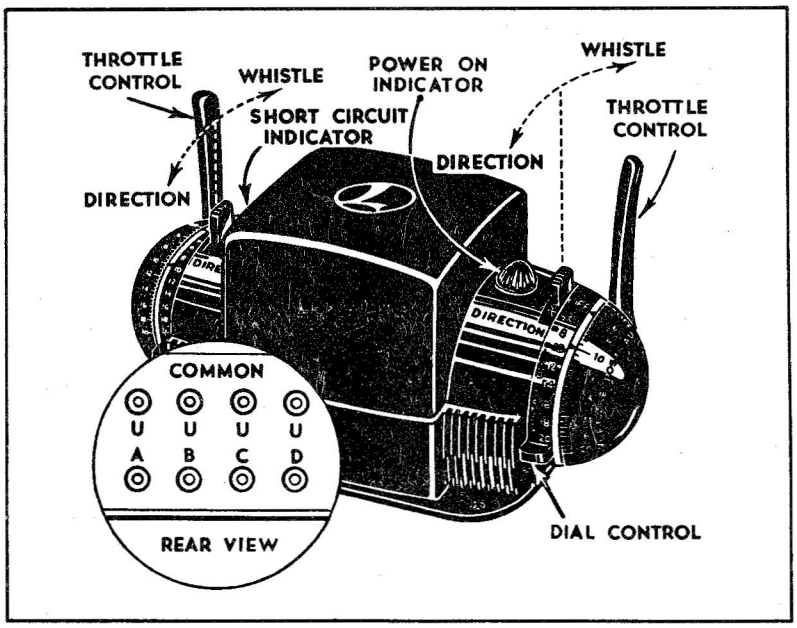
INSTRUCTIONS

LIONEL TYPE ZW TRANSFORMER

115 VOLTS 60 CYCLES 275 WATTS

ALTERNATING CURRENT ONLY



INTRODUCTION

Lionel electric trains operate on low voltage, ranging from 8 to 18 volts. Lionel Transformers reduce or transform the available house voltage to the low voltage required. The plug at the end of the transformer cord is plugged into any convenient wall outlet of 115 volts, 60 cycles alternating current. The low voltage for operating trains and accessories is then obtained from the output terminals at the rear of the transformer.

The wattage rating of the "ZW" Transformer is 275 watts. The wattage of a transformer is a measure of its capacity or ability to furnish power. The wattage of the transformer you need is governed by the kind and number of trains and the number of lights and operating accessories in your model railroad system. The larger the train and the greater the number of accessories, the more power you need and the higher should be the wattage rating of the transformer.

USES OF TRANSFORMER CONTROLS

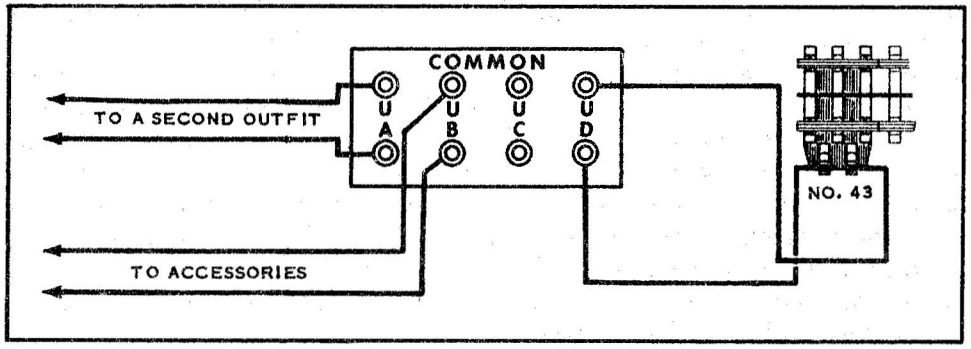
"ZW" Transformers are so designed that two trains can be operated and controlled independently of each other on a properly designed layout. On each end of the transformer there is a long throttle-type lever. This is the speed control. By moving this throttle you can regulate the voltage supplied to the track so that the train speed can be regulated in a realistic fashion. In Figure 2 the left-hand throttle controls the voltage supplied by the output binding posts labeled "A-U", while the right-hand throttle controls the pair labeled "D-U".

Next to each of the throttles you will find a short lever. This is a combination whistle and reversing control for that circuit. Moving the lever away from you, toward the side marked "Whistle", blows the train whistle. Moving the lever toward you, to the side marked "Direction", stops, starts and reverses the locomotive. A separate whistle and reverse lever is provided for each of the two throttle-controlled train circuits so that if you operate two trains on separate sections of your model railroad you can sound each whistle separately and start and stop each locomotive without interfering with the action of the other.

CONNECTING TRANSFORMER TO TRACK

"ZW" Muti-Control Transformers have four pairs of binding posts located on the rear wall of the transformer case. Each pair of these posts provides a separate power source which can be controlled independently of the other three. Of these the "A-U" and the "D-U" combinations are controlled by the throttles as described above and should be used for the main track supply. The two center combinations, "B-U" and "C-U", are reserved for accessories as described in a later section.

In order to get current from a transformer to the track, a pair of transformer binding posts must be connected to the track. If you use "0" or "027" track, this connection is generally made by means of a track lockon, either the regular CTC, or the illuminated LTC. The lockon is clipped onto a convenient section of straight track. With "Super-0" track a No. 43 Power Track Section is used; this is inserted in the layout like any short straight track. Lockon and No. 43 terminals are connected to the transformer by two lengths of insulated wire.



WIRING PROCEDURE

- Strip the insulation from the ends of the two pieces of heavy wire furnished with the transformer. Do not use the thin wire furnished with accessories.
- Wrap the end of one wire around one of the "U" binding posts of transformer and tighten thumb nut. Wire should be wrapped around post in clockwise direction, so that it doesn't slip out as you tighten the nut.
- Connect other end of this wire to No. 2 clip of lockon or No. 43. Push down upper half of clip until loop projects through the slot on top. Insert bare end of wire into this loop and release clip. No. 2 clips make connection to the outside or "ground" rails of the track.
- In the same manner connect No. 1 clip to either "A" or "D" binding post and tighten thumb nut. No. 1 clips make connection to center or "power" rail.

After the transformer is properly connected to the track, push the plug at the end of your transformer cord into a wall outlet. The green pilot light on the transformer should now go on. This indicates that the power is flowing into the transformer and that you have no "short circuits."

Both the green and red pilots use a 18 volt No. L1445 lamp available at your dealer.

HOW THE CIRCUIT BREAKER OPERATES

To protect the transformer from overheating and damage due to short circuits, "ZW" Transformers are equipped with built-in automatic circuit breakers. Whenever the current drawn from the transformer exceeds a certain limit the red warning light flashes on and the circuit breaker opens cutting off power to the track. In few seconds the circuit breaker automatically closes and the red light goes off. If, however, the short circuit which caused the overload still exists, the red light will go on again and the circuit breaker will reopen. This sequence will continue without damage to the transformer until the cause of the short circuit has been removed.

A short circuit is an excessive load on the transformer caused by a direct connection between the center rail and one of the outside rails. A derailed car or locomotive is the most frequent cause of a short circuit so make sure that all the wheels of locomotive and cars are properly set on the rails.

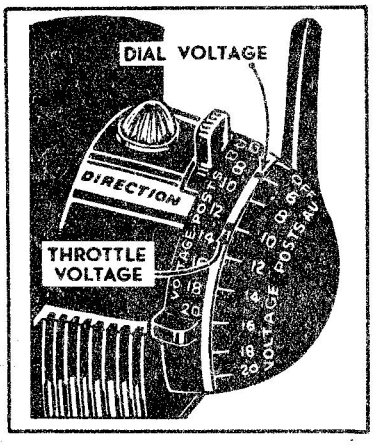
It is important to understand that the purpose of the circuit breaker is to protect the transformer itself. It operates only if the transformer is overloaded. Therefore, it is possible for the track to be shorted without causing the circuit breaker to operate or the red light to flash. In this case, although the transformer voltage may drop below the operating point of the trains, the transformer will not be injured because it is not being overloaded beyond its safe limit.

WARNING: Do not attempt to blow the whistle while there is a short circuit or you may damage the whistle controller.

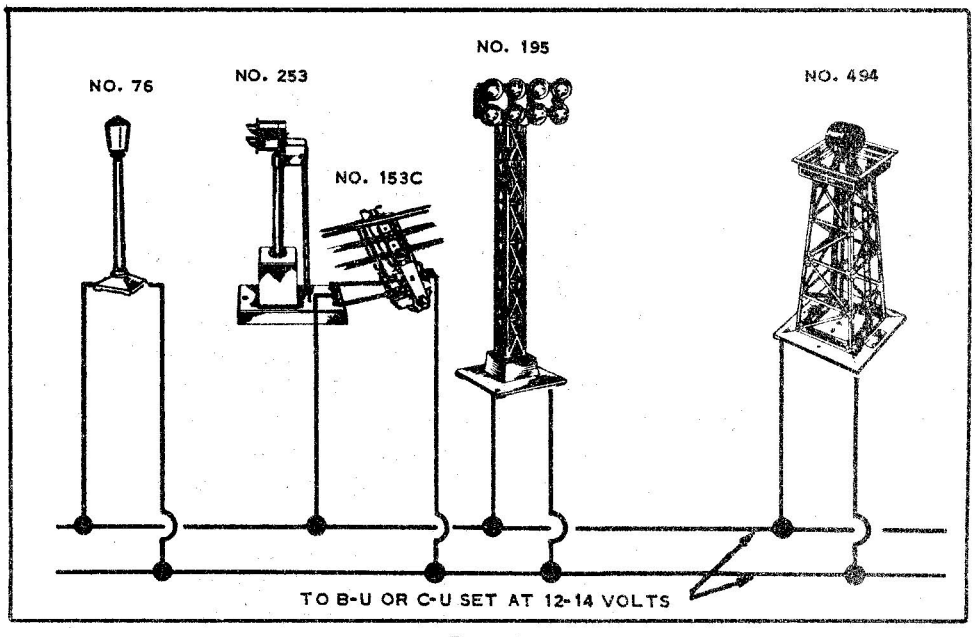
HOW TO CONNECT ACCESSORIES

While transformer binding posts "A-U" and "D-U" are reserved for train control, "B-U" and "C-U" are intended to supply power for lights, switches and other accessory equipment. The voltage supplied by these two combinations is regulated by the two dials located next to the throttle controls and may be set to any figure indicated on the dial. Most illuminated accessories operate on 12-14 volts, while operating accessories work on voltage ranging from 10 to 16 volts depending on the accessory.

To determine the proper voltage for your accessories, connect the accessory terminals to "B-U" or "C-U" posts of your transformer and slowly move the corresponding dial control from "OFF" to the point where you get the desired brightness of illumination or satifactory operation of the mechanism. Be careful, particularly in the case of illuminated accessories, not to set the voltage too high, or you will burn out the lamps. If you operate with the lowest voltage possible you will greatly extend the life of your lamps and other equipment. In the event that you have several accessories requiring the same voltage it is possible to use the same transformer binding posts for all. A simple method for wiring a number of lights, etc. in parallel is shown below.



How to Read Voltage.
Top line indicates Dial Voltage;
Bottom line Throttle Voltage.



HOW TO OPERATE A TYPICAL TWO-TRAIN LAYOUT

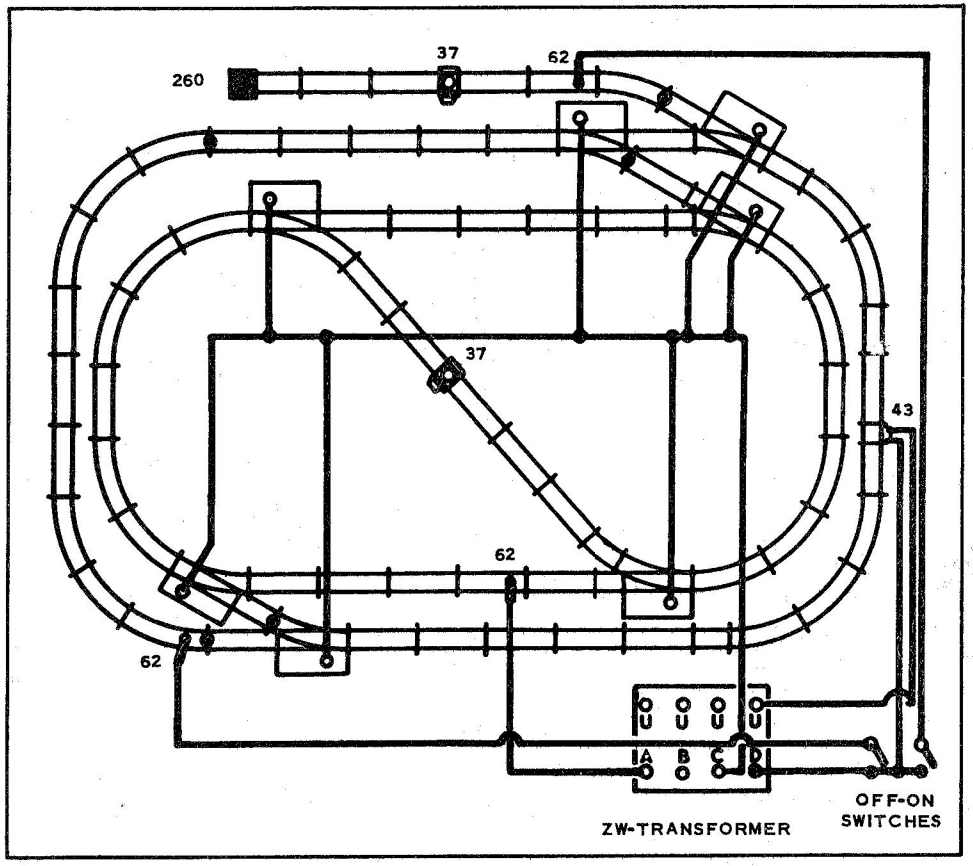


Illustration shows a "Super-0" layout for running two trains independently. In order to operate two trains in this manner, the layout must be "sectionalized", that is one loop insulated from the other loop by insulators at each of the points indicated by dots. Each loop is controlled by a separate throttle lever, while the accessory binding posts are used for switches and other accessories which may be in the railroad system. For convenience all controllers should be mounted on a centrally located panel board. Two No. 37 Uncoupling Units are also shown in the layout but No. 36 Operating Blades can be inserted in any straight track.

NOTE: As shown in the diagram, only one No. 43 Power track section is employed. Connections to insulated power rail sections are made with No. 62 Power Track Lockons, available from your dealer. In large and complicated layouts such as this, additional No. 61 Ground Lockons may be necessary for good ground throughout the system.

In the lower right hand corner of the diagram are shown two electrical toggle or knife switches. The purpose of the right toggle switch is to cut the current in or out of the siding. The other switch sectionalizes the left half of the outside loop while a second train crosses over from the inside loop to the right half of the outside loop.

OPERATING ADDITIONAL TRAINS

Since "ZW" Transformers have four independently variable circuits, as many as four trains can be operated independently of each other with a proper layout. However, in order to control the whistles and direction of the two additional trains, external No. 167 Whistle Controllers have to be added to the "B-U" and "C-U" circuits.

REPLACEMENT LAMPS

Both the green and red pilots use an 18 volt No. L1445 lamp available at your dealer. To replace lamps, unscrew the red or green lens.

LIONEL WARRANTY

All Lionel model railroad equipment is carefully made and inspected and is guaranteed against defects in materials or in our workmanship. If any such defects develop, we will repair or replace the defective part or parts, without charge, within one year of the date purchased. If in the future this equipment should ever require servicing, you may either send it to the Factory Service Department or take it to your nearest Lionel Approved Service Station.

The LIONEL CORPORATION

SERVICE DEPARTMENT: Hoffman Place, Hillside, N.J.

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