LIONEL SERVICE MANUAL

LIONEL OPERATING CARS

All of the Lionel operating cars described in this section are equipped with a dumping or an unloading mechanism which enables the cars to unload various types of freight at the touch of a control button. The mechanism is powered by a coil-type electromagnet, or *solenoid*, which, when electrified, attracts an iron plunger which is free to slide inside the solenoid. The plunger in turn actuates the rest of the mechanism to which it is linked mechanically. After the current is interrupted the plunger and the mechanism return to normal position either by gravity or by means of a spring.

The solenoid leads are connected to the two truck collector shoes which also pick up current for the coils of the electromagnetic couplers mounted on the trucks.

Lionel operating cars (with the exception of the electronic cars) can be unloaded only on the special five-rail remote control track sections which are connected to a two-button controller. For '0' Gauge track the RCS remote control section is used; the section matching the '0-27' Gauge track is either No. 6019 or the older No. 1019.

The controller and the remote control track section are used for both uncoupling and unloading. How these two operations can be performed on the same circuit independently is illustrated in the circuit diagram in Figure 3 and in the simplified schematic diagram in Figures 1 and 2.

The car is positioned on the remote control section so that the collector shoes (2) and (8) make contact with the control rails (4) and (7). Normally the control rails do not carry any current but when the 'Uncouple' button of the controller is pressed down a contact is made between the center rail of the track (6) and the two control rails. Track current then flows from the control rails into the coupler coils (1) and (9) completing the circuit through the frame and truck wheels to the outside rails (4) and the transformer (14)

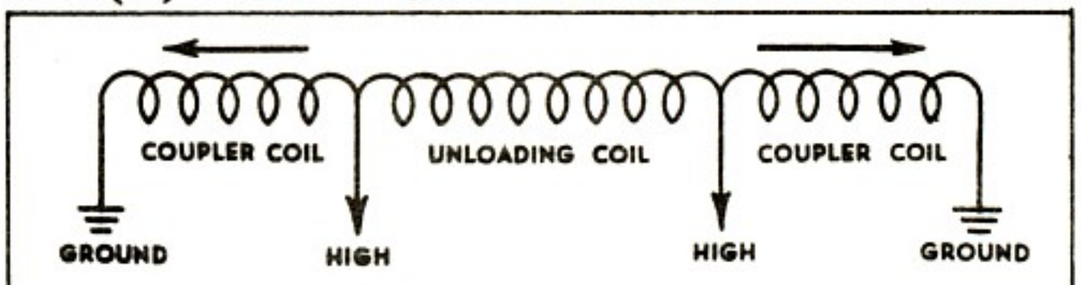

Figure 1 Circuit in 'Uncouple' Position.

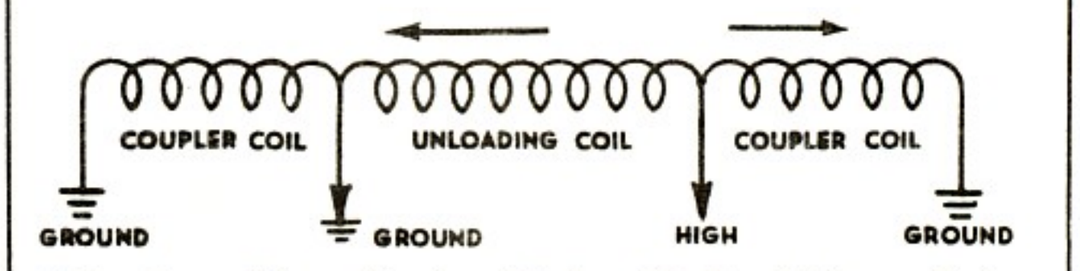

Fig. 2 - Circuit in 'Unload' Position. Note that 'High' Coupler Coil is Energized as Well.

SCHEMATIC WIRING DIAGRAM OF OPERATING CARS

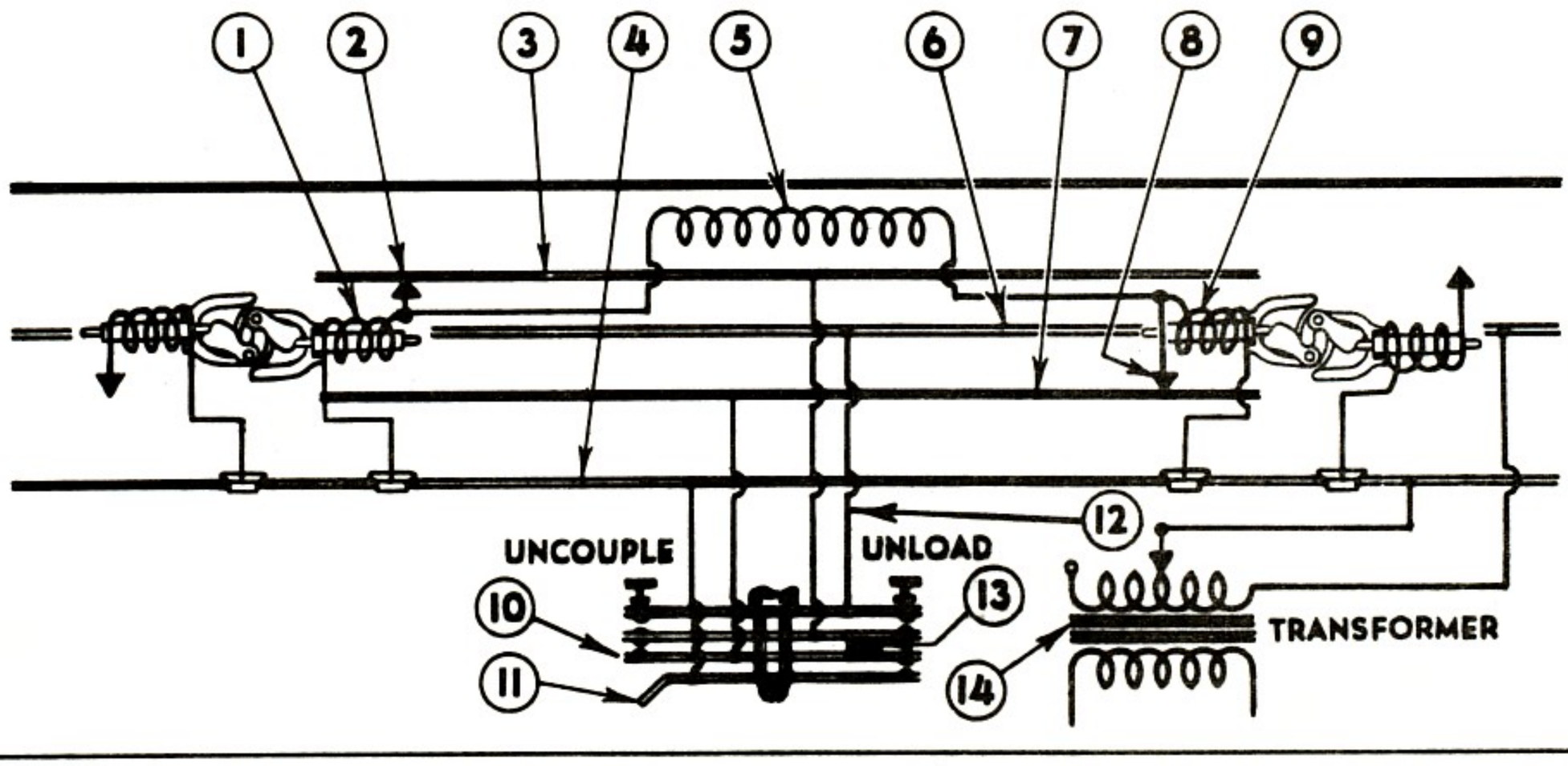

Figure 3 - Schematic wiring diagram of an operating car when positioned over a remote control track section. The mating couplers of the two adjacent cars are also shown. For full explanation see text.

and snapping open the coupler knuckles. Note that half of the bottom spring contact in the controller (11) is bent away to prevent contact against the upper spring (10) when the 'Uncouple' button is pressed. Otherwise a 'short' would be placed across the track. Since in this position both ends of the unloading coil (5) are at the same potential no current can flow through it and the unloading mechanism does not operate.

When the 'Unload' button is pressed, however, one control rail is connected to the center rail while the other is connected to the outside, or ground, rail, with the fibre spacer (13) insulating the two pairs of controller contact springs from each other. With this connection the two ends of the unloading coil are at different potentials so that current flows through the unloading coil from one control rail to the other. At the same time you will note that current is also free to flow through the coupler coil connected to the 'high' control rail, causing that coupler knuckle to open.

The unloading mechanism of operating cars is designed to operate on normal track voltage, 10-14 volts. If a dump car is heavily loaded, however, a slightly higher voltage may be required to obtain positive action. It is possible also to provide a fixed voltage to the remote control section by detaching center rail lead (12) from the remote control section (In the RCS this is screw connection No. 4) and running it directly to an accessory terminal of the transformer set at the desired voltage. In this alternate connection the remote control section will receive regular track voltage for normal train operation and fixed transformer voltage whenever the 'Uncouple' or 'Unload' buttons are pressed.

Since both the unloading and the coupler coils are designed for intermittent operation, they will overheat if energized continuously for too long a time. In other words, the 'Uncouple' and the 'Unload' buttons should be pressed for only a moment. If the coils and mechanisms are in good condition the car operates instantaneously. Failure to do so is a sign that something is wrong and continuing to press the buttons will only aggravate the condition.

SERVICE HINTS

In general, trouble with an operating car can be either mechanical or electrical in nature. The first thing to do, therefore, is to isolate the source of the difficulty. Electrical failure is usually easiest to locate and rectify. Generally it is due either to an incomplete, or 'open' circuit caused by loose connection, poor solder joint or broken wire, or by a 'short' in the coil circuit where a bare wire or solder joint is accidentally grounded to the metal framework of the car or truck.

In many cases visual inspection is all that is necessary to find the source of the trouble. The easiest way to check the continuity of the solenoid circuit is to apply approximately 12 volts to the two collector shoes directly. If the coil circuit is complete the plunger will move forcefully within the solenoid. If the solenoid, when checked in this manner, seems to be in good condition but the car still does not operate when placed on the test track there may be a short in one of the coupler coils which has the effect of short circuiting the unloading coil as well.

MECHANICAL TROUBLE

The precise sources of possible mechanical trouble are, of course, much more difficult to describe, since these may vary widely from one type of operating car to another. Facility in the servicing and adjustment of these mechanisms is gained only through familiarity with the specific type of mechanism. We will attempt to list the typical conditions for each of the operating cars but obviously this list will not be exhaustive. In general the things to look for are bent or distorted parts, undue binding or friction caused by burred edges or too tight riveting of moving parts, improper spring tension in mechanisms where the return is actuated by means of a spring, or jamming of the mechanism by foreign matter such as pieces of artificial coal, etc.

Note: In investigating the possible sources of trouble don't forget the possibility that if the car fails to operate properly the trouble may lie in the controller or in the remote control track section.