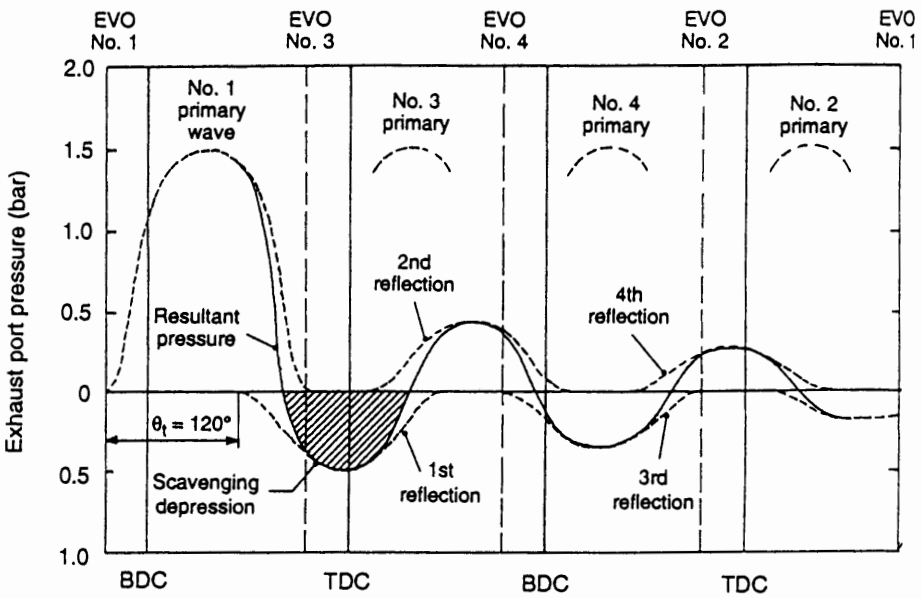
highest, generally 71 to 83 degrees before TDC. The initial high-speed peak is the greater of the two, registering between 0.45 and 0.50 Mach. If flow rates are above 0.50 Mach, the exhaust system is too restrictive. If the speed is closer to 0.40 Mach, the blowdown event will not be powerful enough to generate expansion waves of sufficient magnitude to scavenge the cylinder.

Common sense dictates that a wave traveling at 1,400 feet per second has a dominant effect on gas that is traveling 300 feet per second. If the wave is moving away from the port, the inertial effect helps to scavenge the cylinder; if it is moving toward the port, it easily overcomes the gas velocity and blows the exhaust back into the cylinder bore.

During the combustion process, the leading-edge flame-front temperatures may approach or exceed 2,500 degrees F, while exhaust gas temperatures measured in the header primary tube register 1,300-1,600 degrees F. Though many factors impact exhaust gas temperatures (EGT), flame speed and compression ratio are the dominant ones. As compression ratio diminishes, flame travel slows down and creates higher EGT readings. This occurs because the flame burns during blowdown and exits from the exhaust valve. Likewise, when ignition timing is retarded, the EGT increases.

The purpose of a muffler is to cancel some of the sound from the engine, and a proper design does this while increasing the scavenging effect. Many factors are at work creating the exhaust tone of an engine, and these include cylinder displacement, compression ratio, crankshaft offset, number and placement of the cylinders, as well as



The header designer must consider the relationship of the exhaust pressure in the cylinder head port in reference to the companion cylinders. One bar is equal to atmospheric pressure (14.7:1).