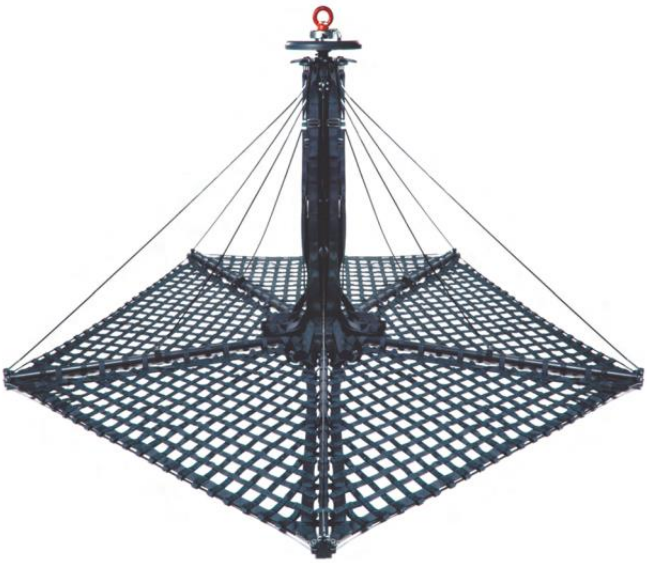
AirTEP

Airborne Tactical Extraction Platform

Maintenance Manual



VERSION

Date	Version	Description
07-may-2020	MM-2020-1.0 *WEB VERSION*	AirTEP maintenance manual.

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GLOSSARY

AirTEP	Airborne Tactical Extraction Platform
Cycle	Refers to: take-off + flight + dropping if necessary + flight with the AirTEP + landing.

I GENERAL INFORMATION

I.1. Lifetime

The AirTEP set has a lifetime of 15 years or 3000 cycles. The lifetime is divided in 3 periods of 5 years corresponding to 1000 cycles each. At the end of each period, the end-user shall contact ESCAPE INTL. for a factory overhaul.

I.2. Levels of maintenance

I.2.1. Level of maintenance 1 (LM1)

The level of maintenance 1 (LM1) consists in the visual inspection of the equipment. It shall be done before and after each use (operation and/or training) and monthly, by a personnel that completed the maintenance training course.

I.2.2. Level of maintenance 2 (LM2)

The level of maintenance 2 (LM2) consists in the replacement of eligible parts of the AirTEP. It shall be done by a personnel that completed the maintenance training course, if a part was declared damaged during a LM1 inspection.

I.2.3. Level of maintenance 3 (LM3)

The level of maintenance 3 (LM3) consists in the factory overhaul of the AirTEP. It includes a general inspection of the equipment, the systematic replacement of all textile parts, and the replacement of worn out parts. It shall be

done after 5 years or 1000 cycles, at ESCAPE INTL.'s factory.

The new certificate of airworthiness – valid for 5 more years or 1000 more cycles – cannot be issued without LM3.

I.3. Summary table

	Frequency	Who ?	Description
LM1	Monthly & before/after each use	Trained personnel	▪ Visual inspection ▪ Torques inspection (monthly)
LM2	When necessary	Trained personnel	▪ Replacement of damaged parts
LM3	5 years or 1000 cycles	Factory personnel	▪ General inspection ▪ Replacement of textile parts, worn out parts.
Lifetime	15 years or 3000 cycles	-	▪ Disposal of the equipment

II. TOOL LIST

II.1. Recommended chemical products

Loctite® 7649	Loctite® 243	Loctite® 7063
Activator	Thread lock	Degreaser

II.2. Provided tools

Pictures for illustration purposes only

- Torque wrenches (5 Nm – 25 Nm and 10 Nm – 50 Nm)
- Hexagonal sockets et Allen wrenches for M8 et M10 bolts
- Copper wedges and maintenance screws
- 17 mm flat wrench socket

III. LEVEL OF MAINTENANCE 1 (LM1)

III.1. Visual check-list

III.1.1. Rope

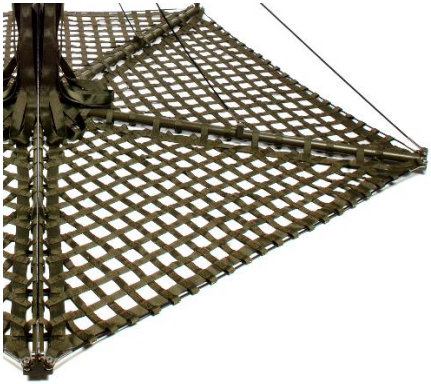
Unwind the rope completely and check the following points:

- No cuts on the strands
- Constant diameter of the rope, including the core (hold the rope and bend it in order to verify that point)
- Presence of the 2 thimbles – no wears, cracks or corrosion on the thimbles
- Absence of knots in the rope: make sure the rope is put back in the bag without making any nodes.

III.1.2. Safety belts

- No cuts on the straps
- No damaged stiches
- No deformation, wears, cracks or corrosion on the quick link
- No deformation, wears, cracks or corrosion on the fastening buckle

III.1.3. Nets



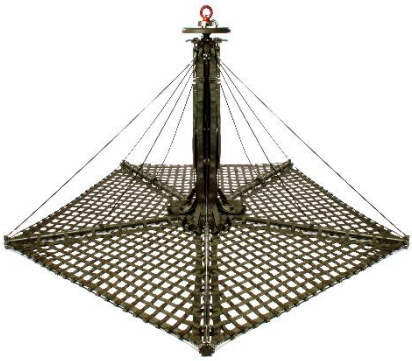
Inspect all the straps and stitches on the nets:

- Less than 3 cuts or damaged stiches on the inner part of the nets
- No cuts or damaged stiches on the buckles that link the nets to the arms

III.1.4. Braking device

- Smooth surface on the parts in contact with the rope
- No abnormal slack between the different components
- Presence of the safety spindle and its cable linking it to the body of the braking device
- Correct opening and closing of the braking device
- No deformation, wears, cracks or corrosion

III.1.5. AirTEP structure



- Correct rotation of the selector between the locked and unlocked positions
- Correct unfolding of the AirTEP by a simple pressure on the locking plate (selector on unlocked position)
- Correct locking of the arms in unfolded position through to action of the ratchets and the springs
- Free rotation, and free translation of the locking plate along the mast axis
- Correct torques, by checking the fastening marks
- No deformation, wears, cracks or corrosions on any structural parts of the mast or the arms.
- No incipient break on the short, long and peripheral cables – no deformation, wears, cracks or corrosion on the crimps and eyelets.

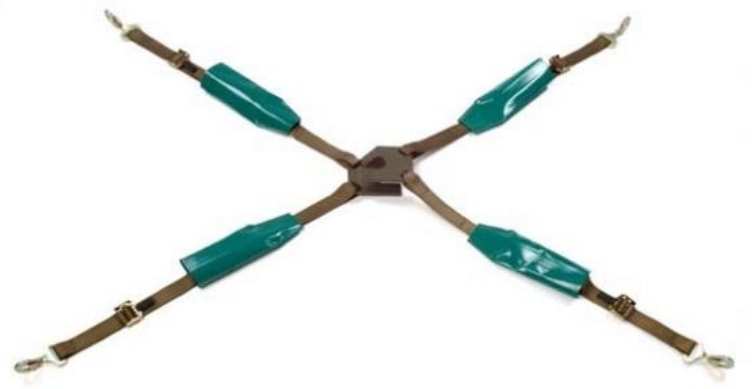
III.1.6. Shackle

- Presence of the safety spindle; check the safety spindle stay in position once put in the hole the shackle axle
- No deformation, wear, cracks or corrosion on the shackle

III.1.7. BK hook

- Good functioning of the safety latch
- No deformation, wears, cracks or rust on the body of the BK hook
- No deformation, wears, cracks or rust on the aluminum eyelet

III.1.8. Centering ring



- No cuts or damaged stiches on the straps.
- No deformation, wears, cracks or rust on any of the metallic parts
- Slick surface on the parts in contact with the ropes

III.2. Criteria for part replacement

Part	Replacement criteria
Rope	▪ Presence of a cut on a strand ▪ Non-constant diameter (weak zone on the core) ▪ Absence of thimble, or damaged thimble
Safety belts	▪ Presence of a cut on the strap, ▪ Damaged quick link or buckle ▪ Damaged stiches
sNets	▪ Presence of 3 cuts and/or damaged stiches on the net ▪ Presence of a cut or damaged stiches on a loop linked to the arm
Braking device	▪ Absence of the safety spindle ▪ Deformation or slack inducing wrong opening/closing of the braking device
Arms	▪ Wear, crack or rust ▪ Bending inducing bad folding of the arm
Cables	▪ Incipient break ▪ Deformation of crimps and/or eyelet
Ratchets	▪ Wear, crack or rust ▪ Rupture of the spring (replacement of spring only)
Shackle	▪ Absence of safety spindle ▪ Deformation, wear, crack or rust
Centering ring	▪ Cut on the strap ▪ Damaged stiches ▪ Deformation, wear, crack or rust on a metallic part ▪ Abrasive surface in contact with the rope

IV. LEVEL OF MAINTENANCE 2 (LM2)

IV.1. General recommendations

IV.1.1. Locking system

The locking system on the masthead is a complex assembly.

Only a visual inspection can be achieved by the end-user.

WARNING

Never try to change parts of the masthead by yourself.
In case part replacement is necessary on this assembly, contact ESCAPE INTL.

IV.1.2. Screw connections

For any screw connection, the following procedure must be respected:

1. Remove grease from all threads (screws, nuts and/or aluminum threads) with LOCTITE® 7063 degreaser
2. Apply LOCTITE® 7649 activator on all threads
3. Apply LOCTITE® 243 thread lock on the screw or the aluminum thread
4. Fasten at the recommended torque (see next pages)

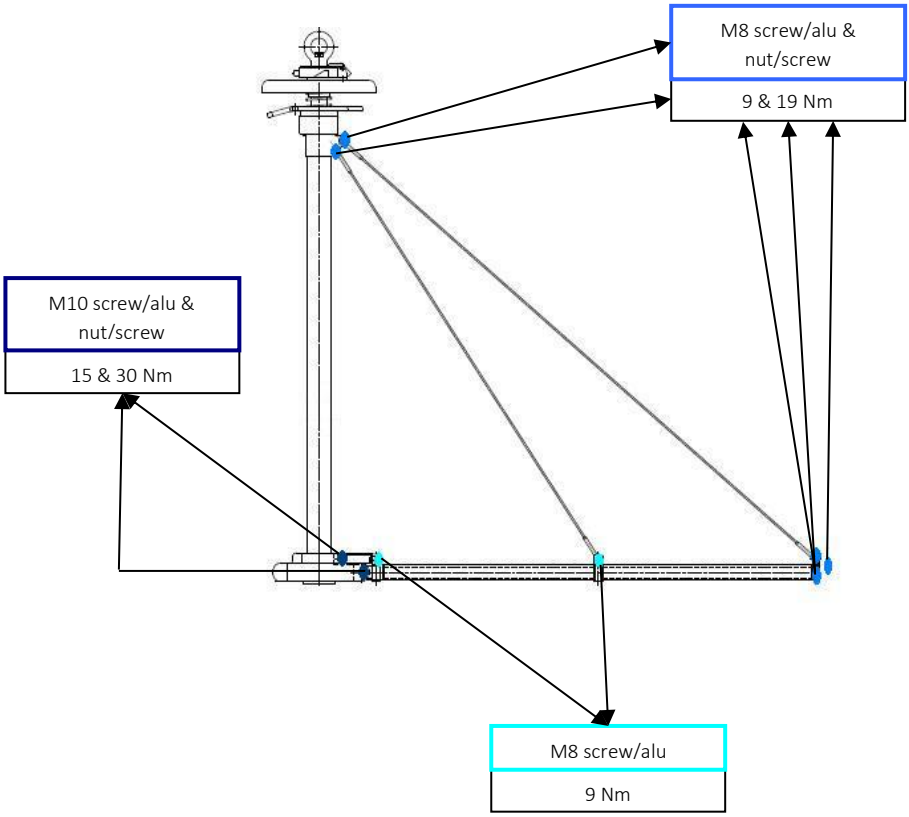
5. Put a visual mark on all parts of the assembly, to allow the visual control of the good fastening of the assembly

WARNING

Some screw assemblies include an aluminum thread, in addition to the screw and the bolt. This thread is part of structural components of the AirTEP (mast, arms, etc.) and can be damaged if the wrong torque is applied.

Systematically fasten the screw in the aluminum thread first at the lower value of the recommended torque. Only then, fasten the bolt at the upper torque, while holding the screw in position.

Assembly	Screws, nuts & washers	Couple
Arm / Mast base	Ø12 axle, M10 PTFE washer Spring washer, Ø12 Flat nut, M10	15 Nm (screw) 30 Nm (nut)
Ratchet / Mast base	Ø12 axle, M10 Spring washer, Ø12 Flat nut, M10	15 Nm (screw) 30 Nm (nut)
Ratchet stop	CHC screw, M8 Spring washer, Ø8	9 Nm
Short cable / Arm	Ø10 axle, M8 Spring washer, Ø10	9 Nm
Short cable / Mast	Ø10 axle, M8 Spring washer, Ø10 Flat nut, M8	9 Nm (screw) 19 Nm (nut)
Long cable / Arm & Long cable / Mast	Ø10 axle, M8 Spring washer, Ø10 Flat nut, M8	9 Nm (screw) 19 Nm (nut)
Peripheral cable / arm	Ø10 axle, M8 Flat nut, M8	9 Nm (screw) 19 Nm (nut)

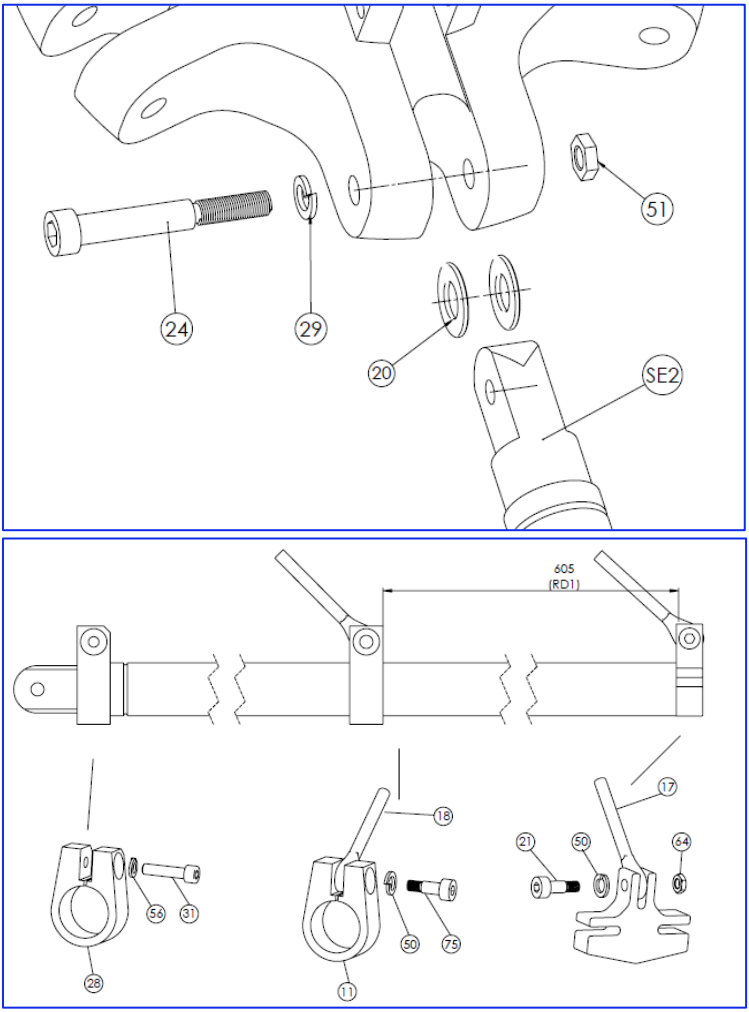

M8 screw/alu & nut/screw
9 & 19 Nm
M10 screw/alu & nut/screw
15 & 30 Nm
M8 screw/alu
9 Nm

IV.2. Arms

a. Part list

Mark	Reference	Description
SE2	7N031761	Arm
28	0N031745	Ratchet stop ring
11	0N031741	Cable support ring
24	0N031756	Arm axle, M10/∅12x50
29	0V031773	Spring washer, ∅12
20	0N031752	PTFE washer
51	0V032715	Flat nut, M10
31	0V035121	CHC screw, M8x35
56	0V032711	Spring washer, ∅8
75	0N035131	Cable axle, M8/∅10x16 – 16,5
50	0V031772	Spring washer, ∅10
21	0N031753	Cable axle, M8/∅10x16
64	0V031771	Flat nut, M8
-	0N031754	Cable axle, M8/∅10x20

b. Drawings



c. Replacement procedure

Disassembly

1. Unscrew the short cable(18)
2. Unscrew the long cable(17)
3. Unscrew the 2 peripheral cables attached to the selected arm
4. Unscrew the ratchet stop ring(28)
5. Insert a copper wedge in the ratchet stop ring(28)

In order to make the ratchet stop ring slide easier on the arm, and preventing for paint damages, use a cooper wedge and a dedicated screw in order to loosen up the ring. That procedure also applies to the cable support ring.

6. Unscrew the cable support ring(11)
7. Insert a copper wedge in the cable support ring(11)
8. Pull the arm(SE2) in order to remove it from the nets and the rings(28)(11)

Reassembly

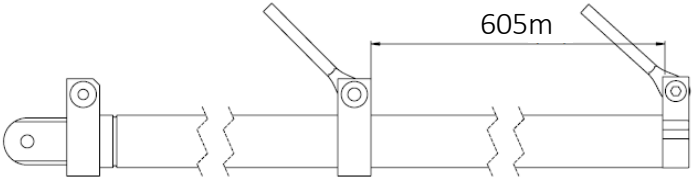
NB: A replacement of damage arm requires the replacement of the paired screws and bolts that might have been damaged too.

9. Insert a copper wedge in the cable support ring(11)
10. Insert a copper wedge in the ratchet stop ring(28)
11. Insert the arm(SE2) through the 3 first loops of both nets
12. Position the cable support ring(11) around the arm(SE2)
13. Insert the arm(SE2) through the 4 last loops of both nets
14. Position the ratchet stop ring(28) around the arm(SE2)

15. Screw the arm(SE2) on the base of the arms at the correct torques (15 & 30 Nm) after positioning the PTFE washers(20)

16. Remove the copper wedge from the ratchet stop ring(28) and screw at the recommended torque (9 Nm)

17. Position the cable support ring(11) at 605 mm from the extremity of the arm(SE2)



18. Remove the copper wedge from the cable support ring(11) and screw the short cable(18) (9 Nm)

19. Screw the long cable(17) at the extremity of the arm(SE2) (9 & 19 Nm)

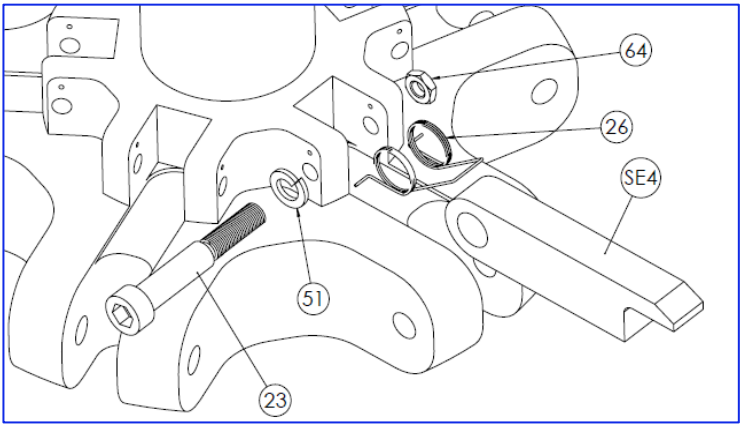
20. Screw the 2 peripheral cables with the eyelets of the nets on the extremity of the arm(SE2) (9 & 19 Nm)

IV.3. Ratchets

a. Part list

Mark	Reference	Description
SE4	0N031737	Ratchet
46	0N033398	Ratchet axle for mast strap, M10/∅12x43,5
23	0N031755	Ratchet axle, M10/∅12x40
26	0V031760	Ratchet spring
29	0V031773	Spring washer, ∅12
51	0V032715	Flat nut, M10

B. Drawing



c. Replacement procedure

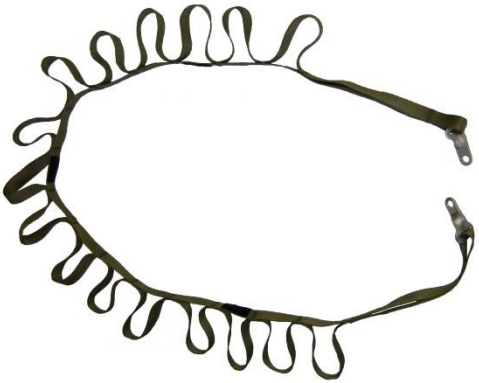
1. Unscrew and remove the ratchet axle(23), the flat nut(64) and the ratchet spring(26)
2. Remove the ratchet(SE4)
3. Insert new ratchet spring(26) in the dedicated holes

4. Insert the ratchet(SE4) as shown below

5. Screw the ratchet axle(23), the spring washer(51) and the flat nut(64) (15 & 30 Nm)

NB: The mast strap can be mounted on any ratchet by replacing the normal ratchet axle by the specific ratchet axle for mast strap.

IV.4. Mast strap



a. Part list

Reference	Description
0N032283	Mast strap (polyamide)
0N034248	Fire resistant mast strap (aramid)
0N034250	Velcro strap (polyamide)
0N034249	Fire resistant velcro strap (aramid)

NB: The 2 extremities of the mast strap are different. The 60° eyelet is position on the bottom of the mast (ratchet axle), the 90° is the top of the mast (cable axle).

IV.5. Cables

IV.5.1. Long cable

a. Part list

Reference	Description
0N031749	Long cable, LEA 1794
0N031753	Cable axle, M8/∅10x16
0V031772	Spring washer, ∅10
0V031771	Flat nut, M8

b. Replacement procedure

1. Unscrew the long cable from the mast
2. Unscrew the long cable from the arm
3. Remove the long cable
4. Screw the new cable on the mast (9 & 19 Nm)
5. Screw the new cable on the mast (9 & 19 Nm)

IV.5.3. Short cable

a. Part list

Reference	Description
0N031750	Short cable, LEA 1362
0N035131	Cable axle, M8/∅10x16 - 16,5
0N031753	Cable axle, M8/∅10x16
0N031754	Cable axle, M8/∅10x20
0V031772	Spring washer, ∅10
0V031771	Flat nut, M8

b. Replacement procedure

NB: The 2 cable axles for the short cable are different. The one for the mast (Cable axle, M8/∅10x16) is shorter than the one for the cable support ring (Cable axle, M8/∅10x16 – 16,5).

1. Unscrew the short cable from the mast
2. Unscrew the short cable from the cable support ring
3. Remove the short cable
4. Screw the new cable on the mast (9 & 19 Nm)
5. Screw the new cable on the cable support ring (9 Nm)

NB: The mast strap can be mounted on any short cable axle on the mast by replacing the normal ratchet axle (“Cable axle, M8/∅10x16”) by the specific ratchet axle for mast strap (“Cable axle, M8/∅10x20”).

IV.5.5. Peripheral cable

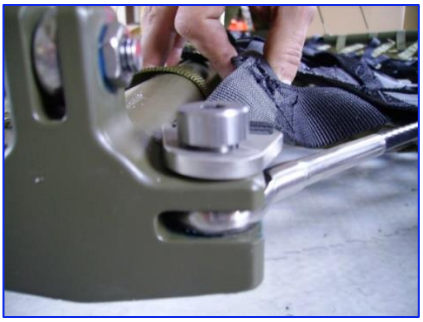
a. Replacement procedure

Reference	Description
0N031751	Peripheral cable, LEA 1638
0N031754	Cable axle, M8/∅10x20
0V031771	Flat nut, M8

b. Replacement procedure

1. Unscrew peripheral cable from the 2 arms
2. Remove the peripheral cable from the loops of the net
3. Insert new peripheral cable through the loops of the net
4. Screw the peripheral cable at the dedicated extremity of both arm, with the eyelet of the net (9 & 19 Nm)

NB: The eyelet of the net is used as a spring washer (see below)



IV.6. Nets

a. Replacement procedure

Reference	Description
3N031743	Net (polyamide)
3N033047	Fire-resistant net (aramid)

b. Replacement procedure

NB: Replacing a net requires the disassembly of the 2 arms holding this nets. Contrarily to a damaged arm, we can assume the screws and nuts did not go through any abnormal stress. Therefore, they can be reused after a visual inspection.

Disassembly of the arms

1. Disassemble the 2 arms holding the net according to the procedure described in section IV.2.-c. (page 25)
2. Removed the net to be changed
3. Remove the peripheral cable for the net and keep it

Replacement of the net

4. Position the new net, making sure its loops make a correct alternation with the loops of the adjacent nets at both side – if it doesn't, flip the new net over
5. Insert the peripheral cable in the loops of the net

6. Reassemble the 2 arms according to the procedure described in section IV.2.-c. (page 26)

V. Level of maintenance 3 (LM3)

V.1. Overview

Every 5 years or 1000 cycles, ESCAPE INTL. shall be contacted in order to make a factory overhaul of the AirTEP set, including all accessories.

This overhaul is necessary in order to re-issue a certificate of airworthiness, with a validity of 5 more years, or 1000 new cycles.

V.2. Maintenance operations

V.2.1. Systematic operations

In any factory overhaul, the following maintenance operations will be executed, regardless the good or bad shape of the equipment:

a. AirTEP platform

- Complete disassembly
- Full structural analysis: absence of deformation, traces of wear, crack, corrosion, check-up of the joints and welds
- Replacement of all textile parts : nets, safety belts, mast straps w/ Velcro straps, sounding line

- Replacement of the 15 cables (long, short and peripheral)
- Replacement of all screws, nuts ,washers and inner rubber joints
- Check-up of the good functioning of the locking assembly
- Painting

b. Shackle

- Check-up for deformation, traces of wear, cracks and corrosion
- Check-up of the safety spindle

c. Rope

- Replacement for a new rope

d. Braking device

- Check-up of the good functioning
- Disassembly
- Check-up for deformation, traces of wear, cracks and corrosion
- Check-up for abrasive surfaces in contact with the rope
- Polishing if necessary

- Re-anodization if necessary

e. Centering ring

- Disassembly
- Replacement of textile parts
- Check-up for deformation, traces of wear, cracks and corrosion on metallic parts
- Check-up for abrasive surfaces in contact with the rope
- Polishing if necessary
- Re-anodization if necessary

f. BK hook

- Check-up for deformation, traces of wear, cracks and corrosion
- Replacement of the eyelet

V.2.2. Necessary operations

Depending on the degree of wear or damaged, it might be necessary to change a few parts. ESCAPE INTL. will notify the end-user, and won't issue the new certificate of airworthiness.

a. AirTEP platform

- Replacement of damaged structural parts : arms, ratchets, mast parts

b. Shackle

- Replacement of the body of the shackle

c. Braking device

- Polishing of the surfaces in contact with the rope
- Re-anodization

d. Centering ring

- Polishing if necessary
- Re-anodization if necessary

e. BK hook

- Replacement of the BK hook

V.2.3. Suggested operations

ESCAPE INTL. can suggest optional operations that can be skipped without inducing a lack of safety during operation. Therefore, it doesn't block the re-issue of the certificate of airworthiness.

a. AirTEP platform

- Replacement of the AirTEP bag

b. Rope

- Replacement of the rope bag