



An Industry-Standard Benchmark Consortium

AutoBench™ Version 1.1

Benchmark Name: Table Lookup and Interpolation

Benchmark Description

This EEMBC benchmark algorithm is used in engine controllers, anti-lock brake systems, and other applications to access constant data quicker than by raw calculation. Instead of storing all data points, which would consume a lot of memory, selective data points are stored and the software then interpolates between them. Data may be stored in 2 dimensional (X,Y) or 3 dimensional (X,Y,Z) tables.

For example, software periodically performs a table lookup process to derive an output value Ignition Angle from two input variables, Engine Load and Engine Speed. The engine control continuously derives the input variables, Load and Speed, from external engine sensors. Speed is derived by measuring the period between pulses from magnetic pickup sensing gear teeth on the crankshaft. Load is derived from sensors measuring air flow through the throttle body.

The bilinear interpolation technique determines values by using four points in a grid that surrounds the desired point.

This algorithm simulates engine load and speed which are indices into an “angle” table. The engine load (X) and engine speed (Y) values are calculated and normalized. The ignition angle (Z) value is then interpolated from the table.

Optimization Rules

Category	Allowed	Disallowed
ANSI C	X	
Intrinsics/Language Extensions	X	
Custom Libraries	X	
Assembly Language	X	
HW Accelerators	X	

Algorithm Flowchart (page 2)

**Algorithm
Flowchart**

