

Universal E-UNIT

for AC - SERIES and DC "CAN" MOTORS.
Handles up to 4 amperes of total motor load.

ITEM #400
\$44.95

OVERVIEW: "E" units provide sequential direction control of model locomotives that are designed to operate with AC track power. Some "E" units had only forward and reverse positions, however the vast majority function with a FORWARD - NEUTRAL - REVERSE - NEUTRAL - FORWARD sequence as track power is interrupted. Unintentional power interruptions caused by track dirt or gaps in the rails such as at switch turnouts tend to be ignored by this ELECTRONIC "E" UNIT so the possibility of accidental sequencing is minimized. Unlike mechanical "E" units which retain their last position, this ELECTRONIC "E" UNIT will revert to an initial "power on" state after power has been interrupted for an extended period of time. This initial state can be either FORWARD or NEUTRAL.

This ELECTRONIC "E" UNIT (0.9" by 1.95" by approx. 1" max. height) is designed for universal use. It will provide sequential direction control for wound field series type motors and for the later locomotives with permanent magnet DC motors. It has a capacity of four (4) amperes of current flow, sufficient for some two motored locomotives. While most operators will use AC track power, this "E" unit will also sequence with DC track power. The initial "power on" state is user selectable so you can decide if you want the locomotive to start in either FORWARD or NEUTRAL. Provision is made so that a switch (not supplied) can be installed to lock the "E" unit in its initial state. Lock in FORWARD for automation applications or lock in NEUTRAL to allow sound systems to function with a static locomotive. If power is off for approximately 6 seconds, the "E" unit will reset to its initial "power on" position. The "E" unit was also designed for easy installation of accessory items such as lighting.

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DISCONNECT it from ground and connect it to either the yellow or the orange wire. This will isolate the field winding from track power and connect it only through the yellow and orange wires to the "E" unit. Once you have disconnected the field from ground you can use this ground location to connect the black input power wire.

If your locomotive has a permanent magnet DC motor and you want to slow it down, connect a series of diodes between the yellow wire and the orange wire as shown in drawing #5. High current diodes (DALLEE Item 375) should be used as they must be able to carry the full motor current. Voltage to the motor will be reduced by .5 to .7 volts for each diode in the string resulting in less overall locomotive speed.

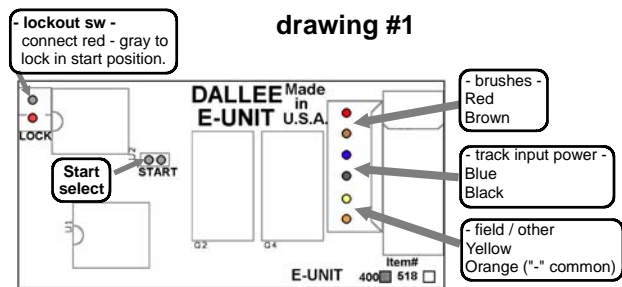
Double motored units: for series motors connect the fields and brushes in parallel to the e-unit. Make sure the rotational direction of the motors is correct. If one is not correct reverse the brush wires to only one motor. For DC permag motors, either connect the motors in parallel or try a series connection. This will slow the locomotive down but may yield more realistic speeds. It will also reduce the current required by half!

Connection 4 is a 2 pin header located at a corner of the circuit board, labeled "LOCK", which permits a switch (see Item 524) to be connected to lock the "E" unit so it does not sequence. To include a lockout switch use the 2 place connector with the red and gray wires. The "E" unit can be locked in either the FORWARD or NEUTRAL positions depending on the status of the lockout switch (open = sequence).

Connection 5 is a 2 pin header with a shorting connector installed. With the connector installed the "E" unit will initially "power on" in the FORWARD position. If the connector is removed, the "E" unit will initialize in the NEUTRAL position.

Smoke units SHOULD NOT BE CONNECTED to the motor brush or field wires. Connect these units directly to track power using the blue and black wires. If you are using this in conjunction with a LocoMatic™ sound & control system, don't forget to add a choke in series with one of the power pickup leads. Various connectors and pin arrangements are available, see the DALLEE catalog or web site.

LIGHTING AND OTHER INSTALLATIONS: Many lighting variations are possible and easy to incorporate because of the design of this "E"



INSTALLATION INSTRUCTIONS: Install the "E" unit where space permits, using the attached mounting tape, being careful that no bare wires or other metallic objects come in contact with the components or the circuit board. Ideally, to improve heat dissipation, the "E" unit should be mounted with as much free air space as possible.

Refer to drawing #1 for the location of the connections that must be made to complete the installation. Adjacent to the bridge rectifier is a six (6) pin header which encompasses connections 1, 2, and 3. These connections are made with a 6 place connector with wires attached.

Connection 1 is the blue and black wires which are the input power coming from the track. The blue wire is to be connected to the center rail pick up rollers, right hand rail on two rail installations. The black wire is to be connected to the locomotive frame ground and thus to the outside rails, left hand rail for two rail installations.

Connection 2 is the red and brown wires which are to be connected to the motor brushes. These wires should be connected so that when the "E" unit initially "powers on" in FORWARD the locomotive actually starts in FORWARD.

Connection 3 is the yellow and orange wires which are to be connected to the wound field of a series motor. If your locomotive has a permanent magnet DC motor simply connect the yellow wire to the orange wire. Use a wire nut, heat shrink tubing or tape to insulate this connection. Skip to the next paragraph. NOTE: LIONEL generally grounds one side of the field winding either to the locomotive frame or to a solder lug on the motor. You must locate this connection and

unit. If you are using 14 or 18 volt bulbs and want them on whenever there is track power wire the lights to the same connections as the blue and black wires of the "E" unit. LED marker lamps can also be wired across the track pickup (blue & black wires) as shown in drawing #2. To make LED marker lamps directional refer to drawing #3. These drawings assume proper motor and track input connections exist.

Directional lighting is a simple matter. The bulbs must be insulated from the frame ground. Connect a light bulb between the brown wire and the orange wire and it will be illuminated only in the FORWARD direction. A bulb connected between the red wire and the orange wire will illuminate only in REVERSE. Refer to drawing #4.

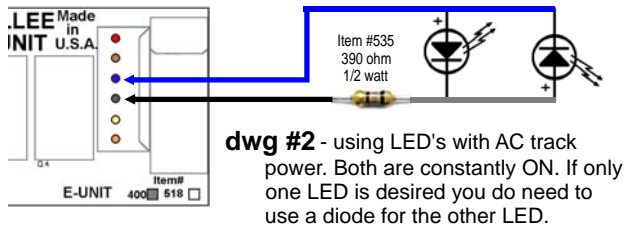
If you would like to include 1.5 volt bulbs (DALLEE Item# 382) for constant intensity lighting simply wire the bulb across any 2 or 3 diodes depending on the brightness level you desire. See drawing #5 options.

You can combine directional lighting (drawing #4) and motor speed reduction (drawing #5) on the same locomotive. This combination is shown in drawing #6.

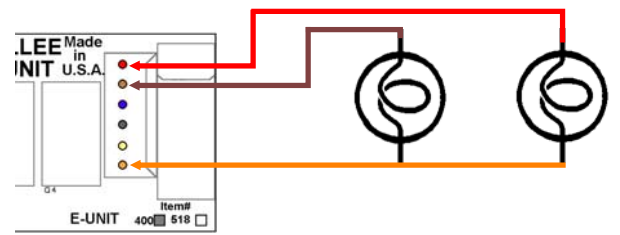
If you wish to use 1.5 volt bulbs (DALLEE Item# 382) for constant intensity directional headlights this can be accomplished by installing a string of diodes in series with the motor brush connections. Make these connections through the red wire as shown in drawing #7 and that high current diodes (DALLEE Item 375) be used as they must be able to carry the full motor current. Voltage to the motor will be reduced by .5 to .7 volts for each diode in the string resulting in less overall locomotive speed. Drawing #8 includes an additional 1.5 volt bulb (DALLEE Item# 382) that is non-directional for interior lighting.

DALLEE also make a complete line of ready to install lighting boards encompassing small 1.5 and 5 volt lamps to white LED's for the brightest of all headlight installations. The RL-1 series can be placed directly across the motor brush wires to obtain directional lighting. Use the RL-1-B series for lighting that is always on regardless of motor sequence operation.

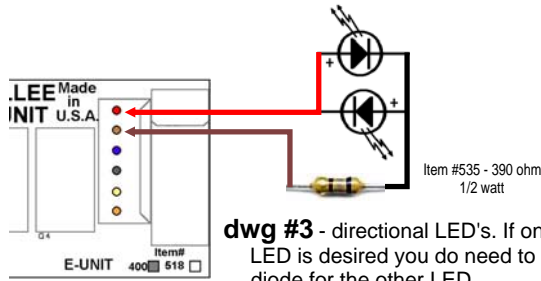
If you would like an e-unit with sound see the DALLEE LocoMatic™ sound and control systems.



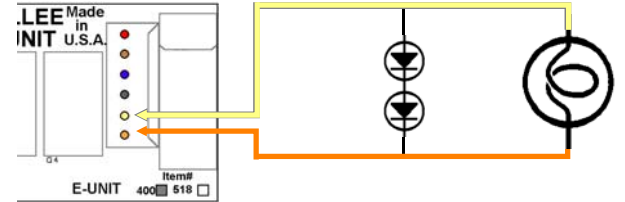
dwg #2 - using LED's with AC track power. Both are constantly ON. If only one LED is desired you do need to use a diode for the other LED.



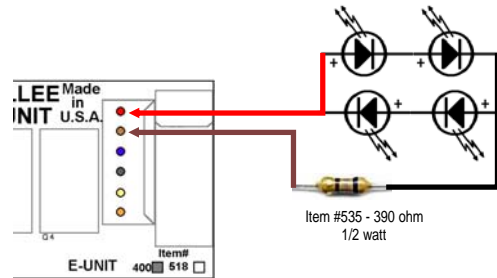
dwg #4 - standard lamps for directional lighting without series diodes. The lamps MUST be insulated from the chassis.



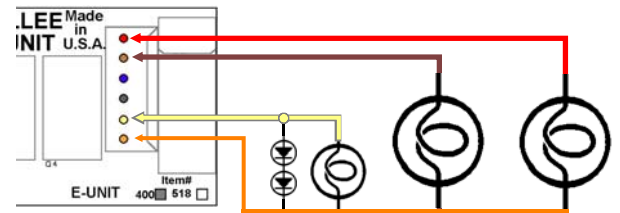
dwg #3 - directional LED's. If only one LED is desired you do need to use a diode for the other LED.



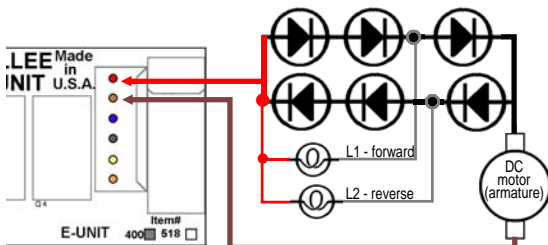
dwg #5 - 1.5 volt lamps for constant lighting. The lamps MUST be insulated from the chassis.



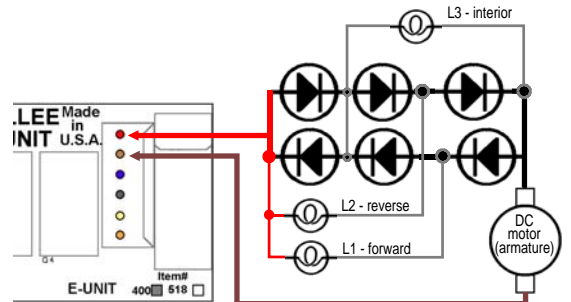
dwg #3A - two directional LED's. If only one direction pair of LED's is desired you do need to use a diode for the other LED's.



dwg #6 - 1.5 volt lamp for constant lighting with standard voltage lamps for headlights. The lamps MUST be insulated from the chassis.

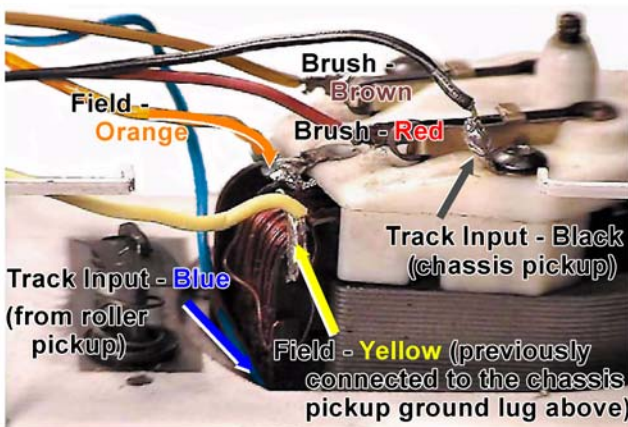


dwg #7 - 1.5 volt lamp directional headlights. The lamps MUST be insulated from the chassis. This configuration reduces the operating voltage to the motor.



dwg #8 - 1.5 volt lamp directional headlights plus 1.5 volt constant lighting. The lamps MUST be insulated from the chassis. This configuration reduces the operating voltage to the motor.

help for Lionel series motors. This picture shows where the grounded field wire needs to be separated from the chassis for the e-unit's proper connection.



Help for Am Flyer series motors. This picture shows where the wires are normally terminated. Colors indicated are those that match the eunit's board connector and not the locomotives existing wires.

