

Instructions for Operating
LIONEL TYPES "S" and "S220"
"MULTI-CONTROL" TRANSFORMERS

FOR ALTERNATING CURRENT
Type "S" - 115 Volts-60 Cycles
Type "S220" - 220 Volts-60 Cycles
80 Watts

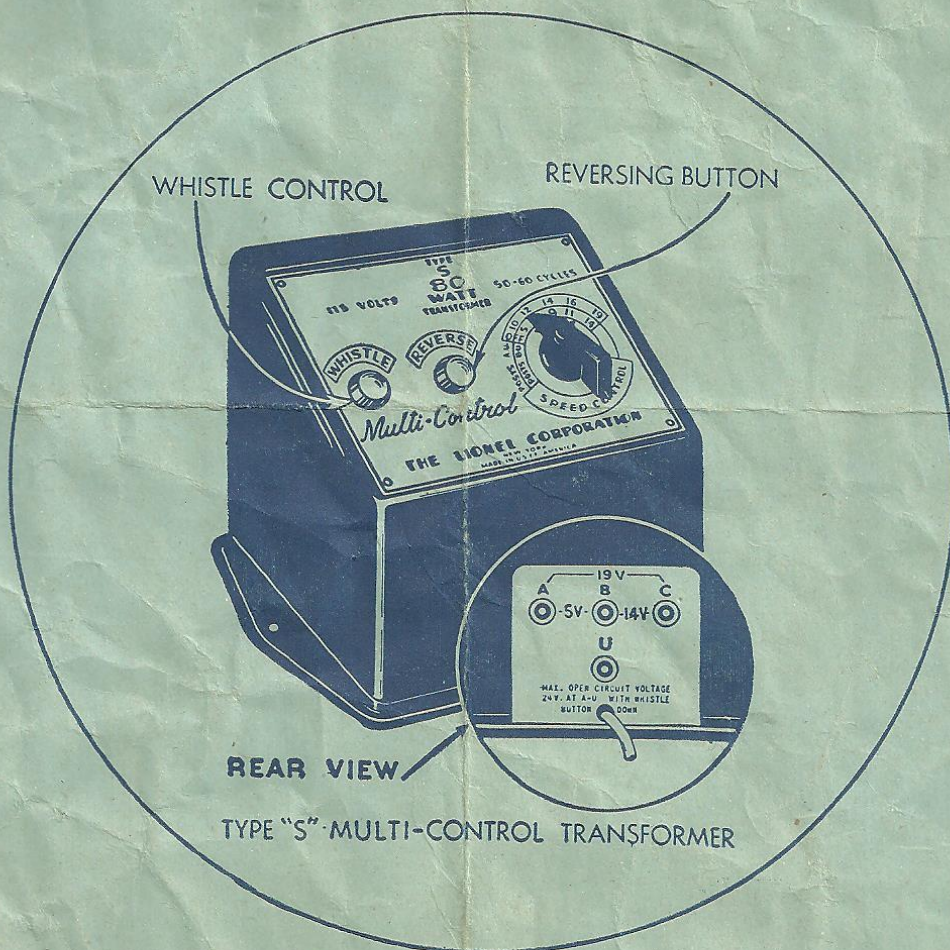


Figure 1—Front and Rear Views of "S" Transformer

Lionel Electric Trains and accessories operate on low voltage, ranging from 8 to 18 volts, depending on the size and type of the locomotive and the number of cars in the train. Lionel Transformers reduce, or *transform*, the house voltage (usually 115 volts) to the low voltage required. The plug at the end of the transformer cord is plugged into any convenient wall outlet. The low voltage is then obtained from the output terminals at the rear of the transformer. (See Figure 1)

Type "S" Multi-Control Transformer is made to operate on 115-volt, 60-cycle alternating current, which is the normal house power supply used in

the United States. Type "S220" is designed to operate from 220-volt power lines. The wattage rating of these transformers is 80 watts. The wattage of a transformer is a measure of its *capacity*, or ability to furnish power. While your house current determines the rated voltage and frequency in cycles of the transformer, the wattage of the transformer that you need for your outfit is determined by the size of the train and the number of accessories you have in your model railroad system. The larger the train and the greater the number of accessories, the higher should be the wattage of your transformer. The capacity of the "S" and the "S220" transformers is ample to run the outfit with which they are sold together with several accessories. To assist you in estimating the number of accessories you may use, read the section on Wattage Requirements in your Instruction Booklet.

Like all Lionel transformers, the Types "S" and "S220" are provided with means of controlling voltage to the track so gradually that any train speed may be obtained. By turning the voltage control knob on the transformer panel the train can be gradually accelerated and retarded in realistic fashion. Continuous voltage control is of particular advantage when operating trains with remote control electromagnetic couplers, operating cars, and similar accessories where precise train control is necessary.

HOW TO CONNECT TRANSFORMER

In order to get current from the transformer to the track two of the output terminals of the transformer must be connected to the track. This connection is generally made by means of a track Lockon, one of which is provided with each outfit. The Lockon is clipped onto a convenient section of track and is connected to a pair of transformer output binding posts which furnish variable voltage.

Types "S" and "S220" Transformers have four binding posts located on the terminal plate at the rear of the transformer. Of these, "A-U" and "B-U" combinations furnish variable voltage for the track. The control knob on the front panel of the transformer simultaneously regulates the voltage output of

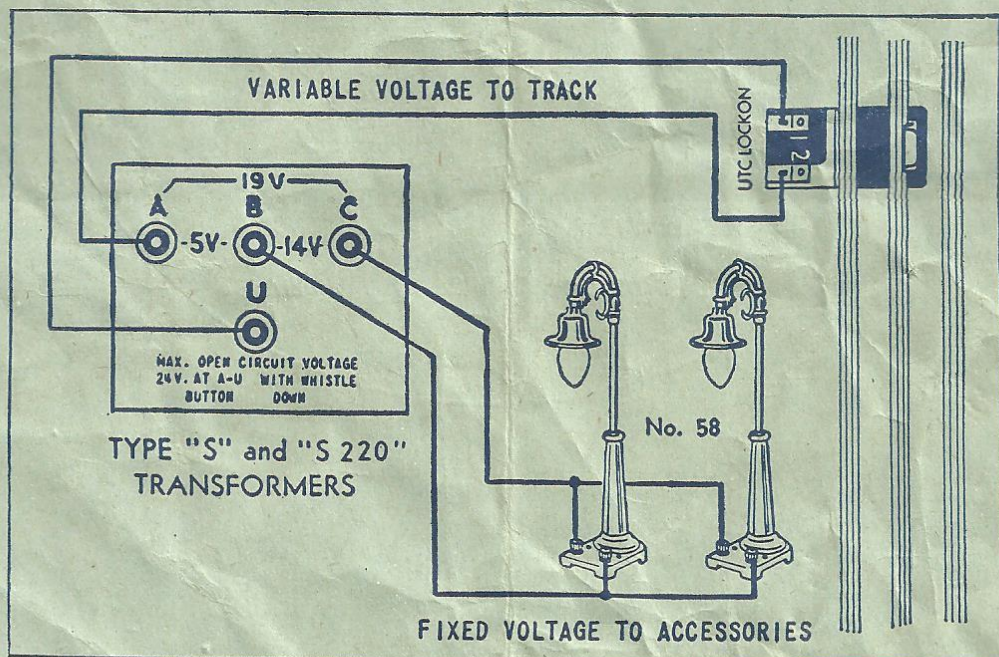


Figure 2—Track and Accessory Connections for "S" Transformer

OUTLET WHEN TRANSFORMER IS NOT IN USE

both the "A-U" and the "B-U" combinations. The transformer dial indicates the voltage ranges of these two combinations. The "A-U" combination supplies any voltage from 10 to 19 volts. The "B-U" combination has a voltage range from 5 to 14 volts. In selecting the proper range of voltage for your particular outfit, try the "B-U" combination first. If the maximum train speed obtainable is not satisfactory, then try the "A-U" posts. The voltage delivered to the rails and the consequent speed of the train increases as you turn the control knob from left to right, or clockwise.

HOW THE CIRCUIT BREAKER WORKS

To protect the transformer from overheating and damage due to "short circuits" the "S" and the "S220" transformers are equipped with built-in automatic circuit breakers. Whenever the current drawn from the transformer exceeds a certain safe limit the circuit breaker opens, cutting off the output of the transformer. The circuit breaker will reset itself in a few seconds, but, if the short circuit which caused the circuit breaker to operate still exists, the circuit breaker will keep on reopening until the cause of the trouble has been removed.

The most frequent cause of a short circuit is a derailed car or locomotive where a truck makes a direct connection between the center rail and one of the outside rails. You can usually detect a short circuit by the sudden dimming of locomotive headlight or track accessory lights.

REMOTE CONTROL REVERSING

All Lionel locomotives have a remote control reversing unit which makes it possible to start, stop and reverse by pressing the "Reverse" button on the panel of the transformer. Pressing the button for an instant stops the flow of current to the track. When the flow of current is interrupted, the reversing unit automatically changes the action of the locomotive in the following sequence: forward, stop, reverse, stop, etc. For example, if the train is moving forward, pressing the button once will cause the train to stop, pressing it again will cause the train to move in the reverse direction, and so on.

HOW TO BLOW WHISTLE

Your Lionel Train outfit is equipped with a realistic-sounding whistle which can be sounded anywhere on the track whether the train is moving or standing still. To sound the whistle press the "Whistle" button on the transformer panel. The whistle will sound as long as the button is held down. The official railroad whistle signals are given below.

OFFICIAL WHISTLE SIGNALS

. means a short blast, — a long blast

.	Apply brakes. Stop.	When train is standing, back.
— — — — —	Release brakes. Proceed.	Call for signals.
—	Flagman go back and protect rear of train.	— — . . .	Approaching highway crossing at grade.
— — — — —	Flagman return from west or south.	— — — — —	Approaching stations, junctions and railroad crossings at grade.
— — — — —	Flagman return from east or north.	— — . . .	Approaching meeting point of trains, on a single-track road.
— — — — —	Train in motion has parted.		
.	Answer to any signal not otherwise provided for.		

A succession of short blasts is an alarm for persons or live stock on the track.

HOW TO CONNECT ACCESSORIES

While variable voltage posts are connected to the track in order to control the speed of the train, accessories work best with fixed voltage. Type "S" and "S220" Transformers provide three different fixed voltage combinations which are not affected by the position of the voltage control knob. These voltages, printed on the terminal plate on the rear of the transformers, are: "A-B", 5 volts; "B-C", 14 volts; and "A-C", 19 volts.

The majority of Lionel operating and light accessories work best at approximately 12 volts and should therefore be connected to the "B-C" terminals as shown in Figure 2.

A wide variety of illuminated accessories, such as lamp posts, block and crossing signals, stations and platforms, is available for your model railroad. Any number of these accessories may be used up to the capacity of the transformer, but too heavy an accessory load will cause the train to slow down when the whistle is blown.

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 light accessories in "parallel" is shown in Figure 2. Two main "feeders" to the transformer and individual leads from the feeders to each accessory eliminate unnecessary wiring. If your railroad is being operated on a table or platform, the feeders may be concealed by attaching them underneath the platform and boring small holes for the leads to each accessory.

Remember that if two or more 12-volts accessories are wired together in "parallel", as in Figure 2, the connections are still made to transformer posts furnishing approximately 12 volts, regardless of whether two, three or more accessories are so connected.

SERVICE INFORMATION

This transformer was inspected at the Factory and is in perfect operating condition. If in the future it should ever require servicing, you may either send it to the nearest Factory Service Department, listed on the front page, or take it to your nearest Lionel Authorized Service Station. Your dealer can tell you the name and address of the Approved Service Man in your neighborhood.

If you decide to mail the transformer to us, be sure to pack it carefully to avoid damage in transit. Use the original box, if possible. A letter in a stamped envelope stating fully the service desired must be pasted to the outside wrapper, since postal regulations do not permit a letter or any written message to be placed inside the package.

THE LIONEL CORPORATION

EXECUTIVE OFFICES — 15 EAST 26th STREET, NEW YORK, 10, N. Y.

Factory and Service Department

28 Sager Place
Irvington 11, N. J.

Chicago Showrooms

Merchandise Mart
Chicago, Ill.

APPROVED SERVICE STATIONS IN THE PRINCIPAL CITIES, UNITED STATES AND CANADA