Title: RPV TRANSPORT VEHICLE

Abstract: A trailer (10) (figure 1) adapted to support a plurality of UAV’s (Unmanned Aerial Vehicles) comprises an upper deck (11) and a lower deck (13). The lower deck (13) includes demountable containers (14), (15), (16) adapted to carry, for example, fuel and spares for the UAV’s. The upper deck (11) is preferably provided with front and rear units (17), (18) to permit unidirectional movement of the UAV’s over the upper deck (11).
RPV TRANSPORT VEHICLE

This invention relates to a vehicle for use with aircraft, and particularly for use with unmanned aerial vehicles. Such vehicle may have command service and transport functions.

Unmanned aerial vehicles (UAVs) have a relatively low cost compared with manned aircraft, and are typically used for data acquisition, for example aerial photography. In order to minimise the difficulties of controlling a UAV in flight it would be convenient to launch and recover the UAV close to the flight zone. However airport facilities may not be available, especially in remote areas. The limited payload/range of a typical UAV also make it desirable to minimise transit time between the take-off and landing location, and the region of interest.

The present invention provides a relatively inexpensive solution to this problem whilst also solving the associated requirements for transport of the UAV and servicing/replenishment of consumables.

According to the invention there is provided a transporter for a UAV, and comprising a trailer of an articulated tractor/trailer combination wherein the trailer comprises an upper deck adapted to carry a UAV and a lower deck adapted to carry consumables for a UAV, separate loading and unloading ramps being provided at the front and back of the upper deck in order to permit unidirectional movement of a UAV over the upper deck.

This arrangement has the advantage that different operations on the UAV take place at different locations on the upper deck. For example fuelling of the UAV may be confined to one dedicated location on the upper deck which is provided with means for accommodating fuel spillages and for fighting fires. The most dangerous operations are preferably carried out close to the
departure end of the upper deck, so as to avoid unnecessary risk at other upper deck locations.

The trailer is preferably a double deck car transporter having upper deck loading/unloading ramp for the UAV, and one or more storage units on the lower deck. It is envisaged that a trailer according to the invention could be easily adapted from an open car transporter by the addition of runways for the UAV, and demountable containers for consumables such as fuel, spares and the like. A demountable container may also be provided for command and control of the UAV.

According to a preferred embodiment, a trailer according to the invention is adapted to carry a plurality of UAVs in series on the upper deck, and can be pulled by a conventional tractor to a launch and/or landing site, which may be a road. The trailer may further include a demountable container for road barriers, signs, cones and the like.

Preferably a tractor for use with the trailer comprises a command and control centre. The tractor preferably has a rearwards cab extension, and is for example a sleeper cab. In the preferred embodiment the cab extension contains command and control apparatus for a UAV which may be demountable.

The tractor may have a rear facing window, and the tractor seats may be adapted to swivel so as to face the command and control equipment whilst permitting viewing through the rear cab window. This arrangement permits the tractor to be positioned away from the trailer, immediately adjacent a temporary take off/landing area.

It is thus envisaged that a trailer according to the invention can provide low cost, self-contained mobile support for a UAV close to the desired operating region, and that a tractor for use with the trailer can provide a mobile command
and control unit. Preferably the UAV is adapted for support by two personnel, being the tractor driver and driver’s mate.

Other features of the invention will be apparent from the following description of a preferred embodiment shown by way of example only in the accompanying drawings in which:

Fig.1 is a side elevation of a trailer according to the invention and carrying three UAVs;

Fig.2 is a side elevation of an extended cab tractor; and

Fig.3 is a schematic plan view of the tractor of Fig.2, illustrating the internal configuration.

With reference to the drawings, Fig.1 shows a conventional double deck car transporter 10 from which, for reasons of clarity, the upper deck supports and hydraulic rams have been omitted.

The upper deck 11 supports three UAVs 12, shown schematically and having wings folded for transport. It will be observed that the overall vehicle height is substantially of the order for a conventional car transporter and thus the transporter 10 is adapted for travel on most roads.

The lower deck 13 includes three demountable containers comprising a fuel tank and armaments bay 14, a service bay 15 and a spares container 16. More or less demountable units having other functions may be provided to suit particular circumstances.

The upper deck is provided with a front ramp and a rear ramp, also contained in demountable units 17, 18 for respective extension to the front and to the rear. These ramps may be extended mechanically or with power assistance to the ground so as to give departure angles which can be accommodated by the design of the UAVs. The units 17, 18 may also include
winches of any suitable kind for assisting smooth loading and unloading, means also being provided for the UAVs to progress along the upper deck 11 as will be described below.

5 Above the fuel tank 14, another container 19, which may be integral with the tank or separate, contains fuel pumps, fire protection equipment and the like. It will be readily appreciated that the range and kind of demountable units is large.

10 Conveniently the demountable containers 14-16 are wheeled, and are loaded via the usual drop down rear ramp of the lower deck, and latched. These containers may be winched on, or pushed on by for example, a small vehicle. Such a small vehicle may also be carried on the lower deck at the back, and may be adapted to tow UAVs.

15 The tractor 20 illustrated in Figs. 2 and 3 has two axles and the usual fifth wheel 21 for coupling to the trailer. An extended cab 22 contains a command and control station 23, the tractor seats 24 being pivotable through 180° to permit the driver and driver’s mate to operate the station 23. A cab rear window (not illustrated) permits viewing of the UAV.

20 Use of the invention is envisaged in the following manner. It will be understood that since the tractor/trailer combination is largely conventional, it can operate over normal roads, be fuelled and serviced in an accepted manner, and be driven by any person having the required class of licence.

25 Typically the transporter will be driven to the predefined location having a surface suitable for take-off and/or landing of a UAV. The tractor 20 will be unhitched, and the unloading ramp 17 extended. If the runway area is a road, suitable road blocking measures will be taken, perhaps using equipment carried on the transporter 10.
The tractor will be parked at about the mid-point of the runway area so as to permit supervision of the UAV. The UAV will be guided off the transporter 10 to the take-off area, and launched in a conventional manner. At the conclusion of the flight the UAV lands in the same or another area, and is guided onto the rear ramp 18 for loading on the top deck of the transporter 10. Once on the top deck, the UAV is subjected to any necessary servicing and maintenance, with any necessary spare parts or other consumables provided from container 16. The UAV is then rolled along the top deck on its undercarriage, either by hand or by a suitable winch (not shown) or the like, towards the front of the transporter (the left hand side of Figure 1) and it is refuelled and then re-armed when it is ready to be demounted from the top deck via front ramp 17 for redeployment.

Typically, fuelling and then re-arming of a UAV will occur immediately prior to unloading and redeployment, so as to minimise the risk of fire or explosion in the event of damage to the transporter or UAV whilst in transit.
Claims

1. A transporter for a UAV comprising a trailer of an articulated tractor/trailer combination wherein the trailer comprises an upper deck adapted to carry a UAV and a lower deck adapted to carry consumables for a UAV, separate loading and unloading ramps being provided at the front and back of the upper deck in order to permit unidirectional movement of a UAV over the upper deck.

2. A transporter as claimed in Claim 1, wherein the trailer is a double deck car transporter having upper deck loading/unloading ramps for the UAV, and one or more storage units on the lower deck.

3. A transporter as claimed in Claim 2 wherein said one or more storage units include one or more demountable containers for consumables such as fuel, spares and the like.

4. A transporter as claimed in any of Claims 1, 2 or 3 comprising a demountable container on the lower deck adapted for servicing and maintenance of a UAV, and/or a demountable container on the lower deck for command and control of the UAV in use.

5. A transporter as claimed in any preceding claim wherein the trailer is adapted to carry a plurality of UAVs in series on the upper deck.

6. A transporter according to any preceding claim, in which the tractor comprises a command and control centre.

7. A transporter as claimed in Claim 6 wherein the tractor has a rearwards cab extension.
8. A transporter as claimed in Claim 7 wherein the cab extension contains command and control apparatus for a UAV.

9. A transporter as claimed in Claim 7 or Claim 8 wherein the tractor has a rear facing window, and the tractor seats are adapted to swivel so as to face the command and control equipment whilst permitting viewing through the rear cab window.
### A. CLASSIFICATION OF SUBJECT MATTER

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<th>IPC</th>
<th>B64F1/04</th>
<th>B64C39/02</th>
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According to International Patent Classification (IPC) or to both national classification and IPC.

### B. FIELDS SEARCHED

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<td>IPC 7 B64F B64C</td>
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched.

### Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**EPO-Internal**

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>A</td>
<td>US 5 695 153 A (BRITTON KEN G ET AL) 9 December 1997 (1997-12-09) abstract figures 1,3,5</td>
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**X** Further documents are listed in the continuation of box C.

**X** Patent family members are listed in annex.

**A** Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
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### Date of the actual completion of the international search

27 March 2002

### Date of mailing of the International search report

11/04/2002

**Name and mailing address of the ISA**

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**Authorized officer**

Estrela y Calpe, J
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<td>HEWISH M: &quot;BUILDING A BIRD'S-EYE VIEW OF THE BATTLEFIELD. UNMANNED AERIAL VEHICLES ADDRESS NEW REQUIREMENTS&quot; JANE'S INTERNATIONAL DEFENSE REVIEW, GB, JANE'S INFORMATION GROUP, vol. 30, 1 February 1997 (1997-02-01), pages 55-56, 58-59, XP000679198 ISSN: 0020-6512 page 56, right-hand column, paragraph 4 page 58; figure 1</td>
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