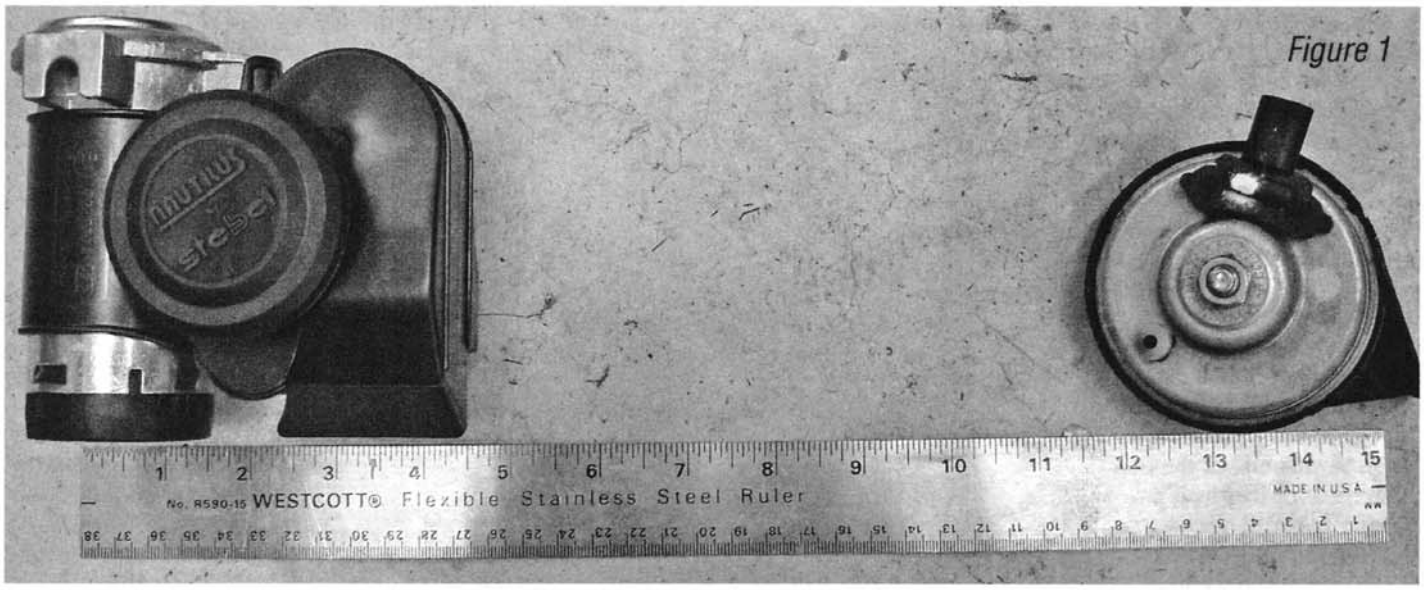
Stebel Air Horn Installation

Transforming A Meek Peeper Into A Master Blaster

by Moshe K. Levy

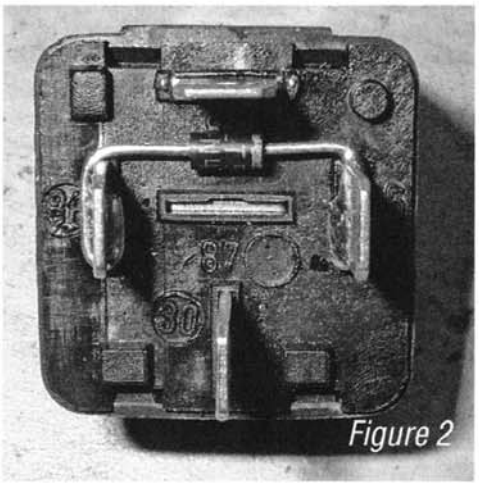


The Stebel Compact Nautilus Air Horn on the left is only about an inch wider than the stock Bosch unit on the right.

THE QUALITY OF stock horns varies widely from manufacturer to manufacturer, and even from model to model. While a horn, in and of itself, is not something a rider should rely on to avoid trouble, it can serve a useful purpose in certain situations, especially during rush hour commutes.

Moto-commuters know that a wimpy horn barely registers on car drivers' auditory radar screens, as they sit in their well-insulated interiors listening to radios, yammering on cell phones, arguing with their toddlers or otherwise being just plain distracted. Indeed, when your fellow drivers need to be jogged into the moment, a loud horn is just the ticket. Many (if not most) stock horns found on today's motorcycles are meek, and we must turn to the aftermarket and use some ingenuity to find solutions that work.

The idea here was to create an affordable, reliable horn setup that would install easily in accessible locations, and of course outperform the stock horn. In addition, the solution should be as universally applicable as possible. All of these factors are often at odds with each other, but in this case, the idea translated quite well into reality.



A 1N4003 Diode soldered across the coil terminals of the Stebel's 12 V 30 A relay will prevent any dangerous voltage spikes.

Test Setup

As a test mule, I used my daily commuter vehicle, a 2004 BMW R1150RT. This RT arrived stock with a pair of fairly powerful Bosch horns and its components are somewhat densely packed underneath its plastic bodywork. If the newly devised system could be made to fit here, it could fit nearly anywhere.

An online search for a compact, inexpensive, and dependable air horn yielded a fair number of results, but none as promising as Stebel's Nautilus Compact Dual Tone Air Horn, at about $37. This Italian-made 139 dB blaster, totally self-contained and barely larger than the RT's conventional stock Bosch unit (Figure 1), was dr. flash gordon's holiday recommendation and was also favored on various Internet forums. I ordered two of them, in hopes of a clean swap from stock.

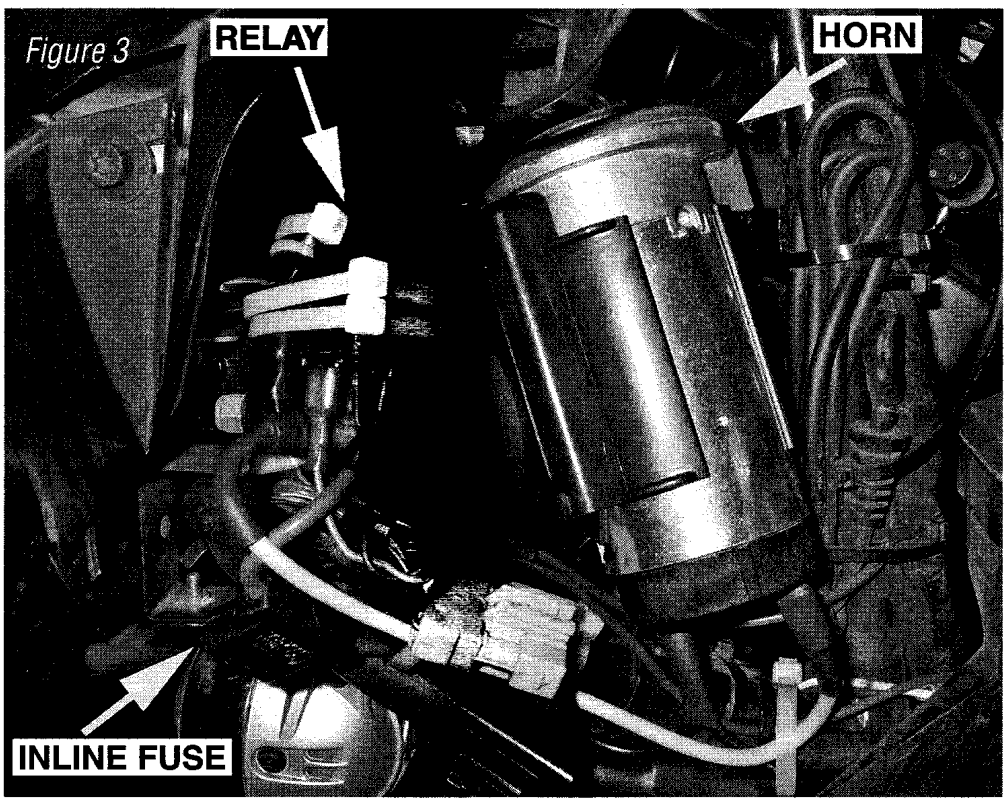
The Stebel Horns And Relays

Each air horn arrived in a neatly packaged box containing the horn, mounting hardware, mounting block, adapter for routing the air intake away from dirty or wet areas (if applicable), and one 12 VDC, 30 A Bosch-style relay. The relay was of particular importance, since not all motorcycles come standard with relays installed for the stock horns.

Relays allow a low-current control circuit (small wires) to make or break an isolated high-current circuit (heavy wires), like in your bike's starter motor circuit. Since the initial current to power up an air horn's compressor is quite a bit higher than a stock horn's starting current, isolating the bike's switchgear and wiring harness via a relay ensures that nothing gets fried. So when in doubt, add the relay!

Relay Diode Modification

A diode is the electrical equivalent of a valve, permitting current flow in only one direction. The relay included with each horn did not have a diode across its coil, but ideally it should. In this particular case, when the voltage source is removed from the relay coil (as the horn switch is released), an enormous voltage spike as high as 1000 V can occur. This spike can cause insulation breakdowns elsewhere in the circuit's wiring harness, or damage the horn switch itself. By connecting a 10¢ 1 A 100 V diode across the relay's coil, a "roadblock" is created which eliminates



Left side air horn and relay mounted in stock location. Note the density of the components.

the destructive potential of such a dangerous spike. For this application, I used a commonly available 1N4003 diode, and carefully soldered it across the relay's coil terminals as shown in Figure 2. Note that the stripe marked on one side of the diode indicates its polarity, and this striped side is where the wire bringing the 12 VDC from the horn switch to the relay is connected. (The stripe is shown on the right side of the diode in Figure 2.)

The RT's Stock Relay And Diode

Astute BMW owners will point out that the RT model already includes a relay with diode on the horn circuit as standard equipment. As such, the RT's horn switch is already safe, as it is only switching the low current for the relay coil as opposed to the high current of the horns directly. Yet, there are still important benefits to employing the relays included with the Stebel horns, as follows:

1. First, the RT's stock relay is not adequate to handle the current of the two Stebel air horns as planned in this experiment. In this case, it is easier to add the new relays than to dig out and replace the stock one.

2. Second, the RT's factory harness has meager 18-gauge wires to feed the stock horns. By utilizing the included relays and running some 12-gauge wire directly from the battery positive terminal to them, the higher voltage the horns receives translates into more real-world decibel output.

3. By including the relays, our solution is not specific to the RT, but rather is electrically applicable to nearly any motorcycle, from classic to modern.

Basic Mechanical Setup

The dense packaging typical of so many motorcycle components is a marvel of engineering. Underneath the swooping, aerodynamic bodywork often lies a maze of hardware and wiring which can make finding a few unpopulated cubic inches for mounting new horns a challenge. Luckily, this was not the case on the RT. Since the Stebel horns are not much larger than the stock Bosch units, they mounted up in exactly the same location as the stock horns, bolted directly to the frame as before.

Some minor wire jiggling was required to eliminate any interferences, but overall, the mock installation was a cakewalk. Once it was determined that the Stebels could mount with adequate clearance to allow the surrounding wiring some room, a small area near each horn was designated to mount the relays. The relays were zip-tied to the frame near the horns, taking care to maintain clearance between any electrical connections and the frame.

Basic Setup—Electrical

The basic wiring setup is extremely easy to connect, and there are straightforward schematics to follow in the printed Stebel horn instructions if reference is required. For the proposed dual horn solution, a simple wiring harness needs to be constructed using commonly available 12-gauge wire, spade lugs, and eyelets to facilitate connection between the relays, ground, battery and horns. A wire stripper and wire crimper are required tools for the job. It's wise to use heat shrink tubing where the lugs and wires meet, as well as some dielectric grease on any spade terminals, to prevent corrosion from forming on contact surfaces. Here are the connection essentials:

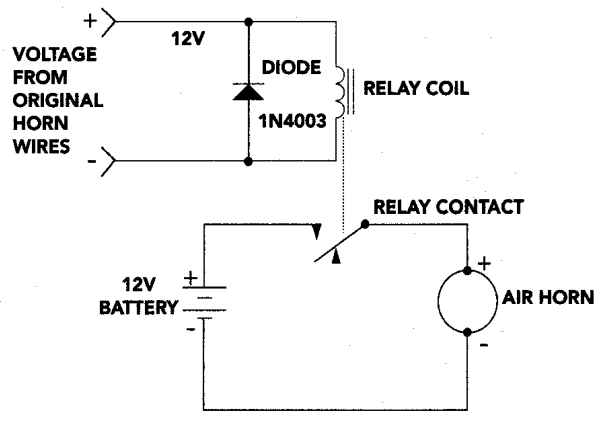
1. The stock 18-gauge horn switch wires are used to trigger the two relay coils rather than to power the horns directly, as they were not big enough to supply the total amperage required for the two Stebels. Remember to connect the positive horn switch wire to the striped diode side of the relay coil.

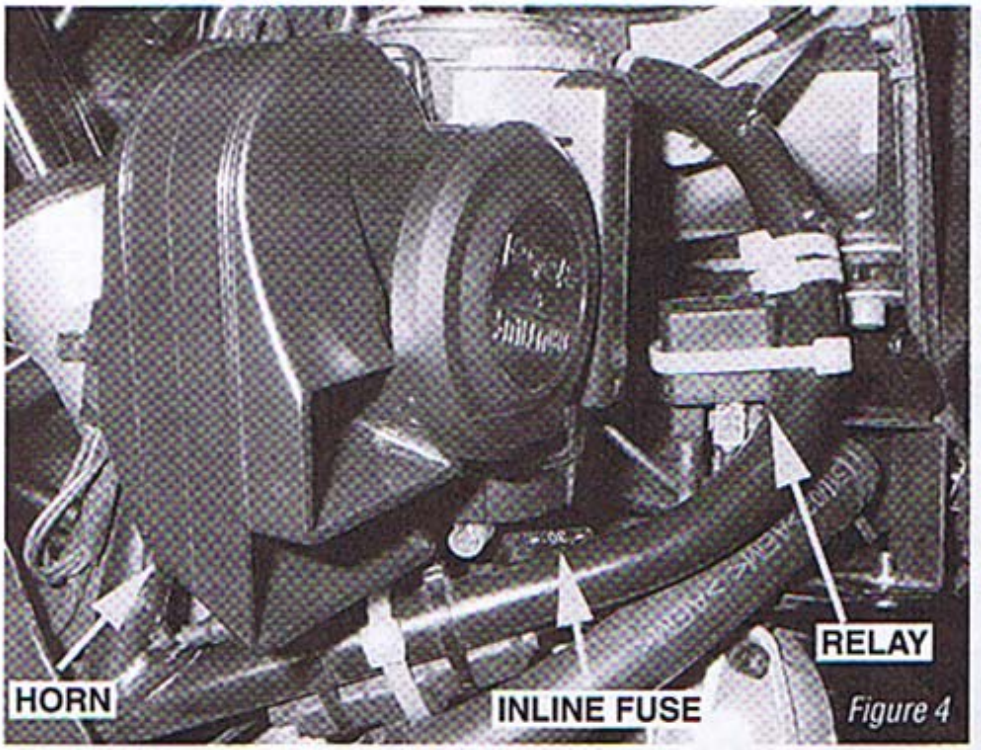
2. Power for each horn was run directly from the battery's positive terminal via 12-gauge wire, and into one of the two remaining terminals on each respective horn's relay. This is the red wire (left side) plugged into the relay as shown in Figure 3. For safety purposes, it's a good idea to install 30 A blade-type inline fuses on any power wires. (See Figure 5.)

3. Run power from the last remaining terminal of each relay into the positive terminal of its respective horn with some more 12-gauge wire. This is the yellow wire running from the relay to the positive terminal (right side) of the air horn compressor as shown in Figure 3.

4. Run a ground wire from the negative terminal of the air horn compressor to the negative side of the battery or other appro-

Schematic





Right side air horn and relay mounted in stock location.

priate ground. This is the black wire plugged into the air horn compressor's negative terminal (left side) in Figure 3.

It should be noted that in place of the two 12 VDC 30 A relays included with the Stebel horns, one 60+A relay can be cheaply procured and used instead. While this would reduce the complexity of the wiring involved, it would do away with the dual relay setup's redundancy. With two relays utilized as shown, should one relay fail, the other will still allow one of the horns to operate. Also, it might be harder to find room for one large relay as opposed to two smaller ones.

Test Blast

With connections now made, it's a good idea to test the system. Make sure the horns and relays are secure, turn on the ignition, cover your ears, and blast away! If all goes well, check for any clearance issues and make sure no sharp edges are anywhere near the wires. Zip-tie any loose wires, and tighten down any hardware used in the installation. Reassemble any bodywork or related components, and bask in the glory of a job well done.

So How Loud Is It?

You will jump out of your skin at the sheer volume of these two air horns screaming in parallel, which sounds very much like a semi-truck's horn on steroids! On paper, stock horns are usually in the 85–90 dB range, so just one Stebel Compact Nautilus Air Horn (rated at 139 dB) is over *four times* as loud as stock (the decibel scale is not linear). Two simultaneously borders on deafening. Of course, just how deafening is the question at hand.

To find out, I arranged a comparison test between the newly improved RT and some other vehicles in the household: my girlfriend's 2004 BMW R1150R and my 2005 BMW X5, both with stock horns. While hardly a proper scientific test, it does give us some idea of what this upgrade is worth.

Using a calibrated Center Technology Corp. Model 320 Sound Level Meter, standing 50' back from the pre-op RT test mule, and with ambient noise hovering at 35 dB, the stock pair of Bosch horns registered 81 dB. So this was the figure to beat. The results post-installation, taken again at a 50' distance with ambient noise still hovering at 35 dB, were as follows:

2004 BMW 1150RT with dual Stebels: 109 dB

2004 BMW 1150R with one stock Bosch: 89 dB

2005 BMW X5 4.4i, stock: 82 dB

Conclusion

At 50', the RT's horn performance went from roughly the volume of a canister vacuum cleaner (about 80 dB) in stock form to roughly the volume of front row at a rock concert (about 110 dB) in air horn configuration—a clearly discernable difference! The total cost for the project was relatively low (under $100) with the horns purchased online and everything else (all the electrical wiring, connectors, fuses, dielectric grease, tools, etc.) purchased at Radio Shack.

Most importantly, given the universal nature of the installation described, this setup can aid any motorcyclist who would like to add some precious decibels to his/her horn volume.

After using the Stebel setup for a few weeks, I can say without question that having a louder horn is especially useful to awaken distracted drivers while commuting or in heavy traffic.

But avoid a false sense of security. While better horns succeed in garnering attention where the stock setup failed miserably, there are no cheap substitutes for awareness and riding skill.

A 30 A inline fuse should be installed on any power lines from the battery's positive terminal to the relays.