RPC Remote Panel Control

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Overview

A system for the remote control of model railway layouts, devised by long term MERG member Gordon Hopkins.
The system consists of a PC interface module known as the RPIC (or RPI, see below) and a number of general purpose or special purpose Input/Output modules designed to plug directly to the interface, or one another, forming what is refered to as a module 'Stack'. Options also exist to use the Input/Output modules without a PC interface. The system is documented in the MERG TB series G16...

RPI

Early versions of the Remote Panel Interface were based on the Intel 8051 and came in two versions RS232 (single drop) and RS485 (multi drop), the RS485 version had a 4 way DIL address switch.

RPIC

Remote Panel Interface PIC, is the current version and is based on the Microchip PIC range of microcontrollers. A single PCB design caters for RS232, RS485 or USB depending on the components fitted. Although USB is provided for, development has not progressed beyond proof of concept, using one USB interface several other RS485 interfaces can be daisy chained from it.

Protocol

The communication protocol is based on having a number of 'message types' which are defined in the header, along with the board address for the multidrop system. Most commonly used of these is type 0 which transmits data for the entire stack of modules and receives data back from all modules. Other message types allow writing and reading of single bits or bytes of data. Type F messages were developed for use specifically with the USB version to take account of the limited packet size available with USB1.

The Stack

Connectors on the stack modules carry power lines 0V and +5V for the electronics on each board, attached devices may require separate supplies. There are four control lines, these are Data out, Data in, Clock and Strobe. When the interface receives a message the Strobe line is activated in order to read the current state of Inputs into the shift registers. The Clock is then activated in multiples of 8 pulses and data is sent out and received by the interface. When shifting is complete the Strobe line is activated again to output the new data to the layout devices. See here for an illustrated explanation of Shift Register operation.

PTP

Point to Point, is the designation for a self contained RPC system consisting of two identical PTP interface modules connected by a 4 pair (cat 5) data cable. One module is fitted with a link that designates it as the Master which controls the data flow to and from the Slave module. Each of these modules has a 'stack' where the Input on one module matches the Output on the other and vice versa. Thus an input change at one end becomes an output change at the other end. The PTP system operates independently, requiring no computer interface module, and accommodates up to 960 inputs and outputs from both ends simultaneously, with an update rate of approximately 20 times per second.

Links

Layouts using RPC
Carstairs at the Nottingham club.
Around Carstairs from the cab
Andi Dell's Dagworth at The Model Railway Club's Keen House open day in September 2005.
Andi Dell's Dagworth taken at the Model Rail Scotland show 2010 in Glasgow.
Andi Dell's Dagworth layout, at Model Rail Scotland show 2010
Horton presented by the late Stephen Parascandolo.
MERG Demo stand

rpc, electronics, public

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