



THE BASICS - Air Conditioning Theory

say something like, R209. The "209" tells that it is a two-cylinder compressor with 9-cubic inch displacement. The sizes are as follows: 210 = two-cyl./10.3 cu. in., 209 = two-cyl./8.7 cu. in., 206 = two-cyl./6.11 cu. in. The York compressor is just like a lawn mower engine, being a two cylinder, reciprocating pump. The reciprocating motion causes it to vibrate more than the Sanden or Frigidaire compressors. It tends to have exceptional low end performance, high pumping peak torque requirements but doesn't like higher RPM's.

The GM/Frigidaire A-6 (long type) compressor shares the same basic design as the Sanden with one cylinder added. It has the same characteristics except that it is very large both in capacity and external dimensions. It is about 12.5 inches long and 5 inches in diameter, with over 12-cubic inches of displacement per revolution. We cover this compressor lightly because in our opinion the only place we would recommend using it would be in an extremely large sedan, with a high capacity evaporator, or two evaporators. A minimum of a 400 sq. in. double row, 5/16-inch copper and aluminum fin condenser is necessary with HFC-134a, and with a double evaporator the condenser should be at least 600 square inches with HFC-134a, provided air flow and temperature were good. For most street rods that is not necessary or possible. Using the GM/A-6 compressor has been a painful and costly experience for many street rodders.

The GM/Frigidaire R-4 is the short (7 1/2-inch) and fat (7-inch dia.) compressor found on the late GM cars. It has just under 10-cubic inches of displacement per revolution, with four cylinders radiating from its crankshaft. It has basically the same characteristics as the A-6 compressor, except it seems to fit in smaller spaces and is much lighter due to its mostly aluminum construction. The R-4 is larger in capacity than we like in an average street



Typical Vintage Air SureFit climate control system components

rod, however, it would be a better choice than its bigger brother, the A-6. Rebuilt compressors are not recommended on GM R-4. The GM/Frigidaire DA-6 compressor is slightly larger than a Sanden compressor and will work okay on most street rods. It is an axial type compressor with just under ten cubic inches displacement. Mounting is more difficult on non OEM applications and new replacement costs are high. Variable displacement compressor are not recommended.

The Ford Nippondenso compressor is an axial compressor with about 9.5 cubic inches of displacement. It's fine on applications where OEM equipment is used on your engine. Mounting is more difficult on non OEM applications and new replacement costs are high. We don't recommend rebuilt compressors of this model.

Compressor Capacity is Critical

Capacity is critical in selecting a compressor. Why? The old saying, "a chain is only as strong as its weakest link," comes into play when you select a compressor size or capacity. The weak link in most street rod air conditioning systems is the condenser's ability to handle the demands of the other components. These demands are to condense the refrigerant enough to keep the compressor head pressure

and corresponding refrigerant temperature within acceptable operating limits (approx. twice the ambient temperature of the day, plus fifteen percent) and to supply the evaporator with adequate refrigerant. Generally speaking, if a compressor has too much capacity the result will be excessive head (internal) pressure and temperature, compressor damage and excessive load on the engine. If a compressor has too little capacity the system will suffer inadequate evaporator performance. Our basic minimum given in the condenser part of this article is larger than most street rods are using; however, we will use that as our standard size condenser. A compressor of 8 or 8.5 cubic inches of displacement per revolution is ideal for a street rod with our standard size condenser, and an average size aftermarket evaporator (approx. 200 cubic inches of coil mass). We would always lean toward a smaller compressor before going to a larger one.

Safety Switches

Here, we should mention system protection switches. An excessive head-pressure safety switch cuts off the compressor if internal pressure exceeds safe limits and then cuts the compressor back on when the pressure is back down within those limits. A

TOTALLY COOLED GALLERY

The 2011 Goodguys Giveaway car is the amazing Clean Air '55 Bel Air Chevy convertible. It was built by Roger Lee's Ironworks Speed & Custom and Kenny Davis Hot Rods. It features a GM E-Rod engine with our Front Runner drive system and a complete Gen IV SureFit climate control system.

