

## Circuits with Common Ground

In model railroading there are numerous occasions when it is desirable to apply different voltages to accessories or track components which have a common "ground" with the rails of the track system. Examples of this usage are fixed voltage plugs of No. 022 switches, No. 112 switches, remote control track sections operating on fixed voltage, insulated track blocks used in multiple train operation, upgrade or downgrade portions of track requiring higher or lower voltage than level track.

To prevent short circuit condition in all such cases it is important to select transformer circuits which also have a common ground. The chart below lists various circuit combinations which are available in modern Lionel transformers. The voltages specified are the nominal or "no load" voltages and drop somewhat under operating conditions.

| Transformer                          | With this as Common or Ground Post | These are the Fixed Voltage Posts | And these are the Variable Voltage Posts           |
|--------------------------------------|------------------------------------|-----------------------------------|--|
| 1032, 1033,<br>1044<br>Multi-Control | A                                  | C 16 V.<br>B 5 V.                 | U 5-16 V.  |
|                                      | B                                  | C 11 V.                           | U 0-11 V.  |
|                                      | C                                  | A 16 V.<br>B 11 V.                | None   |
|                                      | U                                  | None                              | A 5-16 V.<br>B 0-11 V.                             |
| 'KW'<br>Multi-Control                | U                                  | D 20 V.<br>C 6 V.                 | A 6-20 V.<br>B 6-20 V.                             |
|                                      | C                                  | D 14 V.<br>U 6 V.                 | A 0-14 V.<br>B 0-14 V.                             |
| 'LW'<br>Multi-Control                | A                                  | B 18 V.<br>C 14 V.                | U 6-20 V.  |
| 'VW' 'ZW'<br>Multi-Control           | U                                  | None                              | A* 6-20 V.<br>B 6-20 V.<br>C 6-20 V.<br>D* 6-20 V. |
|                                      |                                    | *With Internal Whistle Control    |  |

|  |   |                              |        |
|--|---|------------------------------|--------|
| 'TW'<br>Multi-Control  | A | C 18 V.<br>D 14 V.<br>B 7 V. | U 7-18 |
|  | B | A 7 V.                       | U 0-11 |
| In addition this transformer has 2 posts marked E and F which furnish an independent 14 V source to supply lights, accessories, etc. |   |                              |        |

The following table lists the fixed voltage circuits which can be obtained from some of the most popular Lionel transformers made in recent years.

|                       |   |                               |  |
|-----------------------|---|-------------------------------|--|
| 'A', 'Q'              | A | C 14 V.<br>B 8 V.             | U 14-24 V.                                       |
|                       | B | A 8 V.<br>C 6 V.              | U 6-16 V.  |
|                       | U | None                          | A 14-24 V.<br>B 6-16 V.                          |
| 'R'                   | A | D 14 V.<br>B 8 V.             | C 14-24 V.<br>F 14-24 V.                         |
|                       | B | E 16 V.<br>A 8 V.             | C 6-16 V.<br>F 6-16 V.                           |
|                       | D | A 14 V.<br>E 10 V.            | None   |
| 'RW'<br>Multi-Control | A | D 19 V.<br>C 9 V.             | U 9-19 V.  |
|                       | B | D 16 V.<br>C 6 V.             | U 6-16 V.  |
|                       | D | A 19 V.<br>B 16 V.<br>C 10 V. | None   |
|                       | U | None                          | A 9-19 V.<br>B 6-16 V.                           |
| 'V' 'Z'               | U | None                          | A 6-25 V.<br>B 6-25 V.<br>C 6-25 V.<br>D 6-25 V. |