



Table Of Contents

Introduction: Welcome to Electronic Fuel Injection

Chapter 1: Common Tuning Mistakes

Unwillingness to Learn
Improper Injector Characterization
Failure to Perform Steady State Measurements
Mechanical Problems
Tuning for Dyno Numbers
Tuning Only on the Street
Tuning Only on the Dyno
Trusting Marginal Measurement Equipment
Getting Good Advice

Chapter 2: Components of a Standalone

Why Use a Standalone?
So What's In It for Me?
Drawbacks of SA Controllers

Chapter 3: Combustion Basics

The Great Equalizer
AFR and Torque
Fuel Economy and Emissions

Chapter 4: VE Equation and Airflow Estimation

Engine Load
VE and Torque

Chapter 5: Fuel Injector behavior

Batch vs. Sequential Injection
Saturation vs. Peak and Hold
Flow Rate vs. Time

Choosing an Injector

Fuel Pressure

Multiple Injector Arrays

Chapter 6: Ignition Angle and Cylinder Pressure

Spark Hook Test

Knock

Torque Control

Chapter 7: VE Table Zones

Chapter 8: Introduction to Setups and Calibration

Laptop

Wideband Oxygen Sensor

Dynamometers

Additional Equipment

Chapter 9: Initial Setup

Chapter 10: Creating a VE Table from Scratch

Getting Moving on the Dyno

Working Downward

Higher Loads

Boosted Operation

Chapter 11: Acceleration Enrichment

Calibration of the Transient Fueling Correction

Chapter 12: Timing Maps from Scratch

Rule #1: Don't Knock!

Rule #2: Advance Timing with Increasing Engine Speed

Rule #3: Reduce Timing with Increasing Cylinder Load

Rule #4: Don't Run MBT at Idle

Finding MBT on the Dyno

WOT Spark Advance

Boosted Spark Advance

Chapter 13: Startup Maps

Fuel Delivery

Chapter 14: Auxiliary Outputs

Cooling Fans

Camshaft Actuation

Boost Control

Traction Control

Nitrous Oxide

Two-Step Control

Transmission Control

Chapter 15: Alcohol and Ethanol

Oxygen Sensors and Alcohol

Calibration Setup for Alcohol

Ethanol

Pump Gas

Appendix

Tuning Example

Conversion Charts

Glossary