Claims

1. **An aircraft based weapon targeting training system for training a forward controller to aim weaponry that is mounted on an aircraft, the weapon targeting training system including:**

    a. a housing configured for attachment to an aircraft;

    b. a power source housed within the housing, the power source being configured for powering the weapon targeting training system;

    c. at least one or more transceivers housed within the housing, the at least one or more transceivers being configured for wireless communication with a surface terminal and a helmet mounted display;

    d. at least one or more sensors housed within the housing, the sensors being configured for detecting one or more selected from:

        i. the location of the aircraft;

        ii. the orientation of the aircraft;

        iii. the velocity of the aircraft;

        iv. the acceleration of the aircraft;

        v. an image from a target on the ground;

        vi. the air speed of the aircraft;

        vii. the altitude of the aircraft;

    e. a controller housed within the housing, the controller being configured for:

        i. storing digital terrain data;

        ~~i.~~ii. receiving a target signal from a surface terminal, the target signal being indicative of a ground target being targeted by the forward controller; and

        ~~ii.~~iii. transmitting the target signal wirelessly to a cockpit terminal in the cockpit of the aircraft;

        ~~iii.~~iv. receiving from the at least one or more sensors ~~one or more selected from~~:

            ~~a.~~ a positioning signal indicative of the location of the aircraft; and, optionally, one or more selected from:

~~b.~~a. an altitude signal indicative of the altitude of the aircraft~~;~~.

~~c.~~b. an airspeed signal indicative of the airspeed of the aircraft;

~~d.~~c. an orientation signal indicative of the orientation of the aircraft;

~~e.~~d. a velocity signal indicative of the velocity of the aircraft;

~~f.~~e. an acceleration signal indicative of the acceleration of the aircraft~~;~~

~~iv.~~v. calculating the velocity of the aircraft from the positioning signal; and

~~v.~~vi. calculating a weapon trajectory for a dummy weapon based on one or more selected from:

a. the positioning signal;

b. the airspeed signal;

c. the aircraft velocity; and

d. the altitude signal;

~~vi.~~vii. calculating one or more selected from a continuously calculated impact point (CCIP) and a continuously calculated release point (CCRP) from the weapon trajectory and ~~electronic~~ digital terrain data;

~~vii.~~viii. receiving an HMD orientation signal from one or more selected from an accelerometer and a gyroscope on a helmet mounted display (HMD), the orientation signal being indicative of the orientation of the HMD;

~~viii.~~ix. determining one or more selected from a helmet display CCIP signal and a helmet display CCRP signal from the CCIP, CCRP and/or and HMD orientation signal;

~~ix.~~x. wirelessly transmitting one or more selected from the helmet display CCIP signal and the helmet display CCRP signal to a helmet mounted display in the aircraft;

~~x.~~xi. receiving a pickle signal; and

~~xi.~~xii. actuating the release of a dummy weapon on receipt of the pickle signal.

2. The training system as claimed in claim 1, wherein the housing is configured for removable attachment to an aircraft.

3. The training system as claimed in either of claims 1 or 2, wherein the training system includes:

   a. a first wireless transceiver configured for communicating with a surface terminal; and

   b. a second wireless transceiver configured for communicating with a cockpit terminal.

4. The training system as claimed in any one of claims 1 to 3~~4~~, wherein the sensor is controllable by the controller to focus on a sensed target on the ground.

5. The training system as claimed in claim 4~~6~~, wherein the digital terrain data~~-~~ is three-dimensional terrain data.

6. The training system as claimed in any one of claims 1 to 5~~7~~, wherein the controller is configured for:

   a. receiving a control signal from a cockpit terminal; and

   b. controlling movement of the sensor to focus on a ground target identified by the target signal.

7. The training system as claimed in claim 6~~8~~, wherein the controller is configured for:

   a. receiving a sensor signal from the sensor focused on the ground target; and

   b. transmitting the sensor signal to the surface terminal.

8. The training system as claimed in claim 7~~9~~, wherein the controller is configured for:

   a. transmitting the sensor signal to the cockpit terminal.

9. The training system as claimed in claim ~~10~~8, wherein the controller is configured for:

a. receiving a confirmation signal from the surface terminal.

10. The training system as claimed in claim ~~11~~9, wherein the controller is configured for:

a. transmitting the confirmation signal to the cockpit terminal.

11. The training system as claimed in any one of claims 1 to 10, wherein the target signal includes an indication of a target location and the controller is configured for:

a. determining a target signal from the target location; and

b. wirelessly transmitting the target signal to a cockpit terminal in the aircraft.

12. The training system as claimed in claim ~~15~~11, wherein the controller is configured for:

a. determining a CCIP display signal from the CCIP; and

b. wirelessly transmitting the CCIP display signal to a cockpit terminal.

13. The training system as claimed in any one of claims 1 to ~~16~~12, wherein the controller is configured for:

a. receiving a pickle signal; and

b. actuating the release of a dummy weapon.

14. The training system as claimed in any one of claims 1 to ~~19~~13, wherein the weapon targeting training system includes a rack to which a dummy weapon is releasably attachable.

15. The training system as claimed in claim ~~20~~14, wherein the rack is mounted to the housing.

16. **A targeting system for targeting a target from an aircraft, the targeting system including:**

a. a housing configured for attachment to an aircraft;

b. an electrical power source housed within the housing;

c. a transceiver housed within the housing configured for wirelessly receiving and transmitting data;

d. at least one or more sensors, the sensors being configured for detecting one or more selected from:

i. the location of the aircraft;

ii. the orientation of the aircraft;

iii. the velocity of the aircraft;

iv. the acceleration of the aircraft;

v. an image from a target on the ground;

vi. the air speed of the aircraft;

vii. the altitude of the aircraft;

e. a controller configured for:

i. storing digital terrain data;

~~i.~~ii. receiving a target signal from a surface terminal;

~~ii.~~iii. receiving from at least one or more sensors one or more sensor signals selected from:

a. a positioning signal indicative of the location of the aircraft;

b. an altitude signal indicative of the altitude of the aircraft;~~,~~

c. an airspeed signal indicative of the airspeed of the aircraft;

d. an orientation signal indicative of the orientation of the aircraft;

e. a velocity signal indicative of the velocity of the aircraft; and

f. an acceleration signal indicative of the acceleration of the aircraft;~~,~~

iv. calculating a targeting solution of a weapon mounted on the aircraft from the sensor signals;

v. calculating a weapon trajectory for a weapon based on one or more selected from:

a. the positioning signal;

b. the airspeed signal; and

~~iii.~~c. the altitude signal;

vi. receiving an HMD orientation signal from one or more selected from an accelerometer and a gyroscope on a helmet mounted

display (HMD), the orientation signal being indicative of the orientation of the HMD;

~~iv.~~vii. calculating a HMD continuously calculated impact point (CCIP) display signal from the weapon trajectory and digital terrain data;

~~v.~~viii. generating a helmet mounted display signal from the target signal, the targeting solution, ~~and~~ the HMD orientation signal, and the` HMD CCIP display signal; and

~~vi.~~ix. transmitting the helmet mounted display signal wirelessly to a helmet mounted display arrangement; and

f. wherein the sensors, power source, transceiver and controller are housed within a housing attachable to the aircraft.

17. **A method of targeting a ground target from an aircraft, the method including the steps of:**

a. providing a targeting system as claimed in claim 16;

b. receiving a target signal from a surface terminal;

c. receiving from at least one or more sensors one or more sensor signals selected from:

i. a positioning signal indicative of the location of the aircraft;

ii. an altitude signal indicative of the altitude of the aircraft.

iii. an airspeed signal indicative of the airspeed of the aircraft;

iv. an orientation signal indicative of the orientation of the aircraft;

v. a velocity signal indicative of the velocity of the aircraft;

vi. an acceleration signal indicative of the acceleration of the aircraft;

~~a~~d. receiving an HMD orientation signal from one or more selected from an accelerometer and a gyroscope on a helmet mounted display (HMD), the orientation signal being indicative of the orientation of the HMD;

~~b~~e. calculating a targeting solution of a weapon mounted on the aircraft from the sensor signals, HMD orientation signal is and target signal;

~~c~~f. generating a helmet mounted display signal from the target signal, the targeting solution and the HMD orientation signal; and

~~d~~g. transmitting the helmet mounted display signal wirelessly to a helmet mounted display arrangement.

18. **A method of training a forward controller to aim weaponry mounted on an aircraft at a target, the method including the steps of:**

a. providing a training system as claimed in claim 1;

b. receiving a target signal from a surface terminal;

c. receiving from at least one or more sensors one or more selected from:

i. a positioning signal indicative of the location of the aircraft;

ii. an altitude signal indicative of the altitude of the aircraft;~~,~~

iii. an airspeed signal indicative of the airspeed of the aircraft;

iv. an orientation signal indicative of the orientation of the aircraft;

v. a velocity signal indicative of the velocity of the aircraft;

vi. an acceleration signal indicative of the acceleration of the aircraft;

~~e~~d. receiving an HMD orientation signal from one or more selected from an accelerometer and a gyroscope on a helmet mounted display (HMD), the orientation signal being indicative of the orientation of the HMD;

~~f~~e. calculating a targeting solution of a dummy weapon mounted on the aircraft;

~~g~~f. generating a helmet mounted display signal from the target signal, the targeting solution and the HMD orientation signal; and

~~h~~g. transmitting the helmet mounted display signal wirelessly to a helmet mounted display arrangement;

wherein the targeting solution is one or more selected from a continuously calculated impact point (CCIP) and a continuously calculated release point (CCRP).