even crew changes. However, it is wholly dependent on purpose-designed and built micro-fighters; and purpose-built variants of albeit existing transport/cargo aircraft designs, and would be impractical and cost-prohibitive to implement with an air force's existing fleet.

[008] Two more recent concepts have been proposed by the USAF, and by FAR Technologies of Israel. In US Patent No. US6932299 B2, "Apparatus for aerial rearmament of aircraft" and No. 7793888, "Apparatus and method for air-to-air arming of aerial vehicles", they propose broadly similar concepts are disclosed that involve a transport aircraft extending a rigid telescopic boom, on which the ordnance transfer/loading device is conveyed to the recipient aircraft, formating on the transport. In both concepts, the recipient aircraft is rearmed while flying in close formation with the transport aircraft, and the rearming is possible only with aircraft fitted with stores on external pylons (which are exposed and thus more easily "accessible"); they do not appear to have the capability to rearm aircraft equipped with internal weapons bays.

[009] Both concepts also appear to be for rearming only and no refuelling; therefore if refuelling is required as well, the recipient aircraft would have to engage the tanker aircraft in a separate aerial refuelling procedure, which would extend the overall rearming/refuelling operation time. Similarly, both concepts do not allow for "basic maintenance" to be performed on the recipient aircraft in flight, e.g. the replacement of faulty avionics line-replaceable units (LRUs).

[0010] A need therefore exists to provide an apparatus and method for aerial recovery of an unmanned aerial vehicle that seeks to address at least some of the above problems.

SUMMARY

[0011] According to a first aspect of the present invention, there is provided an apparatus for aerial recovery of an Unmanned Aerial Vehicle (UAV) in mid-flight, the apparatus comprising: a rigid base having a first section and a second section pivotably connected to the first section, wherein the first section is securely mounted to a floor of an aircraft and the second section is configured to be locked to the first section when level with the first section; and a servicing platform moveably mounted to the base and configured to move along a direction parallel to a longitudinal axis of the aircraft such that in an extended position, the servicing platform at least partially protrudes from a rear cargo door of the aircraft, wherein the second section is configured to support the servicing platform in the extended position wherein the servicing

platform comprises a capturing mechanism configured to capture the UAV in the extended position and a restraining mechanism configured to secure the UAV on the servicing platform.

[0012] The second section ~~may be pivotable relative to the first section and~~ may further comprise a plurality of support beams configured to extend rearwardly of the aircraft for supporting the servicing platform in the extended position.

[0013] The capturing mechanism may comprise two telescopic arms, each telescopic arm being disposed on a transverse side of the servicing platform and configured to operate in six degrees-of-freedom.

[0014] Each telescopic arm may comprise a capture fork attached to a distal end of said arm, and wherein the capture fork is configured to engage a selected section of the UAV.

[0015] Each capture fork may comprise a pneumatic body configured to securely engage the captured UAV, the pneumatic body cushioning the selected section to protect the captured UAV.

[0016] Each capture fork may further comprise aerodynamic fairings configured to reduce drag on said capture fork.

[0017] Each capture fork may further comprise an articulation hinge configured to further reduce aerodynamic drag/buffeting on said fork.

[0018] The capturing mechanism may further comprise a jettison system disposed at the distal end of each telescopic arm adjacent to the associated capture fork, the jettison system configured to dismount the said capture fork from the telescopic arm in an emergency.

[0019] The apparatus may further comprise sensing means disposed on the two telescopic arms and configured to communicate with a control station.

[0020] The sensing means may include at least one of infrared sensors, vision system cameras and/or Lidar.

[0021] The apparatus may further comprise a restraining mechanism configured to translationally and rotationally secure the captured UAV relative to the servicing platform in the extended position.

flying servicing aircraft such that the servicing platform at least partially protrudes from a rear cargo door of the servicing aircraft, wherein the base comprises a first section and a second section pivotably connected to the first section and wherein the second section is configured to support the servicing platform, flying the UAV in formation with the servicing aircraft within a capture envelope of a capturing mechanism disposed on the servicing platform; ~~and~~ capturing the UAV using the capturing mechanism while the servicing platform is in the extended position; and securely supporting the UAV on the servicing platform.

[0033] The extending, flying and capturing steps may be performed manually.

[0034] The flying and capturing steps may be performed at least partly autonomously.

[0035] The method of capturing the UAV may comprise extending two telescopic arms disposed on the servicing platform rearwardly and downwardly; opening two capture forks, each attached to a distal end of the respective telescopic arm; engaging selected sections of the UAV using the capture forks upon confirmation that the UAV is within the capture envelope; and retracting the two telescopic arms to draw and position the captured UAV on the servicing platform.

[0036] The method may further comprise adjusting at least one of flight controls and a centre of gravity of the servicing aircraft while the captured UAV is positioned on the servicing platform.

[0037] There is also provided a method for servicing a UAV in mid-flight, the method comprising the steps of: flying a servicing aircraft; capturing the UAV using the method for aerial recovery of a UAV in mid-flight as defined in the second aspect; and servicing the captured UAV.

[0038] The method of servicing the UAV may comprise refuelling the UAV.

[0039] The method of servicing the UAV may further comprise rearming the UAV.

[0040] The method of servicing the UAV may comprise performing maintenance or replacement of a line replaceable unit.

[0041] The method may further comprise monitoring at least one parameter associated with the UAV and/or the servicing aircraft.

CLAIMS

1. An apparatus for aerial recovery of an Unmanned Aerial Vehicle (UAV) in mid-flight, the apparatus comprising:

a rigid base having a first section and a second section pivotably connected to the first section, wherein the first section is securely mounted to a floor of an aircraft and the second section is configured to be locked to the first section when level with the first section; and

a servicing platform moveably mounted to the base and configured to move along a direction parallel to a longitudinal axis of the aircraft such that in an extended position, the servicing platform at least partially protrudes from a rear cargo door of the aircraft,

wherein the second section is configured to support the servicing platform in the extended position; and

wherein the servicing platform comprises a capturing mechanism configured to capture the UAV in the extended position and a restraining mechanism configured to secure the UAV on the servicing platform.

2. The apparatus as claimed in claim 1, wherein the second section ~~is pivotable relative to the first section and~~ further comprises a plurality of support beams configured to extend rearwardly of the aircraft for supporting the servicing platform in the extended position.

3. The apparatus as claimed in claim 1 or 2, wherein the capturing mechanism comprises two telescopic arms, each telescopic arm being disposed on a transverse side of the servicing platform and configured to operate in six degrees-of-freedom.

4. The apparatus as claimed in claim 3, wherein each telescopic arm comprises a capture fork attached to a distal end of said arm, and wherein the capture fork is configured to engage a selected section of the UAV.

5. The apparatus as claimed in claim 4, wherein each capture fork comprises a pneumatic body configured to securely engage the captured UAV, the pneumatic body cushioning the selected section to protect the captured UAV.

6. The apparatus as claimed in claims 4 or 5, wherein each capture fork further comprises aerodynamic fairings configured to reduce drag on said capture fork.

7. The apparatus as claimed in claims 4 or 5, wherein each capture fork further comprises an articulation hinge configured to further reduce drag and buffeting on said fork.

8. The apparatus as claimed in any one of claims 4 to 6, wherein the capturing mechanism further comprises a jettison system disposed at the distal end of each telescopic arm adjacent to the associated capture fork, the jettison system configured to dismount the said capture fork from the telescopic arm in an emergency.

9. The apparatus as claimed in any one of claims 3 to 8, further comprising sensing means disposed on the two telescopic arms and configured to communicate with a control station.

10. The apparatus as claimed in claim 9, wherein the sensing means includes at least one of infrared sensors, vision system cameras and/or Lidar.

11. The apparatus as claimed in any one of the preceding claims, ~~further comprising~~ awherein the restraining mechanism is configured to translationally and rotationally secure the captured UAV relative to the servicing platform in the extended position.

12. A system for servicing a UAV in mid-flight, the system comprising:

a servicing aircraft;

the apparatus for aerial recovery of a UAV in mid-flight as claimed in any one of the preceding claims disposed in the servicing aircraft; and

a control station disposed in the servicing aircraft, the control station being in communication with the apparatus and configured to operate the apparatus.

13. The system as claimed in claim 12, further comprising refuelling means for refuelling the captured UAV.

14. The system as claimed in claim 13, wherein the refuelling means comprises a pallet fuel tank attached to the servicing aircraft and connected to a fuel supply of the servicing aircraft, and a hose connected to the pallet fuel tank and suspended on a supporting frame.

15. The system as claimed in claim 14, wherein an amount of fuel stored in the pallet fuel tank is controllably variable for regulating a centre of gravity of the servicing aircraft.

16. The system as claimed in any one of claims 12 to 15, further comprising rearming means for rearming the captured UAV.

17. The system as claimed in any one of claims 12 to 16, further comprising a mission monitoring system for monitoring at least one parameter associated with the UAV and/or the servicing aircraft.

18. The system as claimed in claim 17, wherein the mission monitoring system is further configured to schedule the servicing of a plurality of UAVs operating in an area covered by the servicing aircraft.

19. The system as claimed in any one of claims ~~11~~ 12 to 17, wherein the control station is movable between a stowed position and an operating position, and wherein the control station maintains a direct line of sight with an approaching UAV at the operating position.

20. The system as claimed in any one of claims 12 to 19, wherein the control station comprises a display configured to provide real-time positional data of the UAV.

21. The system as claimed in claim 20, wherein the display is an augmented-reality display configured to provide an indication of a position on the UAV that the capturing mechanism is expected to engage based on the positional data.

22. A method for aerial recovery of a UAV in mid-flight, the method comprising the steps of:

rearwardly extending a servicing platform relative to a rigid base mounted to a floor of a flying servicing aircraft such that the servicing platform at least partially protrudes from a rear cargo door of the servicing aircraft ~~servicing~~, wherein the base comprises a first section and a second section pivotably connected to the first section and wherein the second section is configured to support the extended servicing platform,

flying the UAV in formation with the servicing aircraft within a capture envelope of a capturing mechanism disposed on the servicing platform; ~~and~~

capturing the UAV using the capturing mechanism while the servicing platform is in the extended position; and

securely supporting the UAV on the servicing platform.

23. The method as claimed in claim 22, wherein the extending, flying and capturing steps are performed manually.

24. The method as claimed in claim 22, wherein the flying and capturing steps are performed at least partly autonomously.