NASA TECH BRIEF

Ames Research Center

Roll Function in a Flight Simulator

The problem:

Flight simulators for the training of pilots must present a view of the outside world as it would be seen from the cockpit of an aircraft in flight. Modern simulators make use of a television monitor mounted in the windshield of the simulated aircraft cockpit; an optical system is used to set the apparent position of the image at infinity. In older equipment, which use a projection display and are only useful for simulating flights at high altitudes, roll simulation is achieved by rotation of the projection tube, but this equipment is not compatible with the shadow-mask color tube. It was therefore necessary to find a method for introducing roll into the flying-spot scanner by modifying the scanning waveforms.

The solution:

Introduce roll into the electronic system of the scanner.

How it's done:

For the purpose of mathematical analysis, the picture on the tube is left fixed in space and roll is accomplished by rotating the aircraft around its axis— the picture does not change but its frame rotates. In the new reference frame, the point p,q which is the simulated point on the pilot's monitor is rotated to a new point p^1,q^1. The current in the X-coils of the flying spot scanner tube is proportional to the X displacement of the picture point. In the rolled position, this displacement is a function of both p^1 and q^1. The X- and Y-deflection amplifiers are driven by a composite waveform so that point p^1,q^1 is simulated as a roll on the display monitor; in fact, when the aircraft is rolled 90°, the X and Y axes are interchanged.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Ames Research Center
Moffett Field, California 94035
Reference: B72-10417

Patent status:

No patent action is contemplated by NASA.

Source: Alfred E. Brain of
Stanford Research Institute
under contract to
Ames Research Center
(ARC-10557)

Category 02