



**GMR – 1519 – 4500 SERIES**  
**AUGUST 07, 1997**

**GENERAL REPAIR AND MAINTENANCE MANUAL**  
**FOR**  
**AIRLINE CONTAINER LEASING**  
**CARGO NET: P/N 1519-4500-SERIES**

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**GMR – 1519 – 4500 – SERIES**

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## GMR – 1519 – 4500 – SERIES

### 1.0 Purpose

- 1.1 The purpose of this manual is to provide instruction for the maintenance and repair of the Airline Container Leasing (ACL) Cargo Net P/N 1519-4500-Series.

### 2.0 Inspections

- 2.1 It is recommended that the cargo net be inspected periodically for damage and excessive wear, in addition to routine inspections prior to each use.
- 2.2 Damaged net assemblies are classified in two categories, major and minor.
- 2.3 Any missing, damaged, or inoperative components shall constitute a need for repair.
- 2.4 Only original replacement parts, or equivalent parts approved in writing by ACL, shall be used for repairs to damaged cargo nets.
- 2.5 Allowable Damage (Minor Damage):
- A) **Double stud fittings:** One fitting per side inoperative or missing
  - B) **Adjustable hooks:** One hook per side inoperative or missing not in conjunction with a cut rope or web
  - C) **Rope or Web:** One cut per side not including edge rope or web
  - D) **Edge Rope or Web:** One edge rope or web cut per side not in conjunction with inoperative or missing double stud fitting

**ANY DAMAGE EXCEEDING THE ALLOWABLE DAMAGE SPECIFICATIONS IS CONSIDERED MAJOR DAMAGE AND THE NET ASSEMBLY MUST BE REPAIRED PRIOR TO USE. IT IS STRONGLY RECOMMENDED THAT NETS WITH MINOR ALLOWABLE DAMAGE BE REPAIRED AS SOON AS POSSIBLE BECAUSE MINOR DAMAGE WEAKENS THE NET AND ELIMINATES ANY MARGIN FOR ERROR WITH THE WEIGHT RESTRICTIONS AS DICTATED BY NAS 3610 AND TSO-C90c.**

### **3.0 Reports of Malfunctions**

**3.1** ACL requests that it be notified if any part or parts show signs of failure or defect.

**3.2** When reporting such findings, the user is requested to identify the following:

- A) Part Number
- B) Date of Manufacture
- C) Nature of defect or failure
- D) Serial Number

### **4.0 Repair Instructions – Rope Construction**

**4.1** Double stud fitting, P/N 1519-DS - Series, with or without ring, should be replaced if deemed inoperative or damaged.

**4.1.1** To remove fitting, untie or cut rope and slide fitting off.

**4.1.2** To install new fitting, thread rope through fitting and retie the rope.

**4.1.3** Alternate method of replacing double stud fitting.

- A) Take a new fitting and thread folded over rope through the fitting.
- B) Then open the folded rope and put the fitting through the open rope pulling the fitting tight to knot the rope (see Figure #1 and #2, page 3). It is recommended to install a retainer ring over the rope to ensure that the fitting is not taken off the net by unauthorized personnel.
- C) Using this method you may leave the damaged fitting on the net temporarily, or cut the fitting off using bolt cutters.

**4.1.4** Net Hooks, ACM-4501-Series, with punch-pin. This net hook can be affixed to the net without cutting or tying the rope. The pin must be hammered in to ensure permanent fixation (Figure #3, page 3).



**Figure #1**



**Figure #2**



**Figure #3**

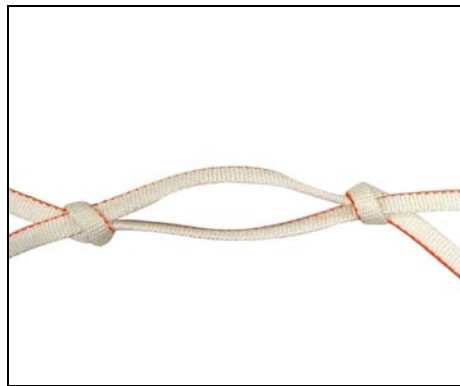
**4.2 Damaged or worn rope sections should be replaced**

**4.2.1** To remove damaged or worn rope section, cut the rope

**4.2.2** Splice new section of rope as indicated below (Figure #5A and 5B)

- A) Two half hitch knots
- B) Square knot and two half hitches knots

**4.2.3** Rope ends should be heated to prevent fraying



**Figure # 5A**



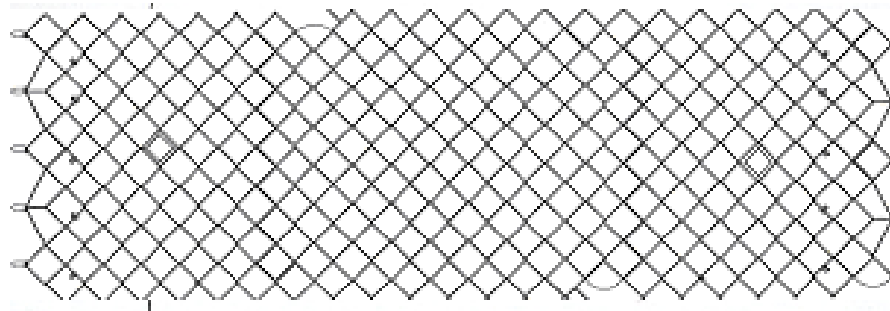
**Figure # 5B**

**4.2.4** Bottom rope should not be spliced. If rope on bottom of the net is damaged, the entire section should be replaced.

**4.3** If net is assembled using two separate sections (-9) long net assembly and (-10) short net assembly, arrange one over the other to make the total net assembly repair as follows:

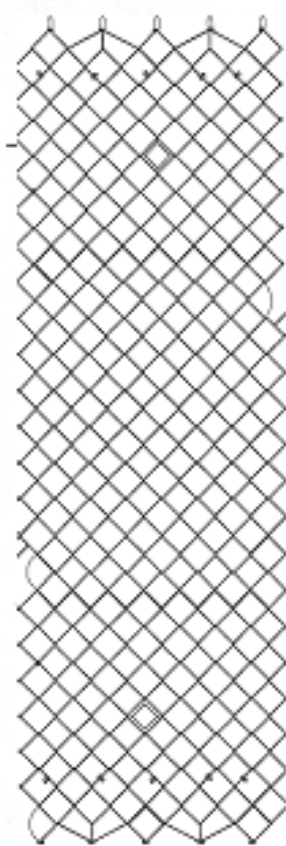
**4.3.1** If (-9) long net assembly is damaged, simply remove the entire (-9) long net assembly and replace with an undamaged (-9) long net assembly.

**4.3.2** If (-10) short net assembly is damaged, simply remove the entire (-10) short net net assembly and replace with an undamaged (-10) short net assembly.

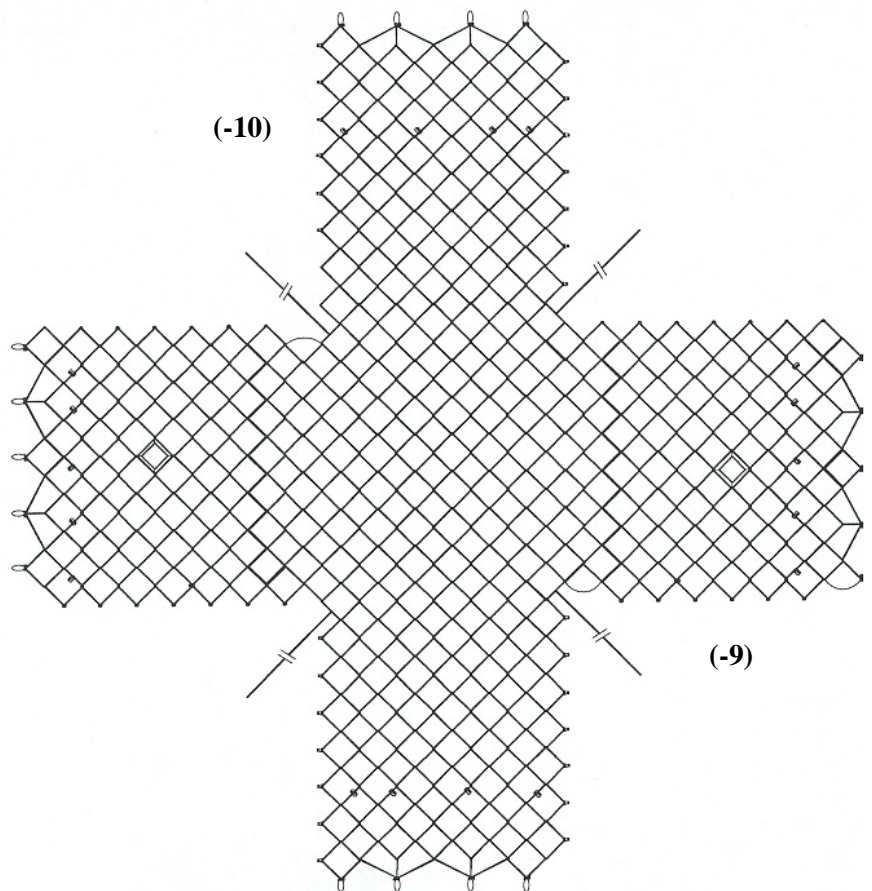


**(-9)**

**(-10)**



**(-10)**



**(-9)**

## 5.0 Repair Instructions – Web Construction

- 5.1 Double stud fitting should be removed and replaced if deemed inoperative or damaged.
- 5.1.1 To remove fitting cleanly cut web – retaining loop on the adjustable length of the cam buckle. Pull web through the cam buckle and out of the inoperative double stud fitting.
- 5.1.2 To install new fitting reverse procedure in 5.1.1 after threading web through cam buckle, fold web and re-stitch as a retaining loop.
- Optional:**  
After threading the web through cam buckle, web may be folded and heat welded together.  
Web ends should always be cut with a hot knife and seared to prevent unraveling.
- 5.2 Cam buckle should be removed and replaced if deemed inoperative or damaged.
- 5.2.1 To remove cam buckle cut the thread stitching holding the web together at fixed end of web attached to cam buckle.
- 5.2.2 Remove adjustable end of web from cam buckle per 5.1.1.
- 5.2.3 Reinstall adjustable end of web to cam buckle per 5.1.2.
- 5.2.4 Reinstall fixed end to cam buckle by threading web through the buckle and re-sew the web using a ¾" box X stitch pattern, 56 stitch using TEX210 Bonded Polyester thread or stronger. Web ends must be cut with a hot knife and seared to prevent unraveling.
- 5.3 D-rings or snap hooks should be removed and replaced if deemed inoperative or damaged.
- 5.3.1 To remove D-rings or snap hooks follow procedures in 5.2.1.
- 5.3.2 To replace D-rings or snap hooks follow procedure in 5.2.4.
- 5.4 Damaged or worn sections of web should be removed and replaced.
- 5.4.1 To remove damaged web sections cut web with hot knife and sear ends to prevent unraveling.
- 5.4.2 To replace damaged sections cut a length of replacement web at least 6 inches longer than section that is removed.
- 5.4.3 Replacement section must overlap pieces being retained, one piece on top of the other, by a minimum of 3 inches at each end.
- 5.4.4 Sew each overlapped end of the replacement section with two ¾" box X stitch pattern, 56 stitch using TEX210 Bonded Polyester or stronger thread patterns per figure (C).



Figure (C)

**6.0 Parts List**

**6.1 Appendix A includes parts list for Cargo Net P/N 1519-4500-Series**

**Appendix A**  
**Parts List**

<b>Item Number</b>	<b>Part Number</b>	<b>Nomenclature</b>
1	1519-DS-Series	Double Stud Fitting with or without Ring
2	ACM-4501-Series	Net Hook – with or without Pin
3	DOT-2000-Series	Polyester Net Rope
4	DOT-3000-Series	Polyester Net Rope
5	DOT-4500-Series	Polyester Net Rope
6	DOT-6000-Series	Polyester Net Rope
7	DOT-3500-Series	1" Polyester Webbing
8	CAM 5	1" Cam Buckle
9	FSH-52	1" Flat Snap Hook
10	1519-SSR*	Single Stud Fitting
11	DOT-3000-D-L12	Lashing Line with or without Loop
12	DOT-BPS-DS-H-Series	Bypass Strap with Fitting

**\*Not approved for use on all 1519-4500 Series. Authorization from ACL is needed to use these parts.**

**AIR CARGO NET SPECIFICATIONS**  
**-Standard Series-**

<b>DESIGNATOR</b>	<b>PART NUMBER</b>	<b>DIMENSIONS</b>	<b>CAPACITY</b>	<b>TARE WEIGHT</b>
2L4N	1519-4500-60.4	60.4" x 125" x 64"	7,000 lbs.	22 lbs.
2B5N	1519-4500-108	88" x 108" x 82"	10,000 lbs.	29 lbs.
2A1N / 2M2N	1519-4500-64	88"/96" x 125" x 64"	15,000 lbs.	27 lbs.
2A1N / 2M2N	1519-4500-82	88"/96" x 125" x 82"	15,000 lbs.	29 lbs.
2A1N / 2M2N	1519-4500-96	88"/96" x 125" x 96"	15,000 lbs.	30 lbs.
2A1N / 2M2N	1519-4500-118	88"/96" x 125" x 118"	15,000 lbs.	33 lbs.
2R1N	1519-4500-196	96" x 196" x 96"	25,000 lbs.	59 lbs.
2G1N	1519-4500-238.5	96" x 238.5" x 96"	30,000 lbs.	63 lbs.

**ROPE COMPOSITION**

Net Body P/N: **DOT-3000** Tested Break Strength: 3375 lbs.  
 Bottom Rope P/N: **DOT-4500** Tested Break Strength: 5118 lbs.  
 Woven Polyester  
 100% First Quality Polyester (2600 Denier)  
 Filler Yarn (1000 Denier)  
 Catch Cord (1000 Denier)  
 Flammability: Self Extinguishing in accordance with 14 CFR Part 25.  
 Bottom rope and lashing lines are resin treated to improve abrasion resistance.

**NET HOOKS**

ACM-4501-Series  
 Tested Break Strength: 5425lbs

**DOUBLE STUD FITTINGS**

Part Number: **1519-DS**  
 Tested Break Strength (P1): 5620 lbs  
 Forged Body: Manufactured in accordance with ISO 9788.  
 Plunger: Manufactured in accordance with ISO 12118.  
 Pre-drilled 3.2mm locking hole.  
 Stamped traceability codes on plunger.

**TSO TAGS**

13oz Reinforced Vinyl  
 Permanently affixed  
 Serialized and dated for traceability and return to service requirements.

**ALLOWABLE DAMAGE LIMITS**

*(Refer to manual GMR-1519-4500 Series)*  
 Fitting and hook replacement permitted per instructions.  
 Damaged or cut rope replacement permitted per instructions.  
 By-pass straps available for temporary repair.  
 TSO / Repair tag replacement capabilities.  
 All repair materials available for purchase.

**CUSTOM OPTIONS**

Digital quality print available for company specific placards.  
 Solid color nets available: Blue, Red, Orange, Green, Yellow  
 Multi-color nets available.  
 Custom colors for bottom rope and lashing lines.

**COMPLIANCE**

**TSO-C90c**  
**NAS 3610**  
**IATA Standard Specification 50/2**  
**FAR Part 21, Subpart O:** Technical Standard Order Authorization  
**FAR 21.601:** Applicability to the TSO  
**FAR 21.605:** Application and Issue of TSO  
**ISO 4170:** Air Cargo Equipment – Interline Pallets and Nets  
**ISO 12118:** Air Cargo Equipment – Identification of Double Stud Fitting  
**ISO 9788:** Air Cargo Equipment – Cast Components of Double Stud Fitting Assembly  
**ISO 4115:** Air Cargo Equipment – Air / Land Pallet Nets  
**ISO 7166:** Aircraft – Rail and Stud Configuration for Passenger Equipment and Cargo Restraint

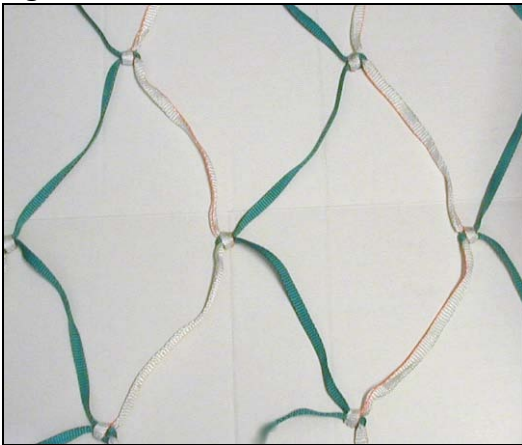
**The following procedures can be used to keep a net manufactured by Airline Container Leasing temporarily in-service.**

**Temporary bypass of a cut rope net.**

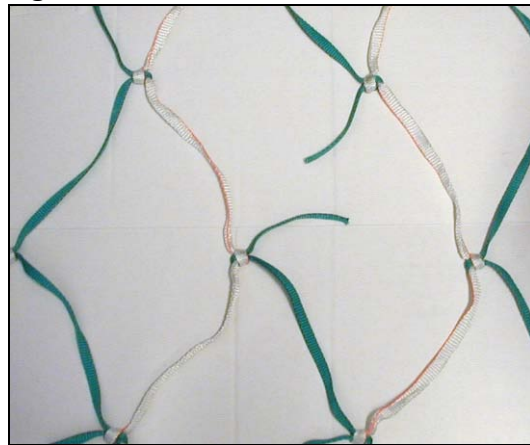
A maximum of three cut ropes can be temporarily bypassed by the use of the following procedure:

This repair entails installing a net hook P/N: ACM-4501-Series to bypass the cut area. The cut section should be tied together to eliminate the possibility of it becoming tangled. The net hook should be attached one knot away from the cut on the opposite side of the knot. See figure # 1, # 2, # 3, and # 4 for hook installation.

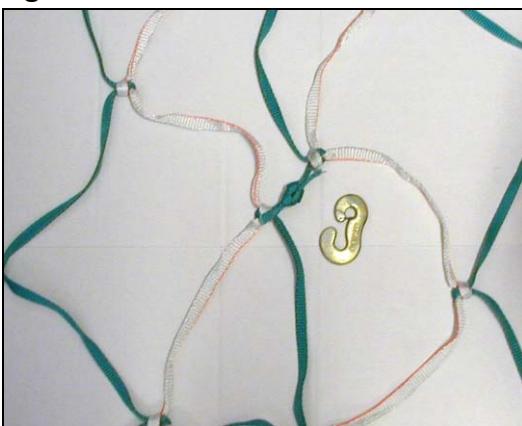
**Figure #1**



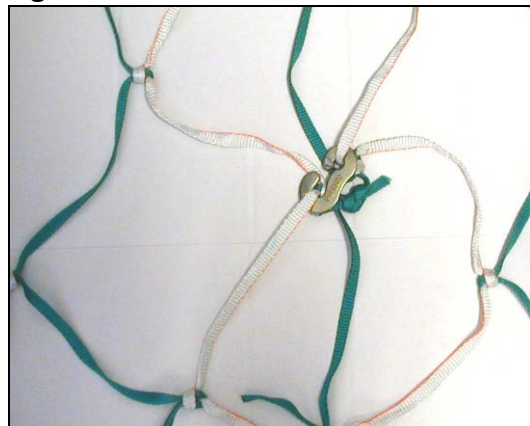
**Figure #2**



**Figure #3**



**Figure #4**



**Replacement of a double stud fittings, P/N: 1519-DS-Series.**

The replacement of a damaged double stud fitting can be accomplished by the use of either of two procedures.

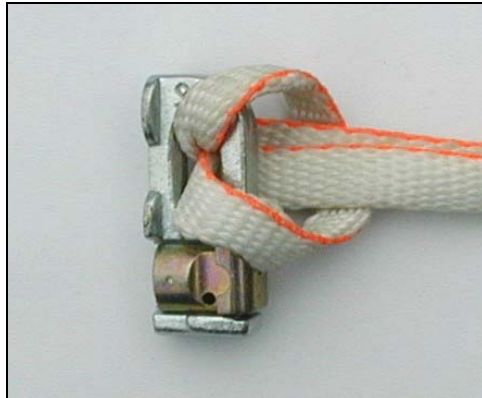
1. The first procedure is:

- 1) Thread the folded over rope through the hole in the new fitting.
- 2) Open the folded rope and pull the fitting through the opening.
- 3) Then pull the fitting tight to knot the rope. See figure # 7, # 8, and # 9.

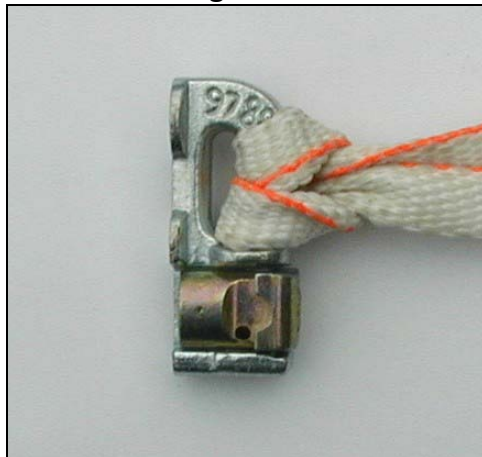
**Figure #7**



**Figure #8**



**Figure #9**



2. The second procedure is to use a bypass strap P/N DOT-BPS-DS-H series see figure # 10 (the strap is manufactured using DOT-3500-Series 1" polyester webbing, two ACM- 4501-Series net hooks, and one 1519-DS-Series double stud fitting ). The strap is installed one knot away from the broken fitting on the opposite side of the knot. See figure # 11.

**Figure #10**



**Figure #11**



**Replacement of a net hook, P/N: ACM-4501-Series.**

The replacement of a damaged net hook can be accomplished by:

- 1) Hang the net hook snap end on the rope in the proper location.
- 2) Pull the hook until the net rope enters past the hook pin. See figure # 12, and # 13.

**Figure #12**



**Figure #13**



**Replacement of a corner rope or lashing line.**

The replacement of a damaged or missing corner rope or lashing line can be accomplished by finding the location where the net side is attached to the net body. That is where the lashing line is to be tied. Tie the lashing line using the following procedure.

- Step one:** With the cargo net on the left side. Take the lashing line and go over the two net ropes, then under the two net ropes, then over the lashing line and under the net rope again. See figure # 14.

**Figure #14**



**Step two:** Tighten the knot.

**Step three:** With the short end of the lashing line go under the other lashing line and through the loop. See Figure # 15.

**Figure #15**



**Step four:** Tighten the second knot. See figure # 16.

**Figure #16**



**Fixed loop lashing line replacement.**

ACL also supplies DOT-3000- Series, DOT-4500- Series and DOT-6000-Series lashing lines with a fixed loop on one end of the rope. If this is the style of lashing line you are using, Simply place the fixed loop end of the lashing line under the cargo net rope in the proper location and thread the opposite end of the lashing line through the fixed loop and pull tight. See figure # 17 a & b.

**Figure #17a**



**Figure #17b**



**Final Note:**

The use of bypass hooks, bypass straps and double stud fitting replacements described in pages 9 - 14 are temporary repairs only. The net should be serviced and repaired by an FAA Certified Repair Station as soon as possible.

The replacement of lashing lines is considered a permanent replacement.