133.35(A) OPERATIONS ...)	Mounted on the instrument panel in clear view of the pilot.

Installation Check-Out

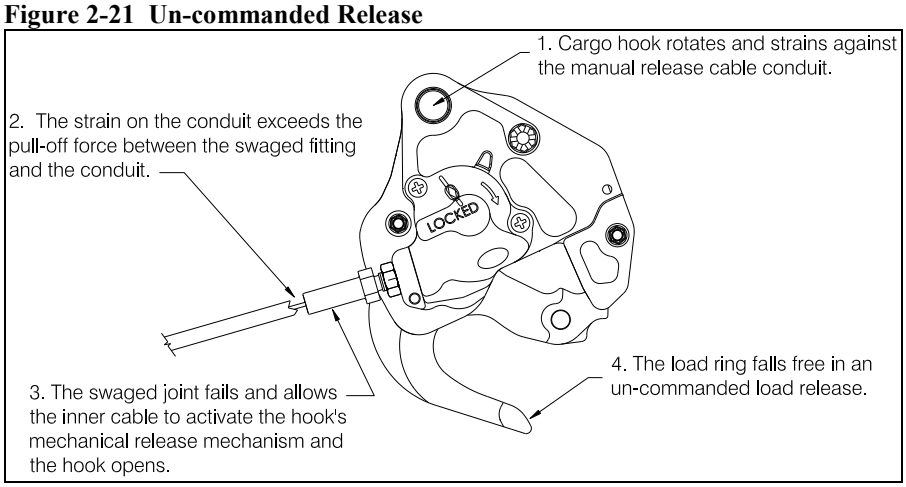
After installation of the Cargo Hook Kit, perform the following functional checks.

1. Swing the installed Cargo Hook to ensure that the manual release cable assembly and the electrical release cable have enough slack to allow full swing of the suspension assembly without straining or damaging the cables. The cables must not be the stops that prevent the Cargo Hook from swinging freely in all directions.

WARNING

Un-commanded cargo hook release will happen if the manual release cable is improperly restrained. The manual release cable must not be the stops that prevent the Cargo Hook from swinging freely in all directions. If the Cargo Hook loads cause the hook to strain against the manual release cable the swaged end of the cable may separate allowing the inner cable to activate the cargo hook manual release mechanism. The result is an un-commanded release. Ensure that no cargo hook position is restrained by the manual release cable.

Figure 2-21 Un-commanded Release



2. With no load on the cargo hook load beam, pull the handle operated cargo hook mechanical release, the Cargo Hook should release. Reset the cargo hook load beam.

3. Close the cargo hook release circuit breaker and position the battery switch to the ON position. With no load on the cargo hook load beam, depress the cargo hook electrical release button, the Cargo Hook should release using both the cyclic and left seat electrical release switches. Reset the cargo hook load beam.

Component Weights

The weight of the system is listed in Table 2-3.

Table 2-3 Component Weights

Item	Weight
P/N 200-262-01	5.0 lbs (2.3 kgs)

Cargo Hook Location

Table 2-4 Cargo Hook Location

Fuselage Station	92.2 in.

Paper Work

In the US, fill in FAA form 337 for the initial installation. This procedure may vary in different countries. Make the appropriate aircraft log book entry. Insert the Rotorcraft Flight Manual Supplement P/N 121-004-01 in the Rotorcraft Flight Manual.

Section 3
Operation Instructions

Operating Procedures

Prior to a flight involving external load operations perform the following:

1. Activate the electrical system and press the Cargo Hook release button to ensure the cargo hook electrical release is operating correctly. The Cargo Hook must release. Reset the hook by hand after the release. If the hook does not release or re-latch, do not use the unit until the difficulty is resolved.

CAUTION

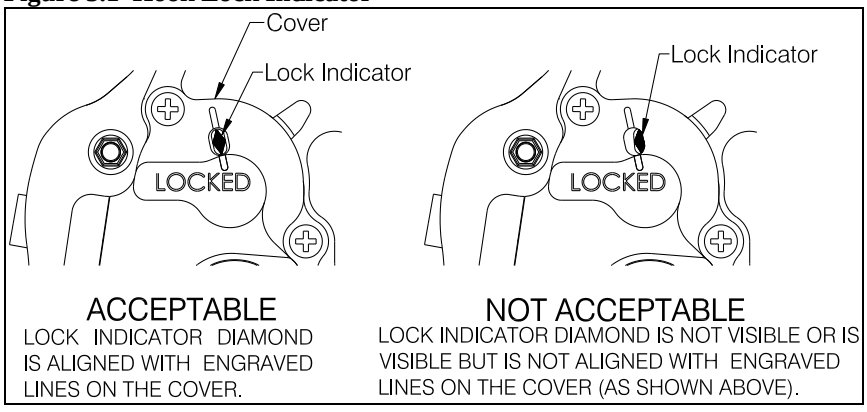
The release solenoid is intended to be energized only intermittently. Depressing the electrical release button continuously in excess of 20 sec. will cause the release solenoid to overheat, possibly causing permanent damage.

2. Activate the manual release lever to test the cargo hook manual release mechanism. The mechanism should operate smoothly and the Cargo Hook must release. Reset the load beam by hand after release. Verify that the hook lock indicator on the side of the hook returns to the fully locked position. In the fully locked position the hook lock indicator must align with the lines on the manual release cover (see Figure 3.1). If the hook does not release or re-latch, do not use the unit until the problem is resolved.

⚠ CAUTION

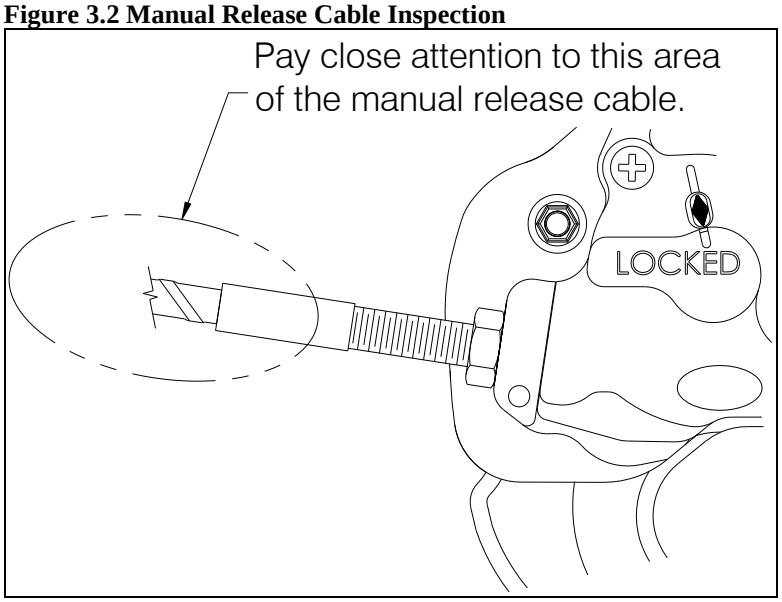
In the fully locked position the hook lock indicator must align with the lines on the manual release cover (see Figure 3.1).

Figure 3.1 Hook Lock Indicator



3. Visually inspect the manual release cable for damage, paying close attention to the flexible conduit at the area of transition to the cargo hook end fitting (refer to Figure 3.2). Inspect for splitting of the outer black conduit in this area and separation of the conduit from the steel end fitting.

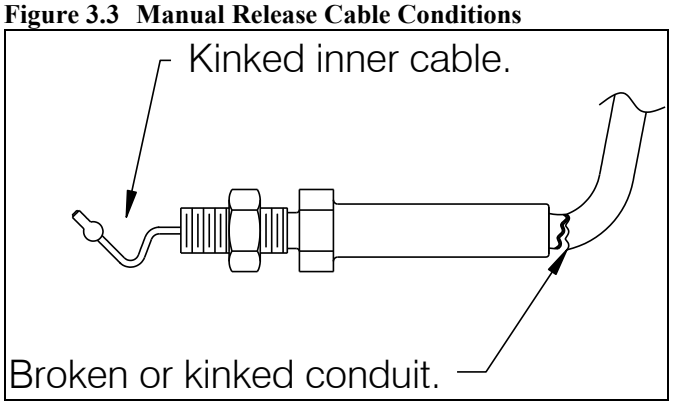
Figure 3.2 Manual Release Cable Inspection



WARNING

Manual release cables are wearable items and must be replaced as condition requires. Broken or kinked conduit, inner cable kinks (ref Figure 3.3), frays, or sticky operation are each cause for immediate replacement.

Figure 3.3 Manual Release Cable Conditions



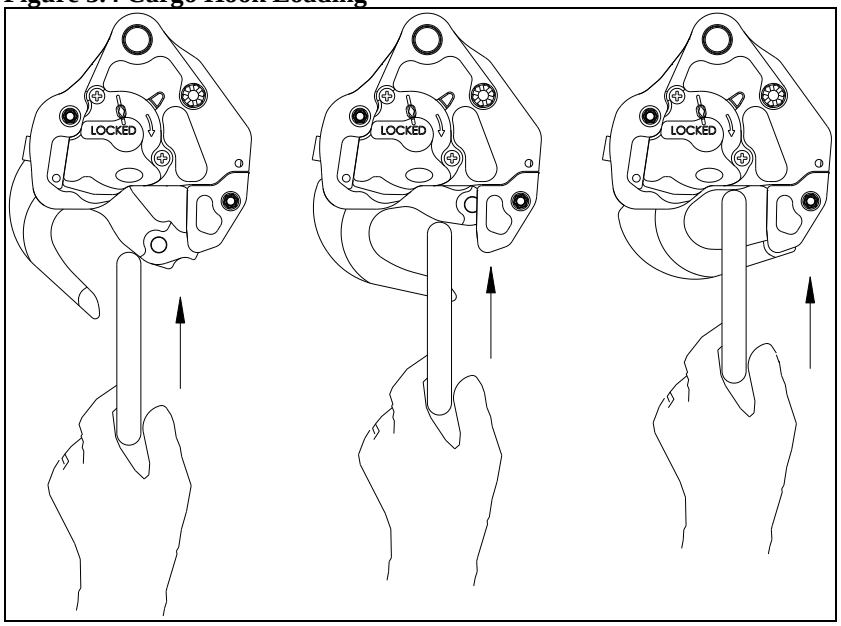
Optional Flight Configuration

The aircraft can be operated with the Cargo Hook and gimbal assembly removed. This may be accomplished by removing the Cargo Hook from the 232-050-00 Link Assembly. Then remove the 232-049-00 Gimbal Assembly and 290-461-01 Pillow Block together by removing the four Pillow Block mounting fasteners (510-280-00, 510-253-00, See Figure 2-7). Secure the manual release cable and electrical wire bundle to any convenient location on the frame structure using tie wraps.

Cargo Hook Loading

The cargo hook can easily be loaded with one hand. A load is attached to the hook by pushing the ring upward against the upper portion of the load beam throat, as illustrated in Figure 3.4, until an internal latch engages the load beam and latches it in the closed position.

Figure 3.4 Cargo Hook Loading



Cargo Hook Rigging

Extreme care must be exercised when rigging a load to the Cargo Hook. Steel load rings are recommended to provide consistent release performance and resistance to fouling. The following illustration shows the recommended rigging and rigging to avoid, but is not intended to represent all rigging possibilities.

WARNING

Some combinations of small primary rings and large secondary rings could cause fouling during release.

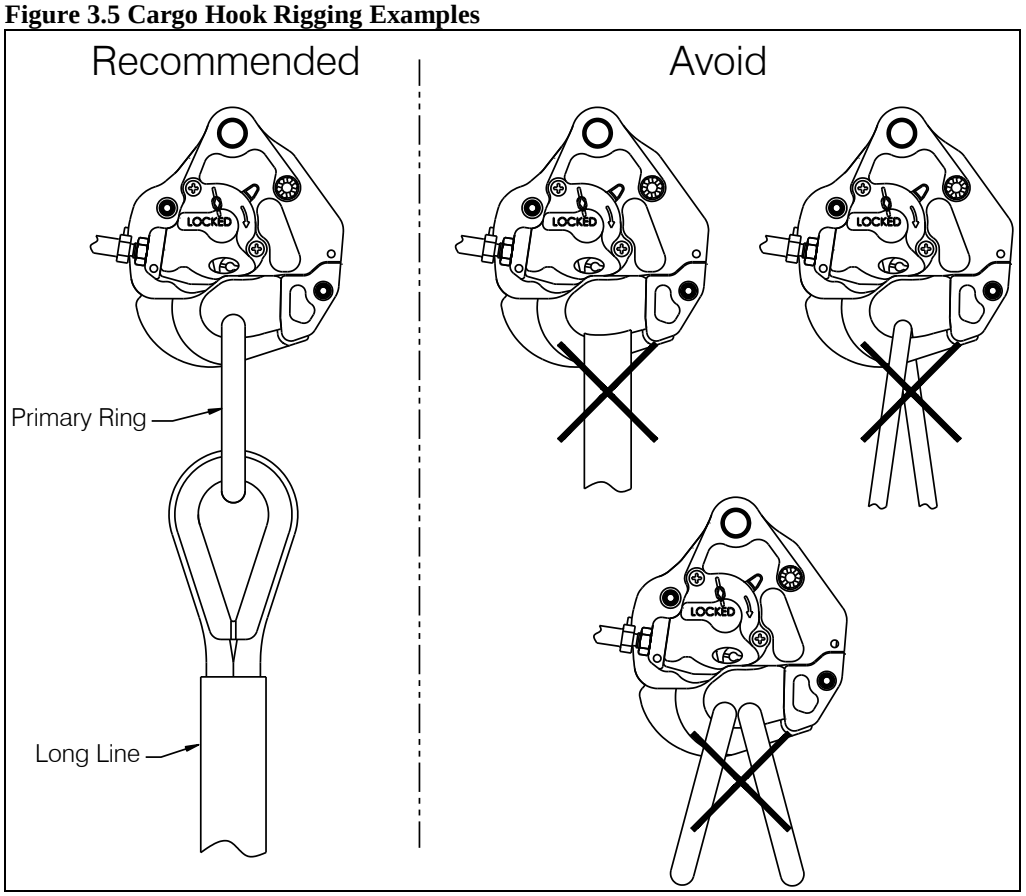
It is the responsibility of the operator to assure the cargo hook will function properly with each rigging.

Cargo Hook Rigging, continued

WARNING

Multiple load rings, nylon type straps (or similar material) or rope must not be used directly on the cargo hook load beam. If nylon straps or rope must be used they should be first attached to a steel primary ring. Verify that the ring will freely slide off the load beam when it is opened. Only the primary ring should be in contact with the cargo hook load beam.

Figure 3.5 Cargo Hook Rigging Examples



Section 4
Maintenance

Storage Instructions

Clean the Cargo Hook Kit components thoroughly before packaging. Pack the unit in a heat-sealable package. If the unit is to be stored for long periods in a tropical climate it should be packed in a reliable manner to suit local conditions. Refer to relevant MIL specifications. Refer to the Component Maintenance Manual (CMM) 122-017-00 for storage instructions for the Cargo Hook.

Package the unit in a suitable fiberboard box and cushion the unit to prevent shifting. Seal the fiberboard box with tape and mark the box with the contents and date of packaging.

Preventive Maintenance

Remove caked-on dirt from the Cargo Hook and suspension with a brush and clean exposed surfaces with a mild solvent. Thoroughly dry all surfaces.

In highly corrosive environments such as salt water, monthly application of a corrosion preventative compound such as ACF-50 is required. Spray exterior of hook with corrosion preventative compound and wipe off excess.

Inspection

The scheduled inspection intervals noted below are maximums and are not to be exceeded. If the cargo hook suspension system 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.

NOTICE

*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.*

1. Visually inspect for corrosion on the exterior of cargo hook and suspension system components (refer to Table 4-1 for limits for suspension components). Corrosion on the cargo hook side plates is cause for immediate overhaul. Additionally, any exfoliation corrosion in the upper attach lug area of the cargo hook is cause for immediate replacement of the side plate.
2. Move the cargo hook and the suspension system throughout their full ranges of motion and observe the manual and electrical release cables to ensure that they have enough slack. The cables must not be the stops that prevent the cargo hook or suspension from moving freely in all directions.

3. Visually inspect for presence and security of fasteners and electrical connections.
4. Visually inspect the external electrical wire harnesses for damage and security.
5. Visually inspect the manual release cable for damage and security.
6. Visually inspect the suspension system structural components (refer to Figure 2-7) for cracks and damage.
7. Activate the helicopter's electrical system and press the Cargo Release button to ensure the cargo hook electrical release is operating correctly. The cargo hook must release. Reset the cargo hook by hand after release. If the cargo hook does not release or re-latch, do not use the unit until the problem is resolved.

CAUTION

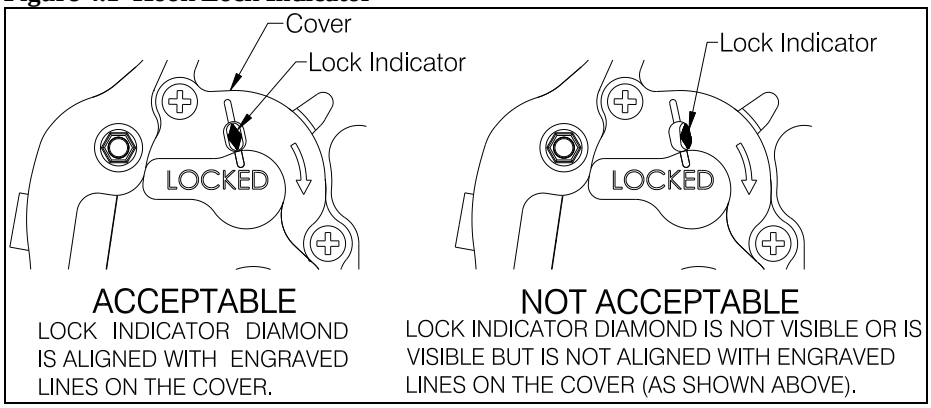
Actuating the electrical release switch continuously in excess of 20 seconds will cause the cargo hook release solenoid to overheat, possibly causing permanent damage.

8. Check the manual release system by pulling the release lever in the cockpit. The cargo hook must release. Reset the cargo hook by hand after release. Verify that the hook lock indicator on the side of the hook returns to the fully locked position. If the hook does not release or re-latch, do not use the unit until the problem is resolved.

⚠ CAUTION

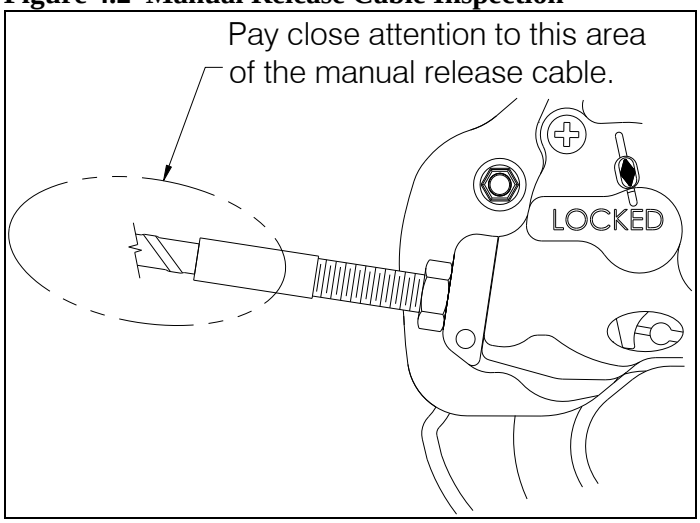
In the fully locked position the hook lock indicator must align with the lines on the manual release cover (see Figure 4.1).

Figure 4.1 Hook Lock Indicator



9. Visually inspect the manual release cable for damage, paying close attention to the flexible conduit at the area of transition to the cargo hook end fitting (refer to Figure 4.2). Inspect for splitting of the outer black conduit in this area and separation of the conduit from the steel end fitting.

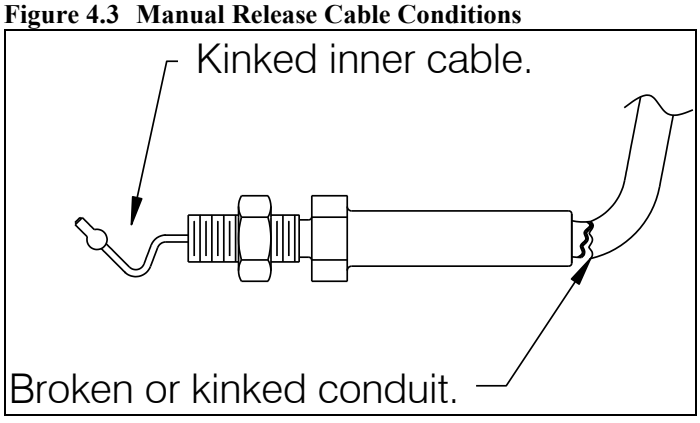
Figure 4.2 Manual Release Cable Inspection



WARNING

Manual release cables are wearable items and must be replaced as condition requires. Broken or kinked conduit, inner cable kinks (ref Figure 4.3), frays, or sticky operation are each cause for immediate replacement.

Figure 4.3 Manual Release Cable Conditions



Inspection continued

Every 1000 hours of external load operations or 5 years, whichever comes first, remove the suspension system from the helicopter, and disassemble per the following instructions and inspect.

Carefully inspect and repair the suspension system detail parts in accordance with the instructions in Table 4-1, refer to Figure 2-7 for part identification. Inspect the parts in a clean, well-lit room.

Table 4-1 Suspension System Inspection

Component	Damage	Remedy	Finish
Pillow Block P/N 290-461-01	Dents, nicks, cracks, gouges, corrosion or scratches	Repair dents, gouges, nicks, scratches and corrosion if less than .020" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	Touch up with Alodine and zinc chromate primer.
Gimbal Assembly P/N 232-049-00	Dents, nicks, cracks, gouges, corrosion or scratches in gimbal link.	Repair dents, gouges, nicks, scratches and corrosion if less than .020" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
	Wear on inside diameter of bushing (P/N 290-462-00).	Maximum permissible bushing ID is .260 inches. Remove and replace if it exceeds .260.	
Link Assembly P/N 232-050-00	Dents, nicks, cracks, gouges, corrosion or scratches in link.	Repair dents, gouges, nicks, scratches and corrosion if less than .020" deep, blend out at a ratio of 20:1, length to depth, replace if otherwise damaged.	This part is 15-5PH, passivated. No touch up finish required.
	Wear on inside diameter of upper bushing (P/N 290-463-00).	Maximum permissible bushing ID is .260 inches. Remove and replace if it exceeds .260.	
	Wear on inside diameter of lower bushing (P/N 290-364-00).	Maximum permissible bushing ID is .520 inches. Remove and replace if it exceeds .520.	

Trouble Shooting

Table 4-2 Trouble Shooting

DIFFICULTY	PROBABLE CAUSE	CORRECTIVE ACTION
Cargo hook does not operate electrically, manual cable release operates normally.	Open electrical circuit, faulty wiring, circuit breaker, switch or solenoid	Disconnect cable from electrical connector on Cargo Hook. Using multimeter, check for 3.0 to 4.0 ohms between pins A and B of electrical connector. If open indication is obtained, check solenoid per Component Maintenance Manual 122-017-00 for 3.0 to 4.0 ohms resistance, replace solenoid if required.
Cargo hook does not operate electrically or manually.	Defective internal mechanism	Disassemble hook per manual 122-017-00 and inspect internal mechanism for binding, jamming, and worn or broken parts. Repair as required.
Cargo hook operates electrically, but not manually.	Defective manual release cable Defective manual release system	Check manual release cable and cable connection to Cargo Hook. Correct any defects. Disassemble hook per manual 122-017-00 and inspect internal mechanism for binding, jamming, and worn or broken parts. Repair as required.
Load beam fails to relatch after being reset.	Defective latch mechanism	Disassemble hook per manual 122-017-00 and inspect internal mechanism. Replace defective part.
Cargo hook manual release cable pull-off force exceeds 8 Lbs. (at the hook).	Friction in internal mechanism.	Check operation of unit using manual release lever. Disassemble hook per manual 122-017-00 and inspect internal mechanism. Check pivot points for excessive friction and lubricate. Check contact surfaces between latch and load beam
Circuit breaker opens when Cargo Hook is energized.	Short in the system, faulty wiring, circuit breaker or solenoid	Check for shorts to ground. Check solenoid per manual 122-017-00. Repair or replace defective parts as required.

Cargo Hook Overhaul Frequency

Time Between Overhaul (TBO): 1000 hours of external load operations or 5 years, whichever comes first.

*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.*

Cargo Hook Overhaul

It is recommended that only minor repairs be attempted by anyone other than the factory. It is recommended that the Cargo Hook be returned to the factory at the overhaul interval or when any of the components are in need of major repair.

If Cargo Hook overhaul is to be performed by the customer, refer to CMM 122-017-00. The instructions in this manual are provided for the benefit of experienced aircraft maintenance facilities capable of carrying out the procedures. They must not be attempted by those lacking the necessary expertise.

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.

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

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Section 5
Certification

FAA STC

United States of America
Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

Number **SR00920SE**

This certificate, issued to **Onboard Systems**
13915 NW 3rd Court
Vancouver, WA 98685

certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part **27** *of the* **Federal Aviation Regulations.**

Original Product—Type Certificate Number: H10WE
Make: Robinson
Model: R22; R22 Alpha; R22 Beta; R22 Mariner

Description of the Type Design Change: Fabrication of Onboard Systems Model 200-262-00 or 200-262-01 Cargo Hook Kits in accordance with Federal Aviation Administration (FAA) approved Onboard Systems Master Drawing List No. 155-059-00, Revision 10, dated September 6, 2011, or later FAA-approved revision. Installation of these kits in accordance with FAA-approved Onboard Systems Owner's Manual listed in the table on the Continuation Sheet or later FAA-approved revision. This modification must be inspected and maintained in accordance with Onboard Systems Owner's Manual and Onboard Systems Component Maintenance Manual listed in the table on the Continuation Sheet or later FAA-approved revisions.

(See Continuation Sheet Page 3 of 3 Pages)

Limitations and Conditions: Approval of this change in type design applies only to the Robinson model rotorcraft listed above. This approval should not be extended to other rotorcraft of these models on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and any of those other previously approved modifications, including changes in type design, will introduce no adverse effect upon the airworthiness of that rotorcraft.

(See Continuation Sheet Page 3 of 3 Pages)

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: September 22, 2000 *Date reissued:* December 29, 2006
Date of issuance: May 29, 2001 *Date amended:* 1/13/2003; 3/14/2011; 2/9/2012

By direction of the Administrator

(Signature)

Acting Manager, Seattle Aircraft Certification Office
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA FORM 8110-2(10-68)

PAGE 1 OF 3 PAGES

FAA STC continued

United States of America
Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

Number **SR00920SE**

Continuation Sheet

Onboard Systems

Issued: May 29, 2001
Reissued:
Amended: 1/13/2003; 3/14/2011; 2/9/2012

Description of the Type Design Change Continued:

System Part No.	Owner's Manual No.	Cargo Hook Component Maintenance Manual No.
200-262-00	120-095-00, Revision 10, dated November 9, 2010	122-005-00, Revision 21, dated April 7, 2011
200-262-01	120-095-01, Revision 0, dated September 6, 2011	122-017-00, Revision 14, dated September 2, 2011

Limitations and Conditions Continued:

Rotorcraft modified in accordance with this STC must be operated in accordance with a copy of an FAA-approved Onboard Rotorcraft Flight Manual Supplement (RFMS) No. 121-004-00, Revision 2, dated February 17, 2011, or later FAA-approved revision for the 200-262-00 cargo hook kit or RFMS No. 121-004-01, Revision 0, dated January 13, 2012, or later FAA-approved revision for the 200-262-01 cargo hook kit. A copy of this Certificate, FAA-approved RFMS, Owner's and Component Maintenance Manuals must be maintained as part of the permanent records of the modified rotorcraft.

If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

- END -

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA FORM 8110-2(10-68)

PAGE 3 OF 3 PAGES

ANAC STC

ANAC

CERTIFICADO SUPLEMENTAR DE TIPO
(Supplemental Type Certificate)

NÚMERO (Number) **2012S06-06**

Este certificado, emitido com base na Lei nº 7565 "Código Brasileiro de Aeronáutica", de 19 de dezembro de 1986,
(This certificate, issued in the basis of the Law No. 7565 "Código Brasileiro de Aeronáutica", dated 19 December 1986,

é conferido ao (à): (is granted to:)
Onboard Systems
13915 NW 3rd Court
Vancouver, WA 98685
USA

por ter a modificação ao projeto de tipo do produto abaixo citado, observadas as limitações e condições
(for having the change to the type design of the product mentioned below, with the limitations and conditions therefor as)

especificadas, satisfeito aos requisitos de aeronavegabilidade aplicáveis.
(specified hereon, met the applicable airworthiness requirements.)

Produto Original - Número do Certificado de Tipo: (Original Product – Type Certificate No:) 8714 (ANAC).

Fabricante: (Manufacturer:) Robinson Helicopter Company.

Modelo(s): (Model(s):) R22, R22 Alpha, R22 Beta and R22 Mariner.

DESCRIÇÃO DA MODIFICAÇÃO AO PROJETO DE TIPO:
(Description of Type Design Change:)

Installation of 200-262-00 or 200-262-01 Cargo Hook Kits in accordance with Onboard Systems, Master Drawing List (MDL), Document No. 155-059-00, Rev. 11, dated 20 Feb. 2012, or later approved revisions.

This CST validates in Brazil the STC No. SR00920SE, issued by FAA (USA).

LIMITAÇÕES E CONDIÇÕES:
(Limitations and Conditions:)

See continuation sheet for applicable data.

DATAS:
(Dates of:)

Do Requerimento: (Application:) 18 Apr. 2012 **Da emissão**: (Issuance:) 12 June 2012 **Da reemissão**: (Reissuance:) **Da emenda**: (Amendment:)

HÉLIO TARQUINIO JÚNIOR
Gerente-Geral, Certificação de Produto Aeronáutico
(General Manager, Aeronautical Product Certification)

DINO ISHIKURA
Superintendente de Aeronavegabilidade
(Airworthiness Superintendent)

Nelson Eisaku Nagamine
General Manager - Acting
Aeronautical Product Certification Branch

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ANAC STC continued

ANAC

Folha de Continuação ao
(Continuation Sheet to)

CERTIFICADO SUPLEMENTAR DE TIPO
(Supplemental Type Certificate)

NÚMERO (Number) **2012S06-06**

LIMITAÇÕES E CONDIÇÕES:
(Limitations and Conditions:)

I. The approval of this type design change should not be extended to other rotorcraft of this model on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and any of those other previously approved modifications, including changes in Type Design, will introduce no adverse effect upon the airworthiness of that rotorcraft.

II. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

III. Operation must be performed in accordance with the applicable FAA Approved Rotorcraft Flight Manual Supplement (RFMS) specified below:

- Document No. 121-004-00, Rev. 2, dated 17 Feb. 2011, or later approved revisions for the 200-262-00 Cargo Hook Kit;
- Document No. 121-004-01, Rev. 0, dated 13 Jan 2012, or later approved revisions for the 200-262-01 Cargo Hook Kit.

IV. Inspection and Maintenance must be performed in accordance with the applicable Owner's Manual and Component Maintenance Manual respectively specified below:

- For the 200-262-00 Cargo Hook Kit: Owner's Manual, Document No. 120-095-00, Rev. 11, dated 18 Mar. 2011, or later approved revisions, and Component Maintenance Manual Document No. 122-005-00, Rev 23, dated 12 Mar. 2012, or later approved revisions;
- For the 200-262-01 Cargo Hook Kit: Owner's Manual, Document No. 120-095-01, Rev. 0, dated 06 Sep. 2011, or later approved revisions, and Component Maintenance Manual Document No. 122-017-00, Rev 16, dated 12 Mar. 2012, or later approved revisions.

V. A copy of this Certificate and the applicable Supplement refered on item III above shall be maintained as part of the permanent records of the modified rotorcraft.

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