MODEL RAILROAD ELECTRICAL SUPPLIES

Catalog No. 3

January 15, 1950

MODEL RAILROAD CONTROLS CO.

5805 N. Francisco Ave. Chicago 45, Ill.

1823 FARGO AVE. DES PLAINES, ILL.

All Products Listed Are

Selected

From among the thousands of available electrical devices, as those most suitable and economical for model railroad use.

Tested

Extensively to determine quality, adaptability to model railroad needs, and operation. No items are offered which fail to satisfy high standards.

Guaranteed

Against defective material and workmanship. If any parts are found to be defective, or not as described, we will gladly replace them or refund the purchase price at your option.

Suggestions
for
Model Railroad Builders

Because we believe you will appreciate suggestions that may help you in planning, ordering parts, and constructing the electrical section of your model railroad system, we have tried not only to describe the merchandise listed, but have also noted where the various parts may be used to advantage.

We have listed below a few general comments applying to wiring in general and in addition the last pages contain an appendix covering definitions of electrical terms. Some of these are elementary and will benefit only the beginner, but a few may also be of value to the more advanced hobbyist. It is suggested that those of you to whom they are an old story make them available to some novice.

Solder all wire connections where no screw terminal is provided.

Use adequate wire size to avoid voltage loss in sections of the layout distant from the power supply, and consequent slowing of trains.

Circuit breakers should be used to provide protection for equipment. A main breaker or fuse should be used at the power supply, of a rating just over that of the pack. Another is very desirable at each rheostat, rated at just over the rating of the rheostat. All meters should be protected by fuses.

Switch machines having two solenoid coils and equipped with contacts which open the circuit to the coils when the switch has thrown, can be operated with simple SPDT switches. However, those not equipped with such contacts, must not be left energized any longer than is necessary to complete the throw, or burn-out of the coils may result. For this type of switch machine either a SPDT switch having a spring return to off position or two spring return push-buttons must be used.

For trouble shooting and circuit checking, a miniature socket and bulb with two flexible leads is one of the handiest things to have in your tool box.

When connecting meters into a circuit, remember that an ammeter is always connected so that all of the current flows thru it. A voltmeter is connected across the line or in parallel with a device in the circuit. D.C. meters always have one terminal marked for polarity. Be sure they are properly connected into the circuit to avoid damage. They should never be connected in portions of the circuit that are liable to have the polarity reversed.

Wire Labels

Label each end of all wires at your control panel and junctions where a maze of wires makes trouble-shooting and circuit-tracing a headache.

Each label is a neat little adhesive-backed fabric, numbered strip to be wound around the wire insulation at each end, where it will remain in place for permanent identification.

Easy to apply: (1) Simply peel label from card, and (2) wind around wire and press in place. See illustration.
Furnished 33 consecutive number strips to a card. Order in pairs to provide duplicate numbers for both ends of wires.

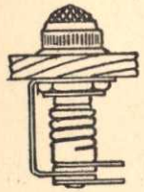
P-2001, 1 to 33 **P-2002**, 34 to 66 **P-2003**, 67 to 99

Each card **17c**

Add 2c postage for each 2 cards if not ordered with other items.

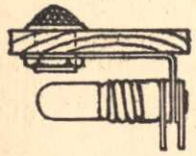
Indicator Lamps

For control panel and track diagram



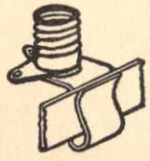
½" Faceted jewel and socket assembly. Jewel can be removed without disturbing bracket or wiring, thus providing access to bulb for replacement from front of panel. Mounts in an 11/16" hole in panels up to 1/4" thick. Bright nickel plated. Terminals insulated from bracket. Use Mazda screw base bulbs; No. 41, 2.5v; No. 40, 6-8v; or No. 1481, 14v. (*Bulb not included*).
P-1301, White; **P-1302**, Green; **P-1303**, Red; **P-1304**, Amber.
Specify panel thickness.
Each **39c**

Large 1" jewel and candelabra socket assembly. Mounts in a 1" hole in panels up to ¼" thick. Otherwise similar to the P-1301-4 series above. Use Mazda S-6, 6 watt, 110 volt bulb. (*Bulb not included*).
P-1321, Red; **P-1328**, Green; **P-1329**, Amber. Each..... **$1.00**



½" Faceted jewel and socket assembly. In using this type, panel must be constructed so as to provide for bulb replacement from the rear of panel. Mounts in a 7/16" hole in panels up to 1/4" thick. Finish and insulated terminals as above. Use same bulbs as above. (*Bulb not included*).
P-1305, White; **P-1306**, Green; **P-1307**, Red; **P-1308**, Amber.
Each **24c**


P-1309


P-1310

Miniature screw base lamp sockets. P-1309 can be fastened to rear of panel with small screw. Snap P-1310 clip over a thin metal strip installed on rear of panel. Use either type with jewels below to make your own indicator lamps. Terminals insulated from brackets.

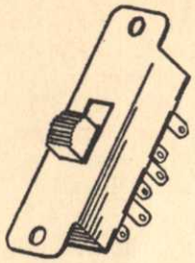
Each **8c**

½" Faceted jewel. Slotted shank 3/16" long pushes into a 3/8" hole. Is held in place by spring action of shank. Use with sockets above to make your own indicator lamps.
P-1311, White; **P-1312**, Green; **P-1313**, Red; **P-1314**, Amber.
Each **12c**

11/32" Faceted jewel. Otherwise similar to P-1311-14 series above. Slotted shank ¼" long pushes into a 9/32" hole in panel. Small size makes it especially good for track diagrams.
P-1324, White; **P-1325**, Green; **P-1326**, Red; **P-1327**, Amber.
Each **10c**

Slide Snap Switches

An economical, light-duty, general-purpose switch



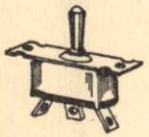
You can save real money by using these switches where they are needed only to select a circuit or are not required to make or break currents over one ampere.
Locations suggested are roundhouse tracks, siding and yard tracks, station and building lights, etc.
One contact of P-1012 is held normally closed by a spring. To close the other contact, the button must be moved against the spring pressure as with a push button. Others are snap action.

P-1011, S.P.S.T., Each **16c**
P-1012, S.P.D.T., Spring return to one side, each **20c**
P-1013, D.P.D.T., Each **25c**

Toggle Switches

STANDARD TYPE: Single ½" hole mounting. Rated 3 amps. at 125 volts. For panels up to 1/4" thick.

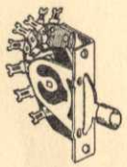
P-1001, S.P.S.T., Each..**40c** **P-1003**, D.P.S.T., Each..**63c**
P-1002., S.P.D.T., Each..**45c** **P-1004**, D.P.D.T., Each..**68c**
P-1016, D.P.D.T. with center off position, Each.....**90c**



SPECIAL SWITCH-MACHINE TYPE: S.P.D.T. Spring return to center off position. Ideal for the control of solenoid switch machines not equipped with contacts. Mounts with two 6-32 screws in panels up to ¼" thick.

P-1005, Each **50c**

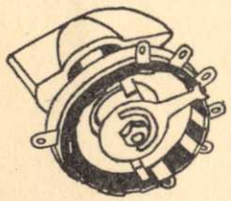
Lever Action Switches



"Centralab" lever action, wafer type switch. Ideal for block control and many other model railroad control requirements. Mounts by means of two 6-32 screws. A 1/16" x 1" slot is necessary in panel to clear the operating lever. Maximum panel thickness is 1/16" making a metal panel a "must". Can be mounted on 3/4" centers. Projects only 1-9/16" behind panel. Furnished complete with knob but without mounting panel. Standard mounting panels for from 1 to 5 switches are available on order.

P-1014, Double-pole, three position. Can be used as D.P.D.T. by leaving center position unwired and using it as off position.
Each **$1.25**

Rotary Tap Switch — Single Pole

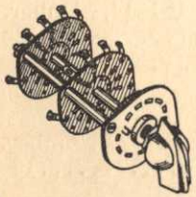


Just the thing to provide selective feed for roundhouse or yard ladder tracks or for mainline blocks.

Snap make and break action. Each contact is broken before next is made, preventing crossing of circuits. Small size, only 1-7/8" diameter over soldering lugs. Projects ½" behind panel. Furnished complete with streamlined knob and fibre bushing and washer to insulate switch when mounted on metal panels.

P-1008, 6 contact, ea. . **60c** **P-1009**, 12 contact, ea. **75c**

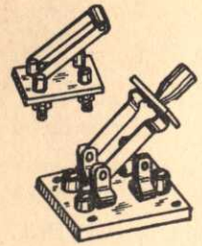
Rotary Tap Switch — Double Pole



Six position, similar to P-1008 except having two poles in each position. Suitable for use where both sides of the circuit must be broken or where two separate circuits are to be broken at the same time. Can be used for round-house, yard tracks, or for block control on small systems. Furnished complete with streamlined knob.

P-1030, Each **80c**

Knife Switches

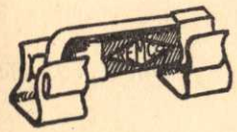


Here are two sizes of low voltage knife switches for which many uses can be found around any layout. Use in main low voltage feeds, for switching batteries to charge or to load, to cut in meters, etc. The fittings are of nickel-plated brass and are mounted on bakelite bases. Handles are insulated. Miniature type has rear terminals, standard type has front terminals.

WARNING! ! ! NOT SUITABLE FOR VOLTAGES OVER 30.

Miniature Type	*Standard Type*
P-1022, SPST, base ½x1¼, Ea..**32c**	**P-1026**, SPST, base 1¾x1, Ea. ... **84c**
P-1023, SPDT, base ½x1¼, Ea..**54c**	**P-1027**, SPDT, base 2⅞x1, Ea. ... **99c**
P-1024, DPST, base 1x1¼, Ea..**64c**	**P-1028**, DPST, base 1⅞x1⅞, Ea. **$1.14**
P-1025, DPDT, base 1x1¼, Ea..**67c**	**P-1029**, DPDT, base 2¾x1⅞, Ea. **$1.32**

Thermal Circuit Breakers



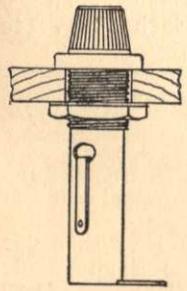
The loss of your investment in control equipment can be prevented by the use of circuit breakers, which will open the circuit in the event of dangerous overload currents.
This thermal type breaker, whose bi-metal strip opens the circuit with a snap when it is heated by short circuits, is cheap but dependable insurance. Unlike a fuse, it is not destroyed by an overload, but may be reset again and again by the pressure of a finger.
Furnished complete with mounting clips, solder terminals, screws, and nuts.

P-2812, 3 ampere **P-2814**, 7 ampere
P-2813, 5 ampere **P-2815**, 10 ampere
Each **40c**

Fuses

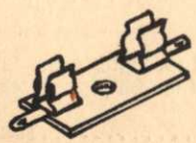
Fuses, (automotive type 3AG) ¼"x1¼". **P-2816**, 2 ampere; **P-2803**, 3 ampere; **P-2804**, 5 ampere; **P-2805**, 7½ ampere; **P-2806**, 10 ampere.
Each **6c**

Fuse Mountings



Tubular panel type mounting as illustrated. Suitable for 3AG fuses listed. Mounts in ½" hole in panels up to 1/4" thick. Fuse is entirely enclosed and can be removed from front of panel by unscrewing knurled cap. Connections are at rear of panel. Makes a very neat professional looking installation.

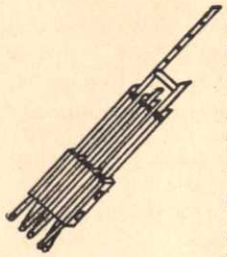
P-2807, Each **50c**



Clip type mounting for 3AG fuses. Clips fastened to bakelite base which has single hole for mounting to panel. Solder terminals.

P-2801, Each **11c**

Contact Spring Assemblies



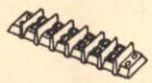
Many uses can be found for these on any layout. Mounted at track switches and operated by the switch rod, they can be wired to connect traction current to the proper rails, to control signal and panelboard indications, or to reverse traction current at loops.
Also well adapted for use in the construction of your own relays. All springs are phosphor bronze and carry silver contacts rated at 2 amperes.
The long spring has four holes for operating rod connection, providing for various lengths of throw. Mounting holes take No. 4 screws.

P-3101, six springs, D.P.D.T. Each **60c**

P-3102, 3 springs, S. P. D. T. Each **35c**

Terminal Strips

P-1601, Four circuit strip. Bakelite strip with four screw terminals, each having a solder lug through to back of strip. Each **16c**



P-1602, Four circuit strip. Moulded bakelite strip with four double screw terminals. Circuits are isolated by raised barriers. Each **25c**

P-1603, Six circuit strip. Otherwise the same as P-1602. Each **35c**

Miniature Bulbs

LENS BULB

Screw Base

P-1503, Mazda No. 222, 2.2v, .25 amp. Each **10c**

SMALL ROUND BULB, (7/16" diameter)

Screw Base

P-1502, Mazda No. 123, 1.2v, .3 amp. Each **9c**
P-1504, Mazda No. 233, 2.3v, .27 amp. Each **10c**
P-1507, Mazda No. 50, 6-8v, .25 amp Each **10c**
P-1510, Mazda No. 1446, 12v., .2 amp. Each **15c**

Bayonet Base

P-1509, Mazda No. 51, 6-8v, .25 amp. Each **9c**

TUBULAR BULB, (13/32" diameter)

Screw Base

P-1505, Mazda No. 41, 2.5v, .5 amp. Each **10c**
P-1506, Mazda No. 40, 6-8v, .15 amp. Each **10c**
P-1511, Mazda No. 1481, 14v, .15 amp. Each **14c**

Bayonet Base

P-1508, Mazda No. 47, 6-8v, .15 amp. Each **10c**
P-1512, Mazda No. 1488, 14v, .15 amp. Each **14c**

MISCELLANEOUS

Candelabra screw base.

P-1513, Mazda S-6, 110 volt Each..... **25c**

Masonite Panels

The ideal material for control panels or track diagrams. Drills and cuts as easy as wood, yet has a hard smooth surface. Can be used "as is" but will take paint if you like. Standard width is 9".

P-2013 9" x 18" x ¼" thick. (Add postage on 2 pounds) Each **65c**
P-2014 9" x 24" x ¼" thick. (Add postage on 2-½ pounds) Each .. **86c**
P-2015 9" x 36" x ¼" thick. (Add postage on 4 pounds) Each **$1.30**

Solder Paste

You don't know how easy soldering can be until you use the right flux. This paste is non-corrosive and can be used for all metals except aluminum. Insures a perfect soldered joint for a very low cost.

P-5002, Per can..... **15c**

Wire

One of the most common ailments of many systems is the loss of a locomotive's power and speed in sections of the layout at some distance from the power supply. This is largely due to the use of too small wire for the traction feeders and the resultant voltage loss in the wiring. By using an adequate size wire, this loss can be cut to a minimum.

We recommend the use of this No. 14 gage stranded wire for traction feeders. Tinned for easy soldering, it is covered with an inner insulation of rubber and a heavy outside braid. You will also find it ideal for main feed wiring at the control panel. It will safely carry 15 amperes continuously up to 20 amps for short periods.

P-1801, No. 14 gage, tinned, stranded, rubber and braid covered wire.
50 Feet..... **$1.00** 100 Feet..... **$1.75**
Add postage on 2 pounds per 100 ft.

For short traction feeders, for the more heavily loaded lamp circuits, and for switch motor feeds, wire similar to that above except No. 16 gage is suitable. This size will safely carry 6 amperes continuously or 10 amperes for short periods.

P-1803, No. 16 gage, tinned, stranded, plastic and braid covered wire.
50 Feet..... **85c** 100 Feet..... **$1.55**
Add postage on 1½ pounds per 100 ft.

At your control panel for short lightly loaded traction feeders and other circuits which will not carry more than 3 amperes continuously or 6 amperes for short periods, we suggest wire similar to that above except No. 18 gage.

P-1802, No. 18 gage, tinned stranded, rubber and braid covered wire.
50 Feet..... **75c** 100 Feet..... **$1.30**
Add postage on 1 pound per 100 ft.

For lamp leads and other lightly loaded circuits, use wire similar to that above except No. 20. It will safely carry 1½ amperes continuously or 3 amperes for short periods.

P-1804, No. 20 gage, tinned, stranded, plastic and braid covered wire.
50 Feet..... **60c** 100 Feet..... **$1.10**
Add postage on ½ pound per 100 ft.

Multi-conductor Cable

Seven conductor, color-coded cable. Each conductor is No. 14 gage, stranded, tinned, and individually insulated. Conductors are enclosed in heavy over-all braid. Ideal for neat wiring of your track feeds. Only slightly more expensive than the equivalent footage of single No. 14 wire and makes a better wiring job.

P-1805, per foot..... **18c**

Add postage to your zone on 1½ lbs. per 10 ft.

Rubber Covered Extension Wire

Moulded, rubber covered dual lead. Each wire is No. 18 stranded. Groove between conductors permits easy separation for stripping and making connections. Color, black.

P-1841, per foot (weight 6 oz. per 10 feet)..... **3½c**

Add postage to your zone if weight totals 8 oz. or more.

Magnet Wire

Fine quality, plain enameled magnet wire for making your own relay and solenoid coils. Put up on economical sized spools. Table shows footage of each size per spool.

P-1818, No. 14, 25 ft.	P-1825, No. 28, 420 ft.
P-1819, No. 16, 40 ft.	P-1826, No. 30, 590 ft.
P-1820, No. 18, 48 ft.	P-1827, No. 32, 805 ft.
P-1821, No. 20, 85 ft.	P-1828, No. 34, 1105 ft.
P-1822, No. 22, 133 ft.	P-1829, No. 36, 1560 ft.
P-1823, No. 24, 200 ft.	P-1830, No. 38, 1980 ft.
P-1824, No. 26, 292 ft.	P-1831, No. 40, 2430 ft.

Per spool 40c

Double cotton or silk covered wire is also available. Slightly less on each spool at the same price. Most sizes are also available in ¼ and ½ lb. spools on special order.

Resistance Wire

High grade, bare, alloy wire to use for making your own resistors and rheostats. Furnished in the length shown for each size.

P-1809, No. 14,	.1648 ohms per foot,	24 feet
P-1810, No. 16,	.2595 ohms per foot,	38 feet
P-1811, No. 18,	.4219 ohms per foot,	46 feet
P-1812, No. 20,	.6592 ohms per foot,	81 feet
P-1813, No. 22,	1.055 ohms per foot,	126 feet
P-1814, No. 24,	1.671 ohms per foot,	190 feet
P-1815, No. 26,	2.670 ohms per foot,	277 feet
P-1816, No. 28,	4.251 ohms per foot,	399 feet
P-1817, No. 30,	6.750 ohms per foot,	560 feet

Per spool 70c

Rheostats

Highest quality rheostats, designed and manufactured especially to provide smooth perfect control of scale models. They are of heavy duty construction throughout and have so called tapered windings. This means they use a heavy wire at the end of the winding where heavier currents must be carried, lighter wire being used in the higher resistance portions of the winding where currents are lower.

This feature, seldom found on surplus and other cheaper rheostats offered for model use, pays dividends in longer life and fewer burnt out rheostats.

P-2301 Ohmite MT-40 Rheostat. Maximum current, 1.5 amperes. Suitable for the following "Permag" motors; Pittman DC-60, and DC-71, Varney V-2 and V-3, and Mantua PM-1. Each $4.70

P-2302 Ohmite MT-20 Rheostat. Maximum current, 3.0 amperes. Suitable for the following "Permag" motors; Pittman DC-91, 92, and 93, Nord M-1. Also for Scale-Craft OOX-639 wound field motor. Each $5.00

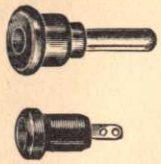
P-2303 Ohmite MT-14 Rheostat. Maximum current, 3.3 amperes. Suitable for the following motors; K&D No. 1 and 2, and Lobaugh 6100 and 6200. Each $5.00

Rheostat Dial

Dress up your panel and be able to re-set your rheostat to any point quickly and easily. Made of aluminum, 2-3/16" in diameter. Background is etched black, leaving markings in aluminum. Calibrated from 0 to 100 in 270 degrees.

P-2026, Each 25c

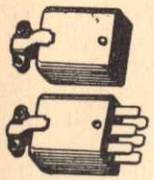
Single Contact Plug and Socket



Wire disconnect devices for use where wire connections must be broken frequently as on portable systems. Also have many uses on permanent systems. Terminal strips can be made by mounting sockets on a bakelite strip with clamp ring furnished, and attaching plugs to the wires. Wire is soldered to plug or socket and tape wrapped over the connection. Will carry up to 5 amperes in low voltage circuits.

P-2412, Plug, Each 8c
P-2413, Socket, Each 10c

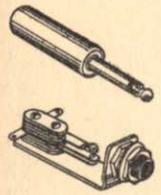
Multiple Contact Plugs and Sockets



Just the thing for portable systems where many wires must be disconnected each time the system is disassembled. Also ideal for making connections at the control panel and permit it to be made semi-portable if desired. Plugs and sockets keyed to prevent incorrect assembly. Each is equipped with a cable clamp and is finished in black crackle enamel. Wires are soldered to lugs inside the protective cover which is removable by withdrawing a small pin. Small and compact, the cases are less than 1¼" long. Contacts will safely carry five amperes in low voltage circuits. Wires up to No. 14 may be used.

P-2416, Socket, 6 contact; Each 76c
P-2417, Socket, 12 contact; Each $1.05
P-2414, Plug, 6 contact; Each 67c
P-2415, Plug, 12 contact; Each 90c

Plug and Jack



When plug is inserted into jack, one of the two insulated sections contacts the jack frame, the other makes connection with one of the jack springs. By wiring the plug to a voltmeter, a single meter can quickly be connected to any of several different circuits. Track circuits can also be easily connected and disconnected on portable layouts or removable sections of permanent layouts.

The jack also has an independent pair of contacts which are closed when plug is inserted and may be wired so as to light signals, warning lights, etc.

Also suitable for use in building an Engineer Control Panel as described in Frank Ellison's article in the March and April, 1947, issues of *Model Railroader*.

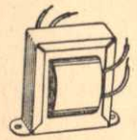
P-2408, Plug, Each 40c
P-2409, Jack, Each 50c

Indicator Bulb Coloring Kit

Long lasting, bright colors for coloring your indicator and signal bulbs. Bulbs are simply dipped in color while lighted and allowed to dry. Full directions are on the carton of five bottles. Colors furnished are: Red, Green, Blue, and Amber. A bottle of solvent is also supplied for removal of color if desired.

P-5001, Each 70c

Low-voltage Transformer



Take the lamp load from your power pack and use the full pack capacity for the trains. Why pay for a D.C. power source and steal part of its capacity to light bulbs which will work just as well on A.C.? This transformer furnishes 6.3 volts and can be loaded up to 6 amperes continuously. This means it will handle up to 40 6 to 8 volt bulbs such as Mazda 40 or 47, or up to 24 Mazda 50 or 51 bulbs.

P-3301, Each $3.50

Add postage on 2 lbs. to your zone.

Plastic Cable Clamps

Eliminate the maze of wires under your layout. Bunch all wires together, place them in the proper size clamp, and mount clamp to benchwork with a nail or screw. Rolled edges eliminate any possibility of cutting or wearing wire insulation, and consequent short circuits. Very reasonably priced, so that you can equip your layout throughout.

P-2027, ¼", Each 4c
P-2028, ½", Each 5c
P-2029, ¾", Each 6c
P-2030, 1", Each 7c

Appendix

VOLT—A unit of electrical pressure. Electrical pressure is similar to the pressure in water pipes. The letter E is used as a symbol for volts.

AMPERES—A unit of rate flow of electricity. It is similar to the rate of water flow in pipes. The letter I is used as a symbol for amperes.

OHM—A unit of electrical resistance. Resistance is similar to the friction that may exist in a water pipe and which would retard the flow of the water. The letter R is used as a symbol for ohms.

OHM'S LAW—A statement of the relation between volts, amperes, and ohms in a circuit. It says for direct current circuits that:

(1) The amperes that will flow is equal to the voltage (E) applied, divided by the resistance (R) in ohms, in the circuit. Thus the higher the voltage applied, or the lower the resistance in the circuit, the higher will be the amperes.

(2) The voltage (E) required to cause a certain current to flow is equal to the current (I) multiplied by the resistance (R) in ohms, of the circuit. Thus the increase of either the amperes or the resistance will increase the voltage.

(3) The resistance (R) in ohms is equal to the voltage (E) applied, divided by the current (I) flowing in the circuit. Thus the higher the voltage or the lower the amperage, the higher will be the resistance of the circuit.

WATT—A unit of electrical power or heat. In a direct current circuit it is the product of volts and amperes, or of the resistance and the square of the current in amperes. The watt rating of most electrical devices is based on the amount of heat they can safely stand in terms of resistance and the current flowing.

D.C.—An abbreviation for direct current. Direct current is a continuous current such that one side of the power supply is always positive, and the other side is always negative. Batteries and certain types of generators as well as power packs furnish direct current. The lighting systems of most city communities furnish A.C. rather than D.C.

A.C.—An abbreviation for alternating current. Alternating current is the type usually found in your home. It is a pulsating current and each side of the supply changes from positive to negative and back to positive a great number of times a second. A.C. is the only common type with which transformers or power packs may be used.

POWER PACK—A combination of transformer and rectifier used to change high voltage A.C. current to D.C. of the proper value to to run your train.

RECTIFIER—An electrical device which has the faculty of converting A.C. to interrupted D.C. The more common type in use for model railroad power supplies consists of four or more metal plates coated with certain materials which cause each to function as a sort of one way valve. By their action all the negative pulses of the A.C. supply are led to one terminal of the rectifier output and all the positive pulses are led to the other terminal. The result is a pulsating D.C. at the rectifier output terminals.

TRANSFORMER—A device to alter or transform an A.C. voltage of one value to that of another. It usually consists of two separate windings, frequently wound one over the other on an iron core. One coil is called the primary, and is connected to the available A.C. source. The other coil, called the secondary, furnishes A.C. current of a different voltage. In model work the transformers are of the step-down variety, that is they reduce the supply voltage to a lower voltage suitable to operate the locomotives.

CIRCUIT—In order for direct current to flow, a complete circuit or path must be provided which is continuous from the source of power thru one or more devices and returning to the source of power. It is best not to lose sight of the fact that the power source itself is a part of this circuit.

SHORT CIRCUIT—An accidental path from one side of the power source thru only a part of the circuit and back to the power source. The "short" refers not to the distance but to the lower resistance of the new path, so that it could be called a low resistance circuit. In any circuit there must be enough resistance, usually called the load, to limit the current to a safe value. Excess current flowing in a circuit creates heat which can damage the wire insulation and cause it to burn or can even melt the wire.

POLARITY—The positive and negative designations used in a D.C. circuit.

SERIES CONNECTION—When electrical devices are connected so that all the current flows thru one after another, they are said to be connected in series. The total resistance is equal to the sum of all their individual resistances.

PARALLEL CONNECTION—When electrical devices are connected so that the current can divide, with part flowing thru each, they are said to be connected in parallel or shunt. The total resistance is always less than that of any one of them.

SPST, SPDT, DPST, and DPDT—Abbreviated designations for types of switches. S stands for single, D for double, P for pole, and T for throw. Pole really could be called circuit or path and throw could be called contact or connection. Thus SPST means single circuit or path with one connection. SPDT means single circuit with two alternate connections. A DPST switch is one having two paths independent of each other, with only one connection for each.

REVERSING SWITCH—As the name implies, this is a switch for reversing the polarity of the current in a direct current circuit. Any DPDT switch can be used as a reversing switch.

VOLTAGE DROP—The loss in voltage due to a current flow thru a resistance or conductor. This loss occurs in conductors as well as in resistances because even conductors have some resistance. It is impossible to have a voltage loss if no current is flowing. This drop in voltage, frequently called the IR drop, will increase as the flow of current is increased. It is because of this drop that, when using too small wire, a train will often run slower or seem to lose power on far sections of the layout. It also explains why one train will sometimes slow down when another is started, as starting the second train increases the current flowing and hence the voltage drop in the track feeders. Voltage drop can only be reduced by using larger wire, thus reducing the resistance. The effects of IR drop can be overcome by increasing the voltage to the rails, but this will result in excess voltage at points near the power supply. Below is found a table for finding the IR drop in any length of wire of from No. 10 to No. 40 gage. To use this table, take the figure opposite the wire size and multiply it by the number of hundred feet involved, expressed as decimals of hundreds. (150 feet would thus be 1.5 and 76 feet would be .76 etc.) In determining the wire length of a complete circuit, the total length from the power source out to the load and back to the power source is used. The table is for one ampere current flow and, if another current value is involved, the product above is again multiplied by this current in amperes.

No. 10..	.09989	No. 18..	.6385	No. 26..	4.081	No. 34..	26.09
No. 12..	.1588	No. 20..	1.015	No. 28..	6.490	No. 36..	41.48
No. 14..	.2525	No. 22..	1.614	No. 30..	10.32	No. 38..	65.96
No. 16..	.4016	No. 24..	2.567	No. 32..	16.41	No. 40..	104.9

Example: What is the IR drop for 93 feet of No. 20 wire with 1.3 amperes flowing. First find the figure in the table for No. 20 wire. The figure to use for 93 feet is .93, so 1.015 is multiplied by .93. This gives .9439. Then, as the current involved is other than one, the answer is again multiplied by 1.3, giving a final answer of 1.227. This is is the voltage lost in overcoming the resistance of the wire.

SINGLE POWER SUPPLY—this usually refers to D.C. power supplies. Such a supply requires that both wires from the power supply be run to the reversing switch for each block and thence to each block, with both rails of each block being insulated from the adjacent blocks. Reversing switches must be of the DPDT type.

DOUBLE POWER SUPPLY—This refers only to D.C. power supplies which can be either two storage batteries or two power packs. They are connected to each other by a lead running from positive on one to negative on the other. A connection from this lead is run to one rail of the layout, which is continuous thru all blocks and is called the common rail since it is common to all blocks. The leads from the other sides of the power supplies (there will be one negative and one positive) are run to the control panel, where only a SPDT switch is needed for reversing. From the panel is run only a single lead to each block. This system, while it requires two power supplies, means that only one rail need be cut and insulated at block terminations. It provides a saving of wiring and requires only SPDT switches for reversing.

How to order by mail

WEIGHT IN POUNDS	ZONES							
	First, Up to 50 MILES	Second, 50 to 150 MILES	Third, 150 to 300 MILES	Fourth, 300 to 600 MILES	Fifth, 600 to 1000 MILES	Sixth, 1000 to 1400 MILES	Seventh, 1400 to 1800 MILES	Eighth, Over 1800 MILES
1	8c	8c	9c	10c	11c	12c	14c	15c
2	10c	10c	11c	14c	17c	19c	23c	26c
3	11c	11c	13c	17c	22c	26c	32c	37c
4	12c	12c	15c	21c	27c	33c	41c	48c
5	13c	13c	17c	24c	33c	40c	50c	59c
6	14c	14c	19c	28c	38c	47c	59c	70c
7	15c	15c	21c	31c	43c	54c	68c	81c
8	16c	16c	23c	35c	49c	61c	77c	92c
9	17c	17c	25c	38c	54c	68c	86c	$1.03
10	18c	18c	27c	42c	59c	75c	95c	1.14
11	19c	19c	29c	45c	64c	82c	$1.04	1.25
12	21c	21c	31c	49c	70c	89c	1.13	1.36
13	22c	22c	33c	52c	75c	96c	1.22	1.47
14	23c	23c	35c	56c	80c	$1.03	1.31	1.58
15	24c	24c	37c	59c	86c	1.10	1.40	1.69
16	25c	25c	39c	63c	91c	1.17	1.49	1.80
17	26c	26c	41c	66c	96c	1.24	1.58	1.91
18	27c	27c	43c	70c	$1.02	1.31	1.67	2.02
19	28c	28c	45c	73c	1.07	1.38	1.76	2.13
20	29c	29c	47c	77c	1.12	1.45	1.85	2.24
For Each Additional Pound Add	1c	1c	2c	3½c	5c	7c	9c	11c

To determine the amount of postage to send when ordering items on which postage is not prepaid, use the table. (Applies to U. S. only.) Total up the weights of such items ordered. Opposite this weight in the column corresponding to your postal zone, you will find the amount of postage. If in doubt ask your postmaster.

All prices are subject to change without notice due to the unstable price situation at present existing.

If remittance does not accompany order, it will be shipped C.O.D.
C.O.D. orders will be accepted, but the extra postage charges will be added to the amount due.

Illinois purchasers please add 2% to cover sales tax expense.

Shipments are made via parcel post except when requested otherwise.

Postage is prepaid within the U.S. on all orders of $1.00 or more, (except on items where noted otherwise). Please add 10c extra on orders for less than that amount.

MODEL RAILROAD CONTROLS CO.

1823 FARGO AVE. DES PLAINES, ILL.

DATE SOLD

TERMS

RATING

No. _____ Salesman _____

Sold to _____

Town and State _____

Ship by _____

FOLIO

DATE BILLED

LEDGER

	SHIPPER'S CHECK	QUANTITY	X10	WEIGHT	PRICE	SALESMEN MUST NOT USE THESE COLUMNS			

PLEASE NOTE

During the past two years we have been able to absorb several rounds of price increases by purchasing in larger quantities and by means of other economics. Recent sharp price increases can no longer be absorbed. We therefore find it necessary to either increase our prices correspondingly or go broke.

Inasmuch as we cannot print new catalogs as fast as prices have gone up, we have determined an overall percentage which will cover our increased costs up to the present time.

We therefore ask that after you have determined the total from the catalog prices you add a flat 10% to the total to arrive at the correct remittance.

EXCEPTION: Since Ohmite has raised the prices of their rheostats and the prices must be adhered to by dealers, the new prices shown below should not be included until after you have added the above 10%.

New prices: P-2301, MT-40, $5.64, P-2302, MT-20, $6.00, and P-2303, MT-14, $6.00.

Effective November 15, 1950.