

“THE ALASKA RACK”



Robinson R44 & R44II External Load Racks

**Construction
And
Installation Instructions**
(Revision F, January 2023)

STC #SR02364AK

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Revision Record

Revision	Issue Date	Description
A	November 2009	New Issue
B	March 2011	<ul style="list-style-type: none"> a. Removed construction descriptions from document. All references are now for installation only. b. Reformatted numbering of paragraphs due to elimination of construction paragraphs. c. Updated and simplified installation instructions d. Added Hardware list
C	January 2013	<ul style="list-style-type: none"> a. Added documentation and instructions for the folding rack design. b. Modified descriptions to allow the use of a single rack on each side of the aircraft.
D	April 2014	Part Numbers and reference Figure Numbers updated to follow new 2014 Version of the Robinson Helicopter Co (RHC) Illustrated Parts Catalog (IPC).
E	March 2016	Updated RHC part numbers, figure numbers, and references to follow latest edition of the Robinson Helicopter Co (RHC) Illustrated Parts Catalog (IPC).
F	January 2023	<ul style="list-style-type: none"> a. Updated to RHC part numbers, figure numbers, and references to follow latest edition of the Robinson Helicopter Co. (RHC) Illustrated Parts Catalog (IPC). b. Revised pictures throughout. c. Revised areas to meet POH descriptions d. Updated descriptions, pictures, notes, tips, and corrected clerical errors. e. Added new style landing gear for recent model R44 aircraft.

1.0 Introduction

These instructions cover the installation of the "Alaska Rack" External Load Racks for the Robinson R44 and R44II series aircraft. The cargo racks are approved for all R44I and R44 II aircraft approved under the FAA TCDS H11NM. This includes the Astro, Raven and Clipper series aircraft.

This design allows for the use of either both racks or a single rack installed on the aircraft. Additionally, the design allows for use or loading of one rack at a time provided either lateral or longitudinal CG limits are not exceeded.

2.0 General Notes

Compatibility of this installation with the aircraft is the responsibility of the installer. Installer shall ensure that this installation does not conflict with any other previous modification or aircraft installation.

The rack installation shall be maintained in accordance with the instructions for continued airworthiness (6.0 in this manual). Refer to the AC 43.13 and the Robinson R44 Maintenance Manual for standard maintenance practices not referred to in these instructions.

The Racks are 12 lbs. each or 24 lbs. per pair and are installed at station + 109 (longitudinal) and +/- 30 right and left (lateral). Racks must be installed and removed with appropriate weight and balance used for load calculations. Most operators have developed "configuration" style weight and balance forms for the POH and maintenance documents. This removes the burden of having to complete weight and balance documents each time a rack is removed or replaced.

During flight testing it was found that it is extremely difficult to exceed the lateral CG limitations while using only one rack, but pilots and mechanics are cautioned to comply with all CG limitations both laterally and longitudinally. Pilots are also cautioned to load the racks with the reminder that the tail rotor is on the left side of the aircraft; a caution against cargo leaving the rack and hitting the tail rotor. REMEMBER --- all cargo must be secured at all times.

3.0 Constructions Procedure

(deleted)

4.0 Mount Installation Procedures

Critical Note

When installing the below mounts and hardware it is imperative the aircraft components be supported and stabilized while any bolts or hardware are removed and installed. This is especially critical for the left and right upper rear mounts, and the lower landing gear tabs.

Hardware and Supplies included in the Rack Kit

Amount	Part Number	Description
<u>Rack Attachment fittings</u>		
1	AR-1	Left Rack
1	AR-2	Right Rack
1	AR-3	Left Upper Tab
1	AR-4	Right Upper Tab
2	AR-5	Landing Gear Tab
2	AR-6	1 inch bushings
<u>Hardware necessary to attach rack fittings</u>		
2	AN44-20A	Eyebolt – left/right lower
1	AN44-17A	Eyebolt – right upper
1	AN44-16A	Eyebolt – left lower
4	MS20002C5 or AN960-516	Washer – for eyebolts (as necessary)
6	AN3-6	Bolts – left/right upper forward tabs
6	AN960-316L	Washers
6	MS21042L3	Nuts
2	AN960-716L	Washers (as needed for landing gear tab)
<u>Hardware screwed into Rack Legs</u>		
8	MSM4	Rod end
8	AN316-4R	Jam nut (locking nut for MSM4 rod ends)
<u>Hardware to attach racks to fittings</u>		
8	AN4-10A	Bolt
8	365-428A	Fiber Lock Nut
8	AN960-416	Washer
8	AN970-4	Large area washer
<u>Folding Style Racks Only: Leg Hardware</u>		
4	AN3-7A or AN3-6A	Bolt length based on correct thread visible
4	365-1032A	Fiber Lock Nut
4	AN960-316	Washer
<u>Paper Work</u>		
1	Cockpit loading label	
1	STC --- Stamped with numbers	
1	Installation Instructions	
1	Cover letter – Stamped with numbers	
1	ICA	
1	POH supplement	
1	Invoice	

The installation to the aircraft of either the fixed racks, or folding design is identical. The folding rack design incorporates bolted hinge points at the lower ends of the primary vertical legs. Each leg has two AN3 bolts, along with associated washers and nuts. This hardware is also included with the racks.

Note: In some instances, additional washers maybe included in the kit. These may or may not be used and are included only for additional shimming if necessary; or if washers are misplaced during installation.

IMPORTANT NOTE

Before beginning installation of the mounts it is necessary to remove both of the side engine access panels, the rear “dog house” engine cowling, and the top cap cowling. Removal of these cowlings will give the installer access to all the necessary areas.

Note

The following descriptions include the Figure numbers for the latest version of the Robinson Illustrated Parts Catalog – December 2021.

Left Upper Forward Mount – Part Number AR-3 (Stainless Steel Triangle Tab)



Note

These triangular tabs are sold undrilled so that the customer can fit it to their particular aircraft. After removing the screws in Step 1 below, the tab must be match-drilled (3/16 inch) to the holes in the aircraft.

Refer to Robinson Helicopter Co. R44 Illustrated Parts Catalog Figure 28-1 for the following.

1. Identify the 4 screws at the lower forward edge of the left (main) fuel tank. In this step you will remove the 3 rear screws.
2. Remove rear 3 screws, item #44 (NS27039C0807); 3 washers, item #25 (NAS1149FN832P); and 3 nuts, item #26 (MS21042L08).
3. These above screws are at the lower forward edge of the left (main) fuel tank. Remove only the 3 rear screws. Do not use the forward screw due to conflict with other fuel tank hardware.
4. Align the support bracket (AK-3) so as to provide adequate clearance to the engine oil filler access door and the bottom of the fuel tank support structure. **Measure very carefully**, and match drill the stainless steel tab with a 1/8” drill, matching the existing holes in the aircraft structure.
5. Temporarily position the stainless steel tab with two of the removed #8 machine screws.
6. Drill the remaining open hole in the tab to 3/16 inch, to fit an AN3 bolt. Install the AN3-6 bolt included in the kit. Secure with MS21042L3 “missile” nut, and at least one AN960-316L washer under the nut.
7. Remove one #8 temporary machine screw (Step 4 above), and complete Step 6 above for this hole.
8. Remove remaining temporary #8 screw from last hole and match drill as per Step 6.
9. Confirm adequate washers and thread count on all bolts.
10. Torque 40-60 inch pounds.

Right Upper Forward Mount – Part Number AR-4

(Stainless Steel Triangle Tab)



Note

This installation is almost identical to the left tab. The same processes and procedures are followed.

Refer to Robinson Helicopter Co. R44 Illustrated Parts Catalog Figure 53-15 for the following.

1. Identify the 4 screws at the lower forward edge of the right (aux) fuel tank. These are located directly under the right, forward access door. In this step you will remove the 3 rear screws.
2. Remove 3 rear screws, item #1 (MS27039C0806), item #14 washers (NAS1149FN832P) and item #15 nuts (MS21042L08), at forward right front edge of the horizontal firewall.
3. These above screws are at the forward edge of the inspection door under the right (auxiliary) fuel tank. Remove only the 3 rear screws. Do not use the forward screw due to conflict with other hardware.
4. Align the support bracket (AK-3) so as to provide adequate clearance to the inspection door above and the side panel support structure. **Measure very carefully**, and match drill the stainless steel tab with a 1/8" drill, matching the existing holes in the aircraft structure.
5. Temporarily position the stainless steel tab with two of the removed #8 machine screws.
6. Drill the remaining open hole in the tab to 3/16 inch, to fit an AN3 bolts. Install the AN3-6 bolt included in the kit. Secure with MS21042L3 "missile" nut, and at least one AN960-316L washer under the nut.
7. Remove one #8 temporary machine screw (Step 4 above), and complete Step 6 above for this hole.
8. Remove remaining temporary #8 screw from last hole and match drill as per Step 6.
9. Confirm adequate washers and thread count on all bolts.
10. Torque 40-60 inch pounds.

IMPORTANT NOTE FOR BELOW STEPS

To install the left and right upper rear mounts, and the landing gear tab (below) it is necessary to slightly “lift the weight” of the helicopter off the frame. This is generally done with an engine hoist and a cargo strap around the upper frame areas; just in front of the tail cone attach fittings. The entire helicopter does not need to be lifted off the gear, just simple remove some of the weight and binding stress on each of these upper frame bolts, and the aft landing gear bolts.

CAUTION!!!

Make sure cargo strap or rope for lifting is around substantial upper frame structure, and not a single tube. Lifting on a single tube may cause the tubing to bend, thus requiring replacement of the upper frame.

Upper Rear Mount (Left) **(AN44-16A Eye Bolt)** **(1 inch standoff AR-6)**



Refer to Robinson Helicopter Co. R44 Illustrated Parts Catalog Figure 53-19 for the following.

1. Remove bolt, item #32 (NAS6605-6).
2. Replace with AN44-16A eyebolt, and 1 inch bushing supplied with kit. (a few extra washers are supplied with the kit for shimming as necessary)

Tip

The weldment areas are very close for this eyebolt installation. It is usually necessary to try a couple different washer stacks for the correct fitting. Also it is usually necessary to thread the palnut and lock nut onto the bolt at the same time.

3. Reuse existing washers, nut, and palnut items, #20, #24, and #26.
4. Side panels will need to be trimmed to fit around eye bolt and bushing. Rear engine “dog house” cowling will also need to be trimmed to fit correctly.
5. As needed, the upper rear nut plate that secures the left side access panel may need to be lowered approximately 1 inch. Depending on the helicopter, this may not be required, but may simplify removal of the side panel. To accommodate lowering the nut plate, simply remove the upper nut plate rivet, and rotate the nut plate 180 degrees. Mark the center hole and drill. Drill and re-rivet the nut plate in place. (Some installations do not require moving this nut plate)

Upper Rear Mount (Right)
(AN44-17A Eye Bolt)
(1 inch standoff AR-6)



Refer to Robinson Helicopter Co. R44 Illustrated Parts Catalog Figure 53-19 for the following.

1. Remove bolt, item #13 (NAS6605-4).
2. Replace with AN44-17A eyebolt, and 1 inch bushing supplied with kit. (a few extra washers are supplied with the kit for shimming as necessary)
3. Reuse existing washer, nut, and palnut items, #20, #24, and #26.
4. Side panels may need to be trimmed to fit around eye bolt and bushing. Rear engine “dog house” cowling may also need to be trimmed to fit correctly. The aft transmission area bulk head, near the inspection door may also need trimming.
5. As needed, the upper rear nut plate that secures the left side access panel may need to be lowered approximately 1 inch. This is not required, but may simplify removal of the side panel. To accommodate lowering the nut plate, simply remove the upper nut plate rivet, and rotate the nut plate 180 degrees. Mark the center hole and drill. Drill and re-rivet the nut plate in place. (Some installations do not require moving this nut plate)

IMPORTANT NOTE

Keep the helicopter on the lift hoist, similar to the above eyebolt installation. This is to remove the binding forces on these aft landing gear bolts. It is usually not necessary to lift the helicopter off the ground; just enough to be able to remove the bolt, install the hardware and then replace.

CAUTION !!!

As above, make sure cargo strap or rope for lifting is around substantial upper frame structure, and not a single tube. Lifting on a single tube may cause the tubing to bend, thus requiring replacement of the upper frame.

CAUTION !!!

Robinson Helicopters recently redesigned the landing gear attach fittings. As such the installation instructions are divided into each style. Make sure you follow the correct instructions below for your applicable style of landing gear.

Lower Rear Mount (Left and Right) – AR-5 (Landing Gear Tabs – Both Sides)



Old Style Landing Gear

Refer to Robinson Helicopter Co. R44 Illustrated Parts Catalog Figure 32-5 (April 2016) for the following.

Tip

Some R44 operators, particular in the utility market, remove the landing gear fairings on the helicopter. If the fairings are not installed, there is no need to accomplish Steps #1, #5 and #6 below.

NOTE

For both the left and right side, pay particular attention to the special washer C141-1, item #22, on each side of the landing gear fitting. This is a special washer that allows the “rod end” on the landing gear bracket to rotate.

1. Remove rear landing gear strut fairing.
2. Remove aft main landing gear bolt item #23 (NAS6607-52) from elbow to strut fitting.
3. **Caution** -- Make sure any washers between landing gear fittings and the gear are NOT removed or dropped. Pay particular attention to the special washer, item #12, C141-4. This washer must stay against the “rod end” of the landing gear fitting.
4. Install rack attach steel strap AK-5 under head of bolt, and reinstall with existing hardware except the replacement of thick washer under the nut (Item #20) with thin washer (AN960-716L) under the nut.
5. Tighten and torque the bolt/nut as per the R44 MM.

6. Confirm adequate threads for the nut and pal nut. Confirm that the special washer C141-4 is against the rod end swivel as required.
7. Cut a slot in the upper section of the landing strut fairing to accommodate the landing gear rack attach strap.
8. Replace landing gear strut fairing. (as desired)

New Style Landing Gear

Refer to Robinson Helicopter Co. R44 Illustrated Parts Catalog Figure 32-1 for the following.

Tip

Some R44 operators, particular in the utility market, remove the landing gear fairings on the helicopter. If the fairings are not installed, there is no need to accomplish Steps #1, #5 and #6 below.

NOTE

For both the left and right side, pay particular attention to the special washer C141-1, item #12, on each side of the landing gear fitting. This is a special washer that allows the "rod end" on the landing gear bracket to rotate.

1. Remove rear landing gear strut fairing.
2. Remove aft main landing gear bolt item #13 (NAS6607P20) from elbow to strut fitting.
3. **Caution** -- Make sure any washers between landing gear fittings and the gear are NOT removed or dropped. Pay particular attention to the special washer, item #12, C141-4. This washer must stay against the "rod end" of the landing gear fitting.
4. Install rack attach steel strap AK-5 under head of bolt, and reinstall with existing hardware except the replacement of thick washer under the nut (Item #15) with thin washer (AN960-716L) under the nut.
5. Tighten and torque the bolt/nut as per the R44 MM.
6. Confirm adequate threads for the nut and pal nut. Confirm that the special washer C141-4 is against the aft rod end swivel as required.
7. Cut a slot in the upper section of the landing strut fairing to accommodate the landing gear rack attach strap.
8. Replace landing gear strut fairing. (as desired)

NOTE

It is usually not necessary to “lift the weight” off this bolt for removal and installation, but sometimes it is helpful. Lifting this weight off the bolt can be done at the same time as the above.

Lower Forward Mount (Left and Right)
(AN44-20A Eye Bolts)



Refer to Robinson Helicopter Co. R44 Illustrated Parts Catalog Figure 53-19 for the following.

1. Remove bolt item #15 (NAS6605-24), and washer #20 (NAS1149F0532P), one from each left and right lower frames at lower forward fuselage attachment.
2. One each side, replace with AN44-20 eyebolts and MS20002C5 or AN960-516 washer reusing existing washer and nut items #16 and #24.

All hardware torqued in accordance with Robinson Helicopter Co. R44 Maintenance Manual instructions.

5.0 Rack Installation Procedures – Standard Design and Folding Design

NOTES

Note 1: Installation of left and right racks is similar.

Note 2: Notice some of the below steps identified only for the “Folding Racks”

Note 3: A single rack or both racks may be installed with this STC. Pilots and mechanics are cautioned to pay particular attention to the lateral CG limits when utilizing only one rack.

1. Install MSM4 rod ends, along with AN316-4R locking nuts onto upper ends for vertical legs of each rack. Also install the rod ends and locking nuts on the bottom fore and aft legs of each rack. Leave rod ends on rack loose until final installation adjustments have been made. Generally these rod ends are threaded most of the way into the legs.
2. **Folding Racks Only:** Install vertical legs onto rack base with supplied AN3 bolts, nuts, and washers. Leave hardware loose until final adjustment is complete. Confirm that the left forward and aft legs and the right forward and aft legs are in the correct location. For initial installation these legs are generally color coded with tape. The taller leg goes toward the rear of the aircraft.
3. With the assistance of another mechanic, lift racks into place and temporarily secure with AN4 bolts through rod ends and attach fittings. As necessary align rods ends on rack so as to line up with mounting plates and hardware on aircraft. Do not install nuts or washers at this time.
4. After rods ends on rack have been adjusted for best fit to attach points install AN4-10A bolts, 365-428A fiber lock nuts, and washers to secure racks. Wide area washers are supplied with the kit. These are to be located next to the rod ends as a security in case the rod end ball comes loose. Additional washers may be used to correct for thread length. Torque to 60-120 in. lbs.
5. Secure locking nut on the rack rod ends.
6. **Folding Racks Only:** Tighten AN3 bolt/nut “folding rack” leg hardware. Torque to 40-60 in. lbs.
7. Install placard in clear view of pilot at all times during operation with the cargo racks installed:

Approved Cargo Envelope

Cargo carried on the external load racks outside the “approved Cargo envelope” limits of the Pilot Operating Handbook Flight Manual Supplement, places the aircraft within the FAR Part 133 Requirements for Class A External Loads. In this case, the Applicable essential crew limitations apply. These crew limitations do not apply provided the cargo is within the “approved cargo envelope” limits.

8. Complete weight and balance calculation for rack installation.

Note

For most installations and uses the cargo racks will be installed and removed as needed. It is suggested that “configurations” be included in the POH and maintenance documents to show configurations with, and/or without, the cargo racks.

6.0 Continued Airworthiness Procedures

Periodic inspection for condition and security shall be performed at each scheduled maintenance inspection. Continued airworthiness to be maintained in accordance with the airframe manufacturer's instructions, FAR Part 43, and the Alaska Rack Instructions for Continued Airworthiness for this installation.

7.0 Weight and Balance

The following is the net weight increase associated with the installation of the external racks

Installation	Weight	Longitudinal		Lateral	
		Arm	Moment	Arm	Moment
Left Rack	12 lbs	+ 109 in.	+1308	- 30 inches	-360
Right Rack	12 lbs	+ 109 in.	+1308	+30 inches	+360

Note: The maximum fore/aft CG, and the maximum left/right CG as per the Pilot Operating Handbook must never be exceeded. For any flight loading refer to Pilot Operating Handbook for proper weight and balance limitations.

Note

For most installations and uses the cargo racks will be installed and removed as needed. It is suggested that "configurations" be included in the POH and maintenance documents to show configurations with, and/or without, the cargo racks.

8.0 Required Placards

Rack Placard

Each rack must have the following identifying placard permanently secured to the rack.

"Maximum Weight – 150 lbs".

Aircraft Placard

The following placard to be installed in clear view of pilot at all times during operation with the cargo racks installed.

Approved Cargo Envelope

Cargo carried on the external load racks outside the "approved Cargo envelope" limits of the Pilot Operating Handbook Flight Manual Supplement, places the aircraft within the FAR Part 133 Requirements for Class A External Loads. In this case, the Applicable essential crew limitations apply. These crew limitations do not apply provided the cargo is within the "approved cargo envelope" limits.

Appendix A **Pictures**

Additional pictures and information are posted on the Alaska Rack web site
www.alaskarack.com

Alaska Rack **AR-1 and AR-2**

The below picture is of the right side rack.
This is a non-folding rack.



Stainless Steel Support Bracket
AR-3 and AR-4

This stainless steel support bracket is attached to the left and right side of the aircraft near the fuel tanks, and is the main upper forward support for the rack. This picture is the right side tab. The left side tab is a mirror image.



1. The three upper holes are drilled to 3/16 inch to fit a AN3 bolt. These holes must be match drilled to the aircraft. This bracket will be installed in the rear 3 holes of each side.
2. The lower hole is drilled to 1/4 inch to fit an AN4 bolt for the rack attachment.

Landing Gear Steel Strap Support
AR-5

This steel support tab is affixed to the left and right lower rear landing gear elbow of the aircraft.



This steel strap support tab is mounted on the rear lower of each side of the aircraft. (see above instructions)

Additional Installation Pictures

Note

Most of the pictures below are from customer aircraft that have hundreds of hours in the air using the Alaska Rack. As such in some instances the installation show as "well worn". Another testament to the durability of the installation and attach hardware. These are representative pictures to assist in the installing the kit if questions arise.

Installed Rack – Left Side



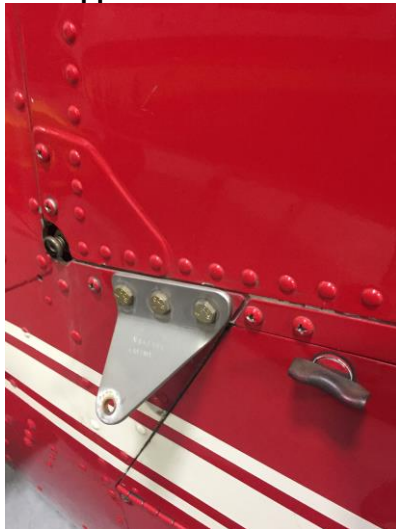
Installed Rack – Right Side (on a Clipper II) – Looking aft



Installed Rack – Right Side (on a Clipper II) – Looking foward



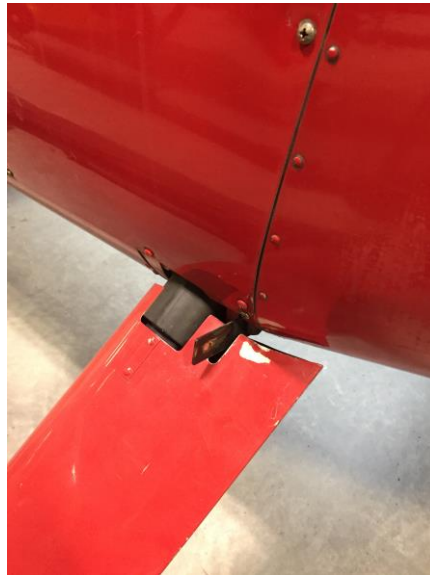
Installed Upper Forward Tabs – Both Sides



Installed Lower Forward Eyebolt (Left Side)



Landing Gear Tab, with fairing installed



Landing Gear Tab, without fairing installed

