Diagnosing and Repairing Postwar Lionel Battery Operated Diesel Horns

The horn circuit of postwar diesels consists of two separate, but interconnected circuits:

1- a DC relay coil actuated by the whistle control on the transformer, and
2- a 1.5 volt D.C. operated horn unit.

To diagnose the system, we must divide it into 2 blocks, and check each block independently.

The horn is easy to check.
Locate where the horn power wire is soldered to one of the relay tabs.
Obtain a fresh battery. Get a length of hookup wire and strip both ends.
Hold the bottom (- negative) side of the battery to the metal casing of the horn itself.
Touch one end of the wire to the top (+ positive) side of the battery, and the other end of the wire to the horn wire on the relay. You may wish to temporarily tape the wire to the top of the battery for easier handling.
The horn should sound.

If it does not sound, unsolder the horn wire from the relay and try again.
If the horn still does not sound, obtain a 9 volt battery and repeat the above connections, but only for a second, to try and jar the coil inside into operation.
If the horn is still silent, it may need to be opened up and diagnosed internally, or simply replaced.

The small screw on the horn is only to adjust the actual tone of a properly operating horn, and should not be moved until the horn gives a strong sound.

Once the horn is sounding properly, attention can be turned to the relay and the rest of the horn power circuit.

The full relay circuit to the horn is what most people are not aware of and do not understand, and is the cause of much frustration.

There are 2 paths for the battery voltage to flow through.
The positive voltage of the battery flows through the relay/battery bracket, the metal housing of the relay, through the points, to the horn.

The frame of the locomotive, battery swivel plate and rivet (holds the battery in place on the bottom of locomotives such as the F-3's and FM's), and the horn and its' mounting

points to the frame, are all part of the negative electrical path for the battery, and this is the circuit that is most often overlooked.

Since the horn operates on such low voltage (1.5 volts D.C.), and since there is so much metal that the battery voltage has to flow through, any slight resistance to that path will cause an inoperable or weak sounding horn. Corrosion, however slight, is our main enemy here.

To insure long term reliable operation of the horn, the entire horn circuit should be disassembled and thoroughly cleaned.

Remove the relay, relay/battery bracket and horn from the frame.

Use fine emery cloth to polish all surfaces until they shine.
Clean and polish the battery contacts on the relay/battery bracket, paying close attention to the spring connection for the battery positive terminal. Clean the mounting point on the bracket where it gets secured to the relay, and the bracket mounting screw. Clean the swivel plate on the bottom of the frame, and make sure the rivet holding the swivel plate on is clean and free of any dirt or corrosion. This is the first connection from the negative battery terminal through the swivel plate to the frame, and it MUST be completely clean.

Lightly polish any oxidation off the relay contacts, being careful not to bend the contacts. Check the swivel points at the rear of the movable contact for free movement and any oxidation.

Clean and polish the mounting bracket on the horn, as well as the point on the frame itself where the horn gets mounted.

Use naphtha (lighter fluid) on a cloth to clean any residue from all points just cleaned.

Reassemble all components. Close and lock the battery swivel plate. Do not put in the battery. If you have an ohmmeter, set it to low ohms and check the resistance from the battery swivel plate to the body of the horn. The reading should be near zero ohms, indicating a good electrical path for the negative battery voltage.

Get a rubber band or string and loop it over the relay to hold the points closed.
Touch one lead of the ohmmeter to the positive battery terminal on the relay/battery bracket, and the other lead to the wire on the relay going to the horn. The reading should again be near zero ohms, indicating a good electrical path for the positive battery voltage.

If any resistance reading is higher than an ohm or two, the relevant circuit should be checked to ascertain where the high resistance is coming from, and the circuit cleaned again until the resistance is lowered to as near zero as possible.

Release the relay points, and insert a fresh battery into the locomotive. Close the relay contact by hand, and the horn should sound as loud as it did when you hooked the battery directly to the horn.
If the horn does not sound, again tie the relay points closed, and with your meter set to read low D.C. volts, check the voltage at the horn wire on the relay and the body of the horn. Anything substantially less than 1.5 volts with a fresh battery indicates a resistance in one of the circuits.

To ascertain which circuit the loss of voltage is occurring in, with the relay points still tied closed, hold one meter wire on the horn body, and with the other lead, in turn, touch the horn wire on the relay, then the metal body of the relay and finally the positive terminal of the relay/battery bracket. The readings should be identical. If they differ substantially, the relay/battery bracket, its' connection to the relay, and the relay points need to be checked and cleaned again.

If the positive circuit checks properly, then the negative circuit needs to be checked. This is what most people overlook.
Release the relay contacts.
Hold one meter lead on the battery positive terminal, and with the other lead, in turn, touch it to the body of the horn, the locomotive frame, the rivet holding the battery swivel plate, and finally the battery swivel plate itself. All readings should be very close to each other. The first place you see a major change in voltage reading is where the resistance is located and needs to be corrected.

The relay can be checked for proper functioning by putting the locomotive on the track, turning up the power, and pressing the whistle button on the transformer. The relay should close, and the horn should blow.
If the relay does not close, isolate the relay or transformer as the cause.

Turn off the transformer, unplug it, and remove the wires from the lockon at the transformer itself. With the locomotive still on the track, get another 1.5 volt battery and touch the wires going to the lockon to the battery terminals. Polarity is irrelevant. The relay should close and the horn should blow.
If the horn blows with the battery and not the transformer, most likely the whistle rectifier in the transformer may be defective and needs to be replaced. There is very little to go wrong with a relay to cause it not to close with proper voltage applied.

Once the horn and circuits are checked and properly cleaned, the horn should give many years of service without issue.