MERG Model Electronic Railway Group
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DPR Double Pole Relay — February, 1997

Introduction.

In spite of all the advances in electronic components over the past few years, there is still no realistic alternative to the electro-mechanical relay. This is especially the case when the voltages or currents to be switched bear no relation to the circuitry switching them. Similarly, the 'Changeover Switch' arrangement is not easy (or economical) to implement in solid state form. Analogue Switches are available, but are generally only suitable for 'small signal' circuitry such as Audio/Video equipment.

The module shown here provides eight independent double pole changeover relays, mainly intended for track section switching, frog polarity switching etc, although they can be used for any desired function within the specification of the relays. The module is designed to be Control Panel mounted, as part of an RPC system.

Interface Specifications.

- **Power Requirements** +5V to +24V DC Regulated Supply (See Circuit Description).
- **Control Input** RPC Shift Register Compatible.
- **Power Switching** Dependent on specification of relays used (See Circuit Description).
- **Connectors** RPC Stacking plus 'Veropin' Terminals for layout wiring.
- **Logic Polarity** 1 = Relay Energised (Toggle-NO), 0 = Relay De-energised (Toggle-NC)

Circuit Description.

The 8 bit control signals are produced by IC1 using the standard RPC shift register stacking method. The logic level signals are buffered by IC2, an Octal Darlington Driver with built-in back-emf protection diodes. This provides eight open-collector outputs, capable of sinking up to 500ma each. These outputs are used to switch the coils of RL1-8. The outputs are also made available at connector PL2 so that the same control line can be connected to switch external circuits such as the PMD range of point motor drivers (see Tech Bulls G16-13 to G16-15 inclusive). This does mean however, that any external circuitry must use the same supply voltage as the relay unless additional diodes are used.

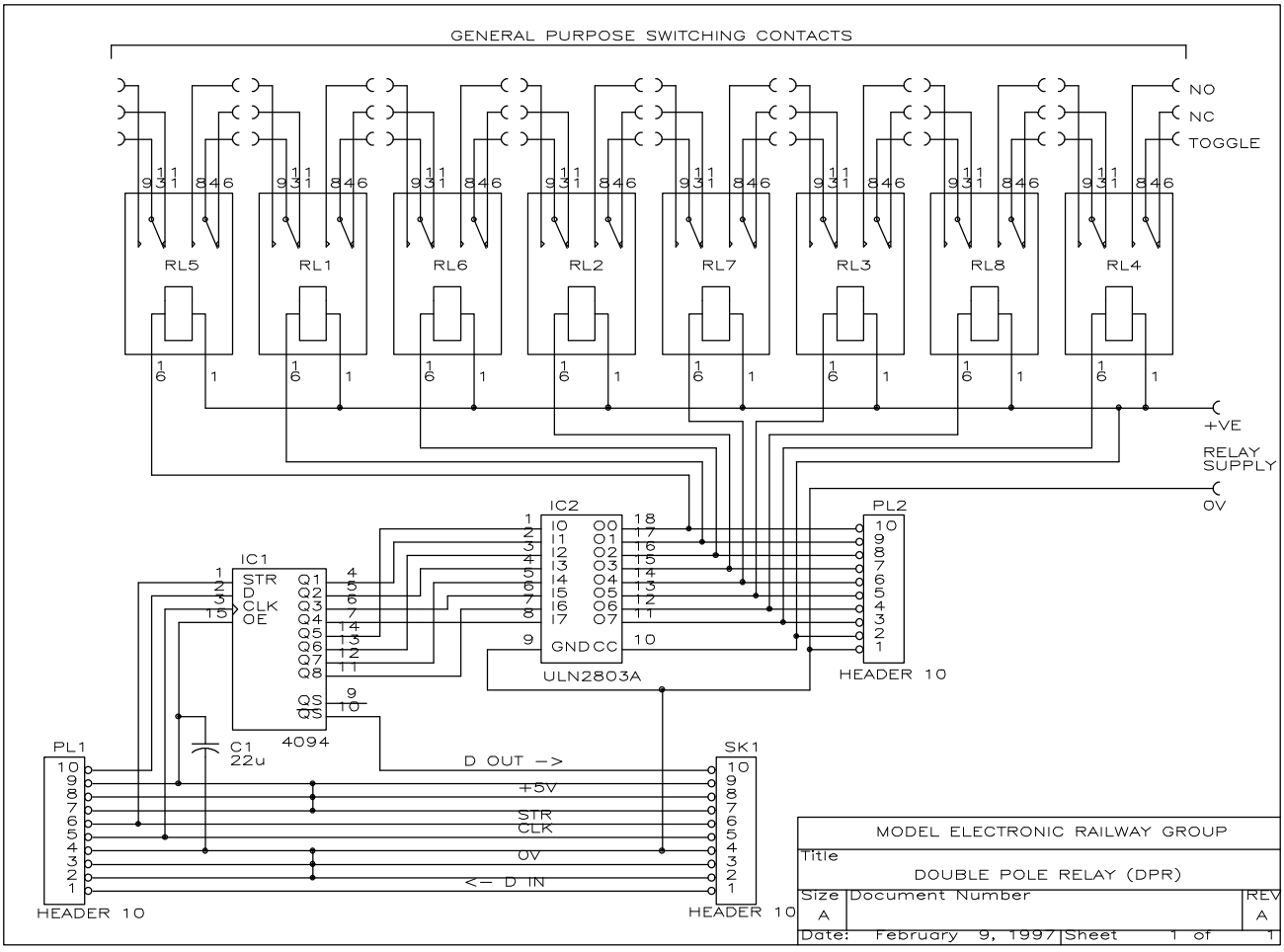
The relays can come from any manufacturer, so long as they conform to the 'BT47' style pinout. Several coil voltages are available for this type of relay. 5V, 12V, and 24V are the most common. It is generally more convenient to use the higher voltage coils, as they require considerably less current to operate than say, 5V coils which take around 140ma each. By comparison, a 24V version will take only 23ma, and a 12V version 43mA. This is a factor which must be borne in mind when specifying power supplies, especially for larger layouts. If it is intended to switch point motors and relays together as mentioned above, then higher voltage coils are a must, as the external circuits need these to operate correctly. Relay contact ratings for this type of relay do vary between manufacturers and model numbers, but generally lie in the range 1 to 2 amps. This should be adequate for almost all track switching applications.

The relay numbering on the Printed Circuit Board layout appears rather confused. This is caused by the unfortunate pinout of the 4094 shift register, which splits the eight bits into two lots of four, one on each side of the device. As a result, the relay numbers are interlaced giving the layout shown. The first data bit sent through the shift register controls RL8 and the last bit sent controls RL1.

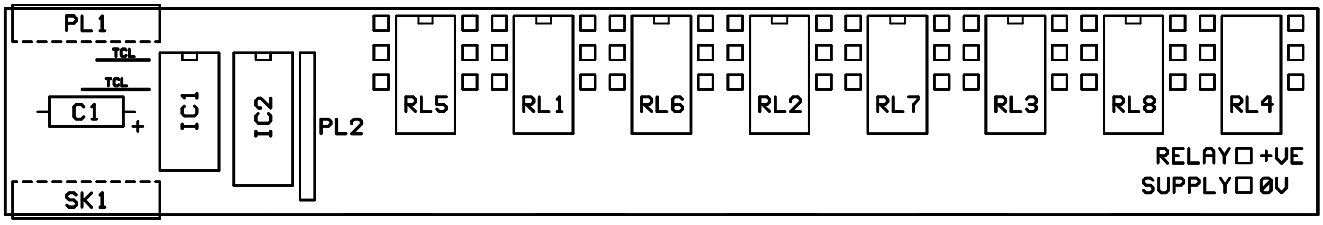
Parts List

Capacitor	22µF 16V	1 off	C1
IC	CD4094BE	1 off	IC1
IC	ULN2803A	1 off	IC2
Relay	BT47 pinout	8 off	RL1-8
Header Plug	10 pin R/A	1 off	PL1
Header Skt	10 pin R/A	1 off	SK1
Header Plug	10 pin HE14	1 off	PL2
Veropins	Single sided	50 off	Relay external connections
Tinned Copper Wire		As Reqd	Tinned Copper Links (TCL)
Spacers	M3 x 3mm	2 off	

Circuit Diagram.



PCB Overlay



PCB Layout