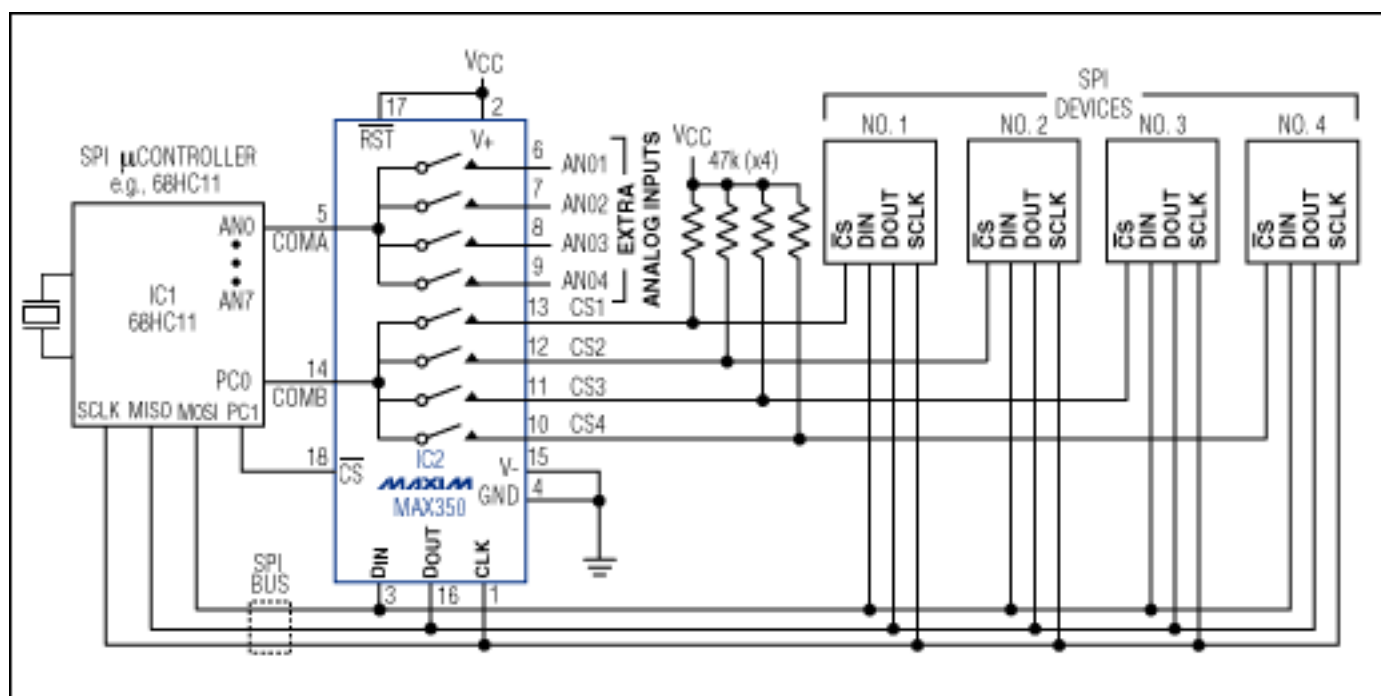


Serial-Control Multiplexer Expands SPI Chip Selects

SPI™ and MICROWIRE™ buses offer a popular and convenient means for minimizing the number of wires required in connecting smart peripherals to a microcontroller (μC). These synchronous buses comprise a serial-clock, data-in, and data-out line in addition to a chip-select line for each peripheral.

A scheme of one chip-select line per device, however, can quickly use up the precious port pins in a μC system. To mitigate this situation, the dual 4-channel analog multiplexer in the figure below (an SPI device itself) multiplexes a single port pin (PC0) to provide chip selects for four other SPI peripherals in the system. A second port pin (PC1) selects the multiplexer.



A dual 4-channel multiplexer expands the number of input channels and chip-select lines that this microcontroller can support.

All switches in this multiplexer are bidirectional. Its two sections are independent, and either output (unlike those of conventional differential multiplexers) can be programmed to connect to any, all, or none of its four input channels. Thus, the second (top) section is employed independently of the lower section to expand the number of analog channels available to the μC. The μC's internal multiplexer supports eight channels, so this scheme (using one to get four

more) yields a total of 11 input channels.

By operating "backwards," the lower 4:1 mux routes the PC0 signal to the CS-bar input of a selected peripheral. Driving PC0 low selects that peripheral for receiving SPI data, and driving PC0 high deselects all four peripherals. Read and write sequences are the same as in regular SPI systems, except the chip selects must be set up beforehand. PC0 then goes low, the read/write operation is executed, and PC0 returns high to deselect the device.

This procedure is not burdensome in practice. Typical SPI systems include a device that is serviced often (such as a display driver) and several others that require service only occasionally (such as EEPROMs or real-time clocks). Thus, the chip-select mux can leave the heavily used device selected most of the time and perform an update only when selecting a new device.

To accommodate other combinations of chip-select and analog-expansion lines, replace the MAX350 with a similar device such as the MAX395, whose eight serially addressed SPST switches can be configured as required.

SPI is a trademark of Motorola, Inc.
MICROWIRE is a trademark of National Semiconductor Corp.

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More Information

MAX350: [QuickView](#) -- [Full \(PDF\) Data Sheet](#) -- [Free Samples](#)