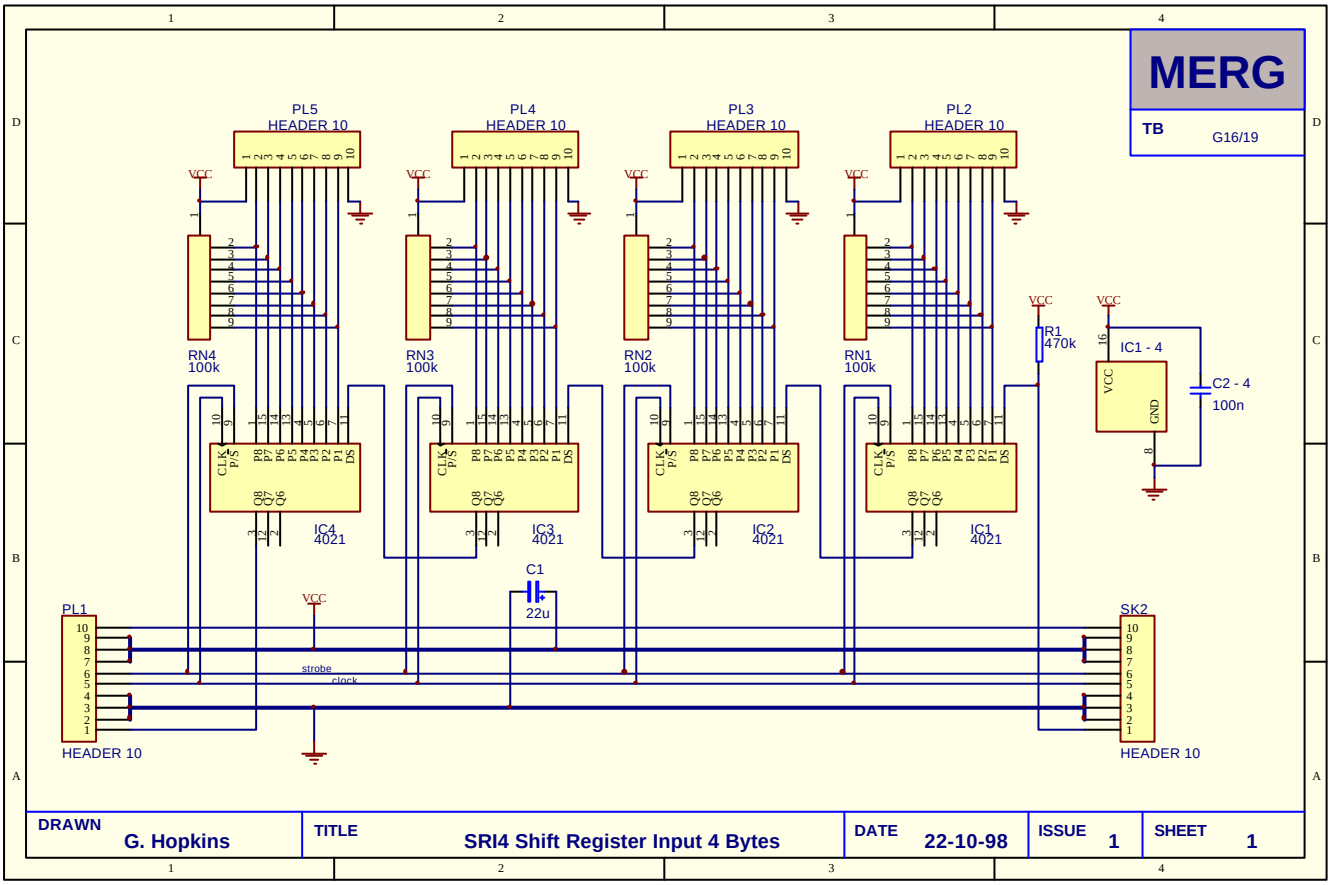
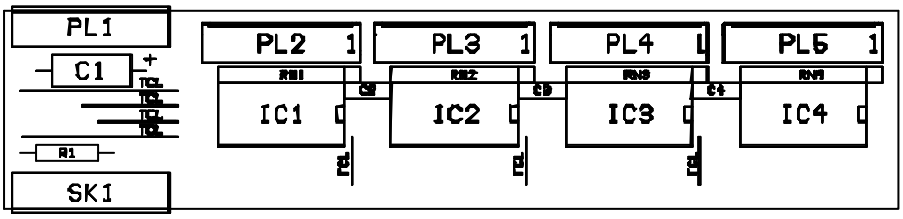
Parts List

Resistor	470k 1/8W	1 off	R1	
Resistor Network	100k x 8 SIL	4 off	RN1,2,3,4	
Capacitor	22µF 16V	1 off	C1	
Capacitor	100nF	3 off	C2 to 4	
IC	CD4021BE	4 off	IC1 to 4	
Header Plug	10 pin R/A	1 off	PL1	
Header Skt	10 pin R/A	1 off	SK2	
Header Plug	10 pin Straight	4 off	PL2 to 5	
Crimp Skt Housing	10 pin	4 off	for PL2 to 5	
Crimp Terminals		40 off	External Wiring connections	
Tinned Copper Wire		As Reqd	Tinned Copper Links (TCL)	
Spacers	M3 x 4mm	2 off		

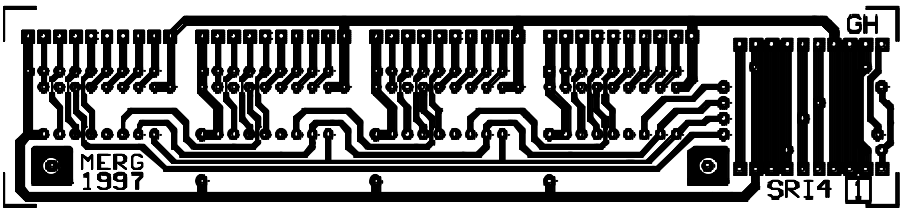
Circuit Diagram.



PCB Overlay (not to scale)



PCB Layout (not to scale)



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MERG Model Electronic Railway Group

TECHNICAL BULLETIN G16/19
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Gordon Hopkins [M328]

SRI4 Shift Register Input 4 Bytes — February 1999

Introduction.

To ensure correct operation of certain remotely contolled layout accessories such as point motors, it is necessary and desirable to have the ability to read back a signal from them which confirms (or otherwise) that the requested action has taken place. Indeed, for fully interlocked systems, especially automatic ones, these indications play an essential role in providing the processing system with its 'view' of the world.

The module shown here provides thirty-two independent TTL, 5V CMOS and Open-Collector compatible inputs, which can be used for any desired function. Further input buffer circuitry (Level Shifters, Opto-Couplers, Resistive Dividers for example) would allow virtually any device to be monitored. Manually operated switches can also be input via this module to provide an alternative 'User Input' to the more conventional keyboard/mouse combination by use of some suitably written software. The module is designed to be Control Panel mounted, as part of an RPC system.

Interface Specifications.

- **Power Requirements** +5V DC Regulated Supply derived from RPC Stack
- **Control Output** RPC Shift Register Compatible.
- **Input Level** TTL, 5V CMOS and Open Collector compatible with 100k Internal pull-up.
- **Connectors** RPC Stacking plus 'Molex' Connectors for external wiring.
- **Logic Polarity** Direct correspondence i.e. '1' on Input = '1' in Output Register, '0' ditto.

Circuit Description.

The 32 bit input signals are connected in groups of eight at connectors PL2 to PL5. Each of these connectors also provides 0V and +5V pins which can be used externally for powering LEDs or similar low power purposes. Each input pin is pulled-up to +5V by resistor networks RN1 to RN4. These allow simple Open-Collectors or 0V-based switches to be connected directly, and also serve as protection for unused inputs. The input signals then pass to the Parallel-to-Serial Shift Registers IC1 to IC4 (4021), which are read by the connected RPI Module using the standard RPC shift register stacking method. Within the module, the devices are cascaded together, using the pins provided for this purpose. The External Cascade input passes via SK1 to the next module in the stack, and is protected by R1 which acts as a pull-up to +5V. This is provided in case one of these modules happens to be the last in the stack.

The connector pin numbering on the SRI4 Printed Circuit Board is much simpler than on the corresponding four byte output module, the SRO4. However, to minimise the number of wire links required, the first input register read by the RPI is the one at the far end of the board, i.e. IC4 / PL5. This also means that the actual PCB layout of the IC's is apparently reversed relative to the conventionally drawn Circuit Diagram, i.e. IC4 is on the right-hand side of the PCB, whereas it is shown on the left-hand side of the Circuit diagram.

Connector Bit Assignments

PIN	PL2	PL3	PL4	PL5
1	+5V	+5V	+5V	+5V
2	24	16	8	0
3	25	17	9	1
4	26	18	10	2
5	27	19	11	3
6	28	20	12	4
7	29	21	13	5
8	30	22	14	6
9	31	23	15	7
10	0V	0V	0V	0V

The bit numbers shown in the table, left, represent the order in which the Bits are read out from the module. Note that Bits are numbered from 0 to 31, not from 1 to 32 as you might expect. This follows the base zero numbering convention for this type of control system, and the PC communication software works in this manner too. For example, Bit 0 (PL5 pin 2) is the first Bit read by the PC via the associated Remote Panel Interface (RPI) module into the SRO4, and Bit 31 (PL2 pin 9) is the 32nd. This module adds four to the number of bytes allocated to the Interface Module when System Initialisation is performed. See Tech. Bull. G16/5 for more information on these aspects of System Setup.

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