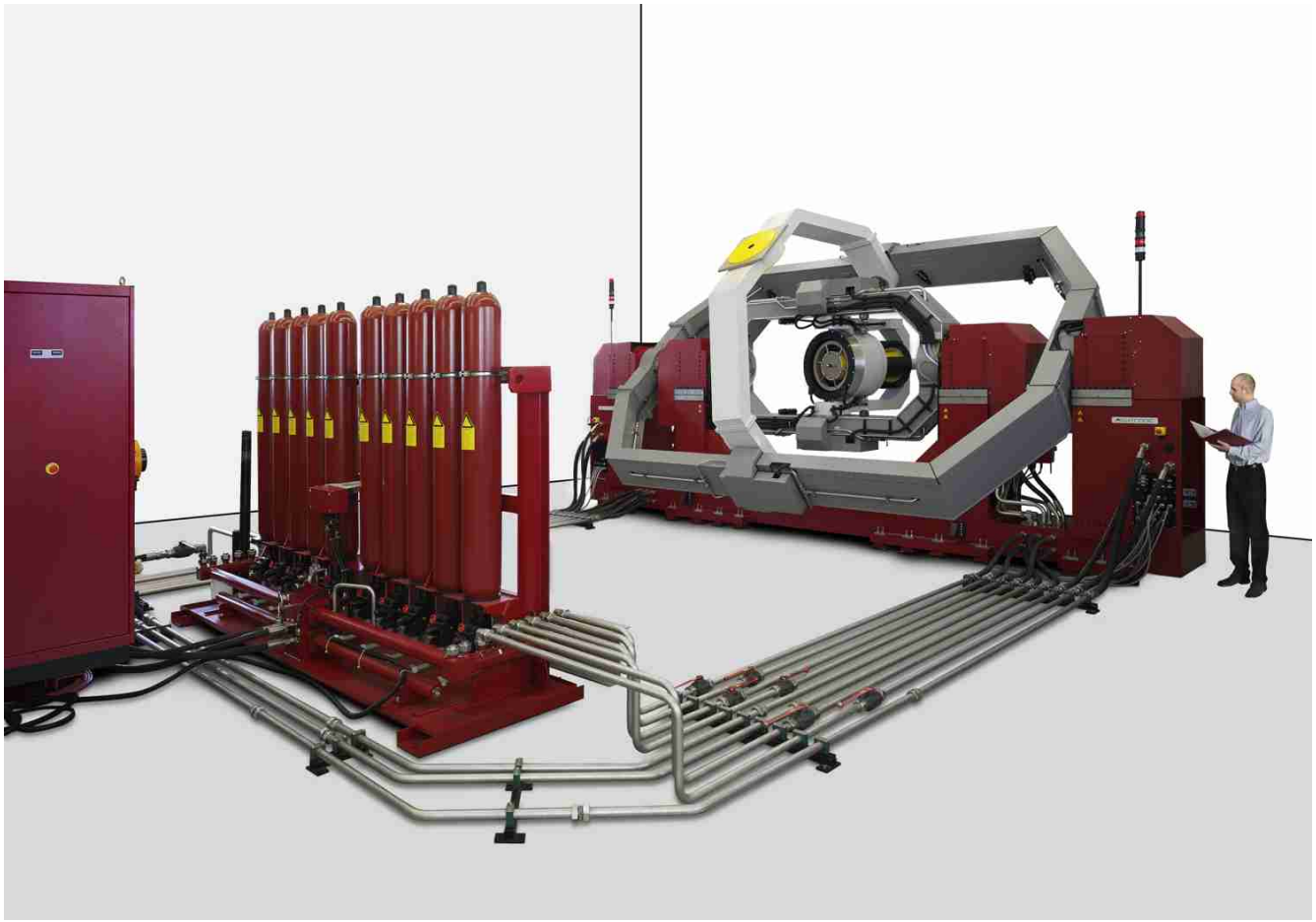
Hardware-in-The Loop Flight Motion Simulator

HD7736 Three Axis Flight Motion Simulator
HD7727-T Two Axis Target Motion Simulator



Description

The Series HD7736 Flight Motion Simulator (FMS) is a precision 3-Axis Missile Flight Motion Simulator typically used together with a 2-Axis Target Motion Simulator (TMS). The system is designed for high dynamic missile test. The HD7736 provides a comprehensive platform for Hardware-in-the-Loop (HWIL) simulation of guided missiles, munitions and other inertial systems.

The 3-Axis FMS is configured with a horizontal outer (pitch) axis, a middle (yaw) axis, which is orthogonal to the outer axis and an inner (roll) axis supported by the middle axis gimbal. The inner axis is the payload mounting area.

The inner axis has continuous angular freedom and is driven by a high torque brushless AC motor. The middle and outer axes have limited angular motion and are driven by hydraulic actuators. A hard-anodized aluminum tabletop on the roll axis serves as the payload mounting surface. A bearing ring attached to the middle axis support the UUT during high dynamic motions

The 2-Axis TMS HD7727-T is configured with an outer elevation axis which supports the inner azimuth axis. The missile target is mounted to the azimuth gimbal at the large payload mounting area.

Construction materials used are treated for long term dimensional stability. The stiffness of the system is such that orthogonality of the axes and bearing wobbles are maintained, virtually independent of axis rate or position. Protective coatings are used to prevent corrosion and outer surfaces are painted.

The real time digital controller, ACUTROL® Model ACT3000 controls the table. The controller has a colour, touch sensitive operator interface flat panel display and scalable analog input/output interfaces. Programmable Event Pulses can be used for

calibration and synchronization with external computers or test equipment. Typically, the standard digital interface Ethernet (TCP/IP) and IEEE-488 are supplemented with a real time computer interface. SCRAMNet and VMIC reflective memory interfaces are the preferred standard in the HWIL test environment.

Performance Specification HD7736 FMS

	ROLL	YAW	PITCH
	inner	middle	outer
Design Features			
Actuator	AC-torquer	Dual vane hydraulic	Single vane hydraulic
Position transducer	Inductosyn Tape	Inductosyn	Inductosyn
Electrical access to UUT	Slipring	Twist cable	Twist cable
Axis Intersection within sphere of	1 mm radius		
UUT			
Payload Max	500 mm dia. x 1'100 mm long		
Offset to axis intersection	1'000mm		
Payload, mass	80 kg, nominal		
Payload, inertia	0.25kg.m^2 roll; 3.0kg.m^2 pitch &yaw		
Sliprings	*10 x 10A, 400VAC; 40 x 2A, 150VDC*		
Specification			
Angular freedom	continuous	+/-55 deg	+/-115 deg
Position resolution	0.0001 deg	0.0001 deg	0.0001 deg
Position accuracy	+/-0.005deg	+/-0.005deg	+/-0.005deg
Position repeatability	+/-0.003deg	+/-0.003deg	+/-0.003deg
Position drift over one hour	<0.0005deg	<0.0005deg	<0.0005deg
Rate, peak	+/-600 deg/s	+/-250 deg/s	+/-250 deg/s
Rate, minimum	0.001 deg/s	0.001 deg/s	0.001 deg/s
Rate, accuracy	0.10%	0.10%	0.10%
Acceleration peak with load	18'000 deg/s^2	7'000 deg/s^2	7'000 deg/s^2
Dynamic performance			
Bandwidth -3db, nominal	>30Hz	20Hz	20Hz

Performance Specification HD7727-T TMS

	AZIMUTH	ELEVATION
	inner	outer
Design Features		
Actuator	dual vane hydraulic	dual vane hydraulic
Position transducer	Inductosyn	Inductosyn
Electrical access UUT	twist cable	twist cable
UUT		
UUT Length	500mm (nominal)	
UUT Offset to axis intersection	1500mm	
UUT Weight	50kg (nominal)	
UUT Dia	300mm	
Payload, inertia	N/A	
Specification		
Angular freedom	+/- 45deg	+/-55 deg
Position resolution	0.0001 deg	0.0001 deg
Position accuracy	+/-0.005deg	+/-0.005deg
Position repeatability	+/-0.001deg	+/-0.001deg
Position drift over one hour	<0.0005deg	<0.0005deg
Rate, peak	+/-60 deg/s	+/-60 deg/s
Rate, minimum	0.001 deg/s	0.001 deg/s
Rate, accuracy	0.10%	0.10%
Acceleration peak with load	1200 deg/s^2	1200 deg/s^2
Dynamic performance		
Bandwidth -3db	8Hz	8Hz

Options

- Digital interface in addition to the standard IEEE-488 and Ethernet (TCP/IP) are; RS-422, SCRAMNet, or VMIC
- Non standard sliprings
- Special UUT adapters

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